

Norwalk-La Mirada Unified School District
La Mirada High School
Existing Ramp & Retaining Walls Rehabilitation Project
13520 Adelfa Drive, La Mirada, CA 90638

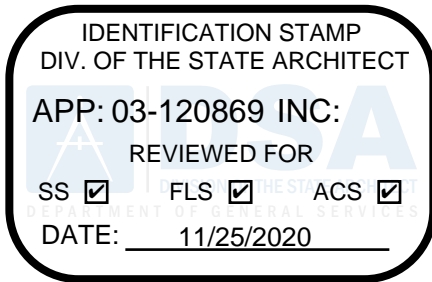
TECHNICAL SPECIFICATIONS
VOLUME 1 of 1

NAC|Architecture

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161-19015

DSA Application No.
03-120869

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NOT APPLICABLE

ACRONYMS CONSULTANTS

ARCHITECT: NAC ARCHITECTURE
CIVIL ENGINEER: BRANDOW & JOHNSTON
STRUCTURAL ENGINEER: BRANDOW & JOHNSTON

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SECTION 00 32 31
GEOTECHNICAL DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. A Geotechnical Investigation was conducted at the site, with the results listed in the following document:
 - 1. Title: Geotechnical Study Report: Proposed New Football Stadium Project.
 - a. Prepared by: Converse Consultants, 717 South Myrtle Avenue, Monrovia CA 91016, T. 626-930-1200.
 - b. Project No.: 19-31-285-01
 - c. Date: October 24, 2019.
- B. A copy of the document may be inspected by prospective bidders at the Architect's office during regular business hours or may be obtained from the Geotechnical Engineer or the Owner.
- C. The document was obtained only for the Architect's use in design. Neither the Owner nor the Architect guarantees the information contained in the report. Report and log of borings are available for the Contractor's information but are not a warranty of subsurface conditions or continuity between soil borings.

END OF SECTION

DIVISION 01

GENERAL REQUIREMENTS

SECTION 01 17 00

OWNER-FURNISHED PRODUCTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes procedural requirements for the processing, installation, connection, testing and adjustment of Owner-furnished equipment to be installed by the Contractor.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Scheduling and sequencing: Deliver backing and embedments, including templates and instructions for their installation, to affected trades before affected construction begins.
- B. Coordination: Coordinate installation of OFCI items appliances with the work of related trades for necessary rough-in work, backing, supports and anchorage.

1.3 REFERENCES

A. Definitions:

- 1. Symbol definitions: "O" designates the Owner; "C" designates the Contractor.
- 2. Symbol responsibility:
 - a. OFCI: Furnished by the Owner, installed by the Contractor.
 - b. OFOI: Furnished by the Owner, installed by Owner.
 - c. CFCI: Furnished by the Contractor, installed by the Contractor.

1.4 SUBMITTALS

- A. Obtain all necessary information from Owner, in a timely manner, as to manufacturer, model, required accessories, both those furnished by the Owner and those to be provided by the Contractor to complete the installation of each OFCI item.
- B. Shop Drawings:
 - 1. The Owner will furnish Shop Drawings showing dimensioned rough-in diagrams for each OFCI item requiring utility connections, dimensioned locations of backing plates required in walls and partitions, and details of connections to supports for all OFCI items. The Owner will furnish wiring diagrams where appropriate.
 - 2. It is the Contractor's responsibility to promptly notify the Owner of errors and discrepancies in the Shop Drawings.
- C. Closeout submittals: Include Owner-furnished operation, adjustment, care and maintenance instructions for each item of OFCI equipment installed.

1.5 HANDLING

- A. OFCI items will be delivered "tail-gate" FOB jobsite.
- B. Contractor shall receive and unload the OFCI items, place them in covered storage or enclosed building(s), and be responsible therefore after delivery. Contractor shall provide a written receipt at time of delivery, noting visible defects or omissions; refer to Paragraph D below for opening and uncrating of OFCI items.
- C. OFCI items that are damaged, abused, lost, or stolen while in Contractor's custody and control, or damaged or defaced during installation shall be repaired, replaced, or otherwise made good to the Owner's satisfaction at the Contractor's expense.

- D. Within 5 days after delivery of the OFCI items, open and uncrate the OFCI items for inspection.
 - 1. The Owner and Contractor shall inspect each item and maintain a written record of all damage, missing parts, and other defects disclosed, all of which will be made good by the Owner.
 - 2. After the inspection, Contractor shall be solely responsible for the equipment as specified above.

1.6 CONTRACTOR'S RESPONSIBILITIES

- A. General: Contractor is responsible for correct and properly located installation of the OFCI items in compliance with their manufacturers' specifications and instructions.
 - 1. If a conflict occurs between manufacturer's instructions and actual field conditions, do not install the affected items until the conflict is resolved. No additional payment will be made to the Contractor for correction of improper installation of OFCI items when reasonably adequate data and instructions for installation were furnished by the Owner or the OFCI item manufacturers.
 - 2. Contractor may request and receive from the Owner necessary additional information, such as specifications, templates, and like items from any of the manufacturers of the OFCI items. When specified, the Contractor shall request a manufacturer's representative to supervise installation of OFCI items, but at no additional cost to Owner.
- B. Installation materials: Provide attachments, fittings, fasteners, connectors, and other ancillary materials required to make complete, workable installations.
- C. Compatibility with space and service requirements:
 - 1. Space limitations, and mechanical and electrical services indicated and specified in other Sections are compatible with OFCI items.
 - 2. Modifications to OFCI items required to conform to space limitations or with utility services specified for rough-in shall not cause additional cost to the Owner.
- D. Provide mounting and utility rough-in for equipment where required.
 - 1. If the Owner substitutes items similar to those scheduled, there shall be no change in rough-in cost, unless substitution occurs after rough-in is completed or rough-in involves other mounting requirements, utilities or utilities different capacity from that required by item originally specified.
- E. Keep and store templates furnished by various OFCI item manufacturers at the site for reference. Make readily available to both the Owner and Architect. Deviations from manufacturers' templates are not acceptable.
- F. Contractor may request, and receive from the Owner, reasonable additional information, specifications, templates, and like items from the manufacturers of the OFCI items. The Contractor may request a manufacturer's representative to supervise installation of OFCI items, but at no additional cost to Owner.

1.7 OWNER'S RESPONSIBILITIES

- A. The Owner will furnish to the Contractor, manufacturer, model and type of each OFCI item to be furnished by the Owner.
- B. The Owner will purchase the OFCI items and arrange for their delivery at the job site as specified above.
- C. Owner will make available manufacturer's literature or information showing required mounting and rough-in information.
- D. The Owner will coordinate deliveries of OFCI items with the Contractor to coincide with construction schedule.

PART 2 - PRODUCTS

2.1 OFCI EQUIPMENT

- A. List: The list of OFCI items is as follows.
 - 1. Ice Machine (11 .001)
 - 2. Refrigerator (11.002)
 - 3. Toilet rooms:
 - a. Paper towel dispensers.
 - b. Liquid soap dispensers.
- B. Installation materials: Provide attachments, fittings, fasteners, connectors, and other ancillary materials required for installations but not usually furnished by the OFCI item manufacturers, of types approved or acceptable to the equipment manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that conditions are satisfactory for the installation of equipment.
- B. Correct unsatisfactory conditions before starting installation.

3.2 INSTALLATION

- A. Comply with each OFCI item manufacturer's specifications, templates, and information, including the necessary assembling of components or sub-assemblies.
- B. Install OFCI items securely in place, plumb, level (where applicable), rigidly or flexibly mounted in compliance with their manufacturer's instructions and approved Shop Drawings, including the necessary assembling of components or sub-assemblies. Where so specified, install OFCI items under the supervision of the manufacturer's authorized representative.
- C. Make electrical and mechanical connections indicated and required.
- D. Touchup and restore damaged or defaced finishes.

3.3 ADJUSTING/CLEANING/PROTECTING

- A. Employ approved manufacturer's factory-trained service engineer to test equipment and make required adjustments for proper operation.
- B. Operate and test each operable OFCI item when installed and connected in the presence of the Owner and equipment manufacturer. If malfunction occurs through no fault of the Contractor, the Owner will make the defect good; otherwise, the Contractor shall make the necessary corrections, so the item operates properly and as intended, at the Contractor's expense.
- C. Repair or replace items not functioning properly or not acceptable to the Owner.
- D. Upon completion of installation, clean OFCI items in compliance with their manufacturer's printed instructions and the provisions of Section 01 71 00 and protect from damage until Substantial Completion.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Administrative and procedural requirements for submittals required for the Work, including but not limited to; Shop Drawings, Product Data, Samples, material lists, and quality control items.
- B. Throughout the Contract Documents, the minimum acceptable quality of materials, fabrication, and execution have been defined by the name and catalog number of a manufacturer and by reference of recognized industry standards.
- C. To ensure that specified products are furnished and installed in accordance with the design intent, procedures have been established for submittal of design data and for its review by Architect, OAR and others.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 PROCEDURES

- A. Contractor is required to review and approve every submittal and shop drawing prior to transmittal and delivery to Architect. Should Contractor determine a submittal contains errors, or does not meet the requirements of the contract, Contractor shall immediately return the submittals and shop drawings to the producer and expedite the corrections prior to transmitting the submittal to Architect. Submittals shall not be used by Contractor to request clarifications or submit questions. Contractor will affix stamp to each submittal certifying Contractor has performed, at minimum, the following:
 - 1. Verified the submittal is complete in all respects and follows the requirements of the Contract Documents without variance.
 - 2. Confirmed that no substitutions have been included. If substitutions are included, Contractor shall eliminate them from the submittal and process them in accordance with Section 00 70 00 General Conditions Article 6.14.
 - 3. Identified any variances from the requirements of the Contract Documents and confirmed that the identified variance meets but does not exceed the allowable limitations or tolerances as defined in these specifications.
 - 4. Verified that all submitted materials, dimensions and tolerances are compatible with existing or planned conditions of the Work in order to erect, fabricate, or install the submitted assembly in conformance with the requirements of the Contract Documents.
 - 5. Coordinated and verified that the dimensions match Contractor measured field or installation conditions.
 - 6. Coordinated and verified that the products of separate manufacturers required within any field produced assembly are compatible in all respects for such assembly.
 - 7. Packaged together all related submittals or shop drawings where such is necessary for a comprehensive Architect review.
- B. Contractor shall package each submittal appropriately for transmittal and handling. Transmittal format shall be as required by Owner. Contractor shall transmit and deliver six sets of each submittal or re-submittal to Architect, two of which shall be returned to Contractor. Some specifications may require additional copies be provided. Contractor shall provide the Owner additional copies as specified or as requested by OAR. Architect will not accept submittals received from sources other than from Contractor.

- C. After Architect's review, Architect will transmit submittals to OAR and OAR shall further distribute to Contractor, Inspector and others as required. Work shall not commence, unless otherwise approved by OAR, until approved submittals are transmitted to Contractor.
- D. Contractor shall clearly identify any deviations from the Contract Documents on each submittal. Any deviation not so noted even though stamped reviewed is not acceptable.
- E. Contractor shall coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities requiring sequential activity.
- F. Timing of Submittals:
 - 1. In accordance with General Conditions, Contractor shall submit to Architect, with copy of transmittal to the OAR, those Shop Drawings, Product Data, diagrams, materials lists, Samples and other submittals required by the Contract Documents.
 - 2. The scheduling of submittals shall be sequenced to support the progress of the Work, and shall be:
 - a. Submitted sufficiently in advance of construction, fabrication or installation in order to allow time for transmittal, review, modification, correction, (and resubmission and re-review when required.)
 - b. Phased with adequate time between submittals in order to allow for proper review by the Architect without negative impact to the Milestones Schedule.
 - 3. Contractor shall coordinate submittal of related items and Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received by Architect.
 - 4. Contractor shall revise, update and submit submittal schedule to Architect and OAR on the first of each month, or as required by OAR.
 - 5. Contractor shall allow in the Construction Schedule, at least sixteen days for Architect review following Architect receipt of submittal. For mechanical, plumbing, electrical, low voltage, fire sprinklers, door and hardware, and other submittals requiring joint review with OAR, Contractor shall allow a minimum of eighteen days following Architect receipt of submittal. Deferred approval items shall be allowed additional time for DSA review.
 - 6. No adjustments to the Contract Time or Milestones will be authorized because of a failure to transmit submittals to Architect sufficiently in advance of the Work to permit review and processing or where Contractor fails to provide Architect submittals on related items.
 - 7. In case of product substitution, Shop Drawing preparation shall not commence until such time as Owner accepts or rejects the proposed substitution in accordance with the procedures described in the General Conditions.
- G. If required, resubmit submittals in a timely manner. Resubmit as specified for initial submittal but identify as such. Review times for re-submitted items shall be as per the time frames for initial submittal review.
- H. Shop Drawing preparation shall not commence until such time as Contractor receives Product Data acceptance.
- I. Architect will stamp each submittal with a uniform, action stamp. Architect will mark the stamp appropriately to indicate the action taken, as follows:
 - 1. Final Unrestricted Release: When Architect marks a submittal "Reviewed" the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
 - 2. Final-But-Restricted Release: When Architect, or authorized agent, marks a submittal "Reviewed as Noted," the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
 - 3. Returned for Re-submittal: When Architect, or authorized agent, marks a submittal "Rejected, Revise and Resubmit," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat as necessary to obtain different action mark. In case of multiple submittals covering same items of Work, Contractor is responsible for any time delays, schedule disruptions, out of sequence Work, or additional costs due to multiple

submissions of the same submittal item. Do not use, or allow others to use, submittals marked "Rejected, Revise and Resubmit" at the Project site or elsewhere where Work is in progress.

4. Other Action: Where a submittal is for information or record purposes or special processing or other activity, Architect, or authorized agent, will return the submittal marked "Action Not Required".

3.2 SHOP DRAWINGS

- A. Shop Drawings are original drawings prepared by Contractor, Sub-contractor, supplier, or distributor illustrating some portion of Work by showing fabrication, layout, setting, or erection and shall not be based on reproduced Contract Documents or copied standard information.
- B. Produce Shop Drawings to an accurate scale that is large enough to indicate all pertinent features and methods. Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 24 by 36 inches.
- C. Shop Drawings shall include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:
 1. Dimensions.
 2. Identification of products and materials included by sheet and detail number.
 3. Compliance with specified standards.
 4. Notation of coordination requirements.
 5. Notation of dimensions established by field measurement.
- D. Provide a space of approximately 4 by 5 inches on the label or beside the title block on Shop Drawings to record Contractor and Architect review, and the action taken. Include the following information on the label for processing and recording action taken:
 1. Project name.
 2. Date.
 3. Name and address of Architect.
 4. Name and address of Contractor.
 5. Name and address of Subcontractor.
 6. Name and address of supplier.
 7. Name and address of manufacturer.
 8. Name and title of appropriate Specification section.
 9. Drawing number and detail references, as appropriate.
- E. Unless otherwise agreed to or indicated in individual Specification sections, submit a sufficient number of sets to allow for adequate distribution to Contractor, Sub-Contractor, supplier, manufacturer and fabricators plus four (4) sets (two sets to be retained by Architect, one set to the Inspector and one set to OAR).

3.3 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of Work or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, wiring diagrams, schedules, illustrations, or performance curves.
 1. Mark each copy to show or delineate pertinent materials, products, models, applicable choices, or options. Where Product Data includes information on several products that are not required, clearly mark copies to indicate the applicable information. Include the following information:
 - a. Manufacturer's printed recommendations.
 - b. Compliance with trade association standards.
 - c. Compliance with recognized testing agency standards.
 - d. Application of testing agency labels and seals.
 - e. Notation of dimensions verified by field measurement.
 - f. Notation of coordination requirements.
 - g. Notation of dimensions and required clearances.

- h. Indicate performance characteristics and capacities.
 - i. Indicate wiring diagrams and controls.
2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed by Contractor.

B. Required Copies and Distribution: Same as denoted in Article 3.02.E.

3.4 SAMPLES

A. Procedure:

1. Submit Samples of sufficient size, quantity, cured and finished and physically identical to the proposed product or material. Samples include partial or full sections or range of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches denoting color, texture, and/or pattern.
 - a. Mount or display Samples in the manner to facilitate review of qualities indicated. Include the following:
 - 1) Specification section number and reference.
 - 2) Generic description of the Sample.
 - 3) Sampling source.
 - 4) Product name or name of manufacturer.
 - 5) Compliance with recognized standards.
 - 6) Availability and delivery time.
2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
 - a. Where variations in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least three (3) multiple units that show the approximate limits of the variations.
 - b. Refer to other Specification sections for requirements for Samples that illustrate materials, fabrication techniques, assembly details, connections, operation, and similar construction characteristics.
 - c. Refer to other sections for Samples to be returned to Contractor for incorporation into the Work. Such Samples must be undamaged at time of installation. On the transmittal indicate special requests regarding disposition of Sample submittals.
 - d. Samples not incorporated into the Work, or otherwise not designated as Owner property, remain the property of Contractor and shall be removed from the Project site prior to Substantial Completion.
3. Color and Pattern: Whenever a choice of color or pattern is available in a specified product, submit accurate color chips and pattern charts to OAR for review and selection.
4. Number Required: Submit six, minimum, of each. Two will be returned to Contractor.

B. When specified, erect field Samples and mock-ups at the Project site to illustrate products, materials, fabrications, or execution and to establish standards by which completed Work shall be judged.

C. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of the Work. Sample sets may be used to obtain final acceptance of the Work associated with each set.

3.5 QUALITY CONTROL SUBMITTALS

- A. Submit quality control submittals, including design data, certifications, manufacturer's field reports, and other quality control submittals as required under other sections of the Contract Documents.
- B. When other sections of the Contract Documents require manufacturer's certification of a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.
- C. Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the represented company.

- D. Requirements for submittal of inspection and test reports are specified in other sections of the Contract Documents.

END OF SECTION

SECTION 01 45 23

TESTING AND INSPECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Testing and inspection services to meet requirements of the California Building Code (CBC) and the Division of the State Architect (DSA).

1.2 ADMINISTRATIVE REQUIREMENTS

- B. Laboratories performing testing shall have DSA's Laboratory Evaluation and Acceptance Program approval prior to providing material testing or special inspection services.
- C. Tests of materials and inspections shall be in accordance to Section 4-213 through 4-219 of the California Building Standards Commission's, California Administrative Code.
- D. Required material testing, inspections and special inspections are indicated on the DSA approved DSA-103, Listing of Structural Tests & Special Inspections (T&I List). OAR will provide CONTRACTOR copy of DSA-103.

1.3 TESTS

- A. OWNER will contract with a DSA approved testing laboratory to perform the testing indicated on the Contract Documents, including the Tests and Special Inspections (T&I) list.
- B. Selection of material to be tested shall be by the Testing Laboratory and not by CONTRACTOR.
- C. Any material shipped from the source of supply prior to having satisfactorily passed such testing and inspection, or prior to the receipt of notice from Project Inspector such testing and inspection is not required, shall not be incorporated into the Work.
- D. OWNER will select, and directly reimburse, the Testing Laboratory for costs of all DSA required tests and inspections; however, the Testing Laboratory may be reimbursed by CONTRACTOR for such costs as specified or noted in related sections of the Contract Documents.
- E. The Testing Laboratory is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
- F. The Testing Laboratory shall not perform any duties of CONTRACTOR.
- G. CONTRACTOR shall provide an insulated curing box with the capacity for twenty concrete cylinders and will relocate said box and cylinders as rapidly as required in order to provide for progress of the Work.

1.4 TEST REPORTS

- A. Test reports shall include all tests performed, regardless of whether such tests indicate the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations, when and as required, shall also be reported. Reports shall indicate the material (or materials) was sampled and tested in accordance with requirements of CBC, Title 24, Parts 1 and 2, as indicated on the Contract Documents. Test reports shall indicate specified design strength and specifically state whether or not the material (or materials) tested comply with the specified requirements.

1.5 VERIFICATION OF TEST REPORTS

- A. Each Testing Laboratory shall submit to the Division of the State Architect, in duplicate, a verified report covering all tests required to be performed by that agency during the progress of the Work. Such report, covering all required tests, shall be furnished prior to Substantial Completion and/or, when construction on the Work is suspended, covering all tests up to the time of Work suspension.

1.6 INSPECTION BY OWNER

- A. OWNER, and its representatives, shall have access, for purposes of inspection, at all times to all parts of the Work and to all shops wherein the Work is in preparation. CONTRACTOR shall, at all times, maintain proper facilities and provide safe access for such inspection.
- B. OAR shall have the right to reject materials and/or workmanship deemed defective Work and to require correction. Defective workmanship shall be corrected in a satisfactory manner and defective materials shall be removed from the premises and legally disposed of without charge to OWNER. If CONTRACTOR does not correct such defective Work within a reasonable time, fixed by written notice and in accordance with the terms and conditions of the Contract Documents, OWNER may correct such defective Work and proceed in accordance with related Articles of the Contract Documents.
- C. CONTRACTOR is responsible for compliance to all applicable local, state, and federal regulations regarding codes, regulations, ordinances, restrictions, and requirements.

1.7 PROJECT INSPECTOR

- A. A Project Inspector will be employed by OWNER in accordance with requirements of Title 24 of the California Code of Regulations with their duties specifically defined therein. Additional DSA Special Inspectors may be employed and assigned to the Work by OWNER in accordance with the requirements of the CBC and DSA.
- B. Inspection of Work shall not relieve CONTRACTOR from any obligation to fulfill all terms and conditions of the Contract Documents.
- C. CONTRACTOR shall be responsible for scheduling times of inspection, tests, sample taking, and similar activities of the Work.

EDIT NOTE: DELETE TESTS AND INSPECTIONS NOT REQUIRED FOR THE PROJECT. IF NEEDED, INCLUDE ADDITIONAL TESTS AND INSPECTIONS. VERIFY THAT TESTS AND INSPECTIONS ON THE SPEC MATCH DSA FORM 103, LIST OF REQUIRED STRUCTURAL TESTS AND INSPECTIONS.

1.8 STRUCTURAL TESTS AND SPECIAL INSPECTIONS

- A. Soils:
 - 1. General: Periodic inspection by Geotechnical Engineer for verification of the following construction activities in conformance to CBC Table 1705A.6:
 - a. Site has been prepared properly prior to placement of controlled fill and/or excavations for foundations.
 - b. Foundation excavations are extended to proper depth and have reached proper material.
 - c. Materials below footings are adequate to achieve the design bearing capacity.
 - 2. Compacted Fills: Testing and inspections shall be in conformance to Table 1705A.6:
 - a. Geotechnical Engineer will continuously verify the use of proper materials and inspect lift thicknesses, placement, and compaction during placement of fill.
 - b. Testing Laboratory under the supervision of the Geotechnical Engineer will:

- 1) Perform qualification testing of fill materials.
 - 2) Test the compaction of fill.
3. Driven Deep Foundations (Piles): Testing and inspections shall be in conformance to Table 1705A.7:
- a. Continuous inspections by Geotechnical Engineer:
 - 1) Verify pile materials, sizes and lengths comply with the requirements.
 - 2) Inspect driving operations and maintain complete and accurate records for each pile.
 - 3) Verify locations of piles and their plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and record any pile damage.
 - b. Testing Laboratory under the supervision of the Geotechnical Engineer will determine capacities of test piles and conduct additional load tests as required.
 - c. Steel piles: Tests and inspections will be as indicated on paragraphs below for structural steel.
 - d. Concrete piles and concrete filled piles: Tests and inspections will be as indicated on paragraphs below for concrete.
4. Cast-in-place Deep Foundations (Piers): Continuous inspections by Geotechnical Engineer in conformance to Table 1705A.8:
- a. Inspect drilling operations and maintain complete and accurate records for each pier.
 - b. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, and embedment into bedrock (if applicable). Record concrete or grout volumes.
 - c. Confirm adequate end strata bearing capacity.
 - d. Concrete Piers: Tests and inspections will be as indicated on paragraphs below for concrete.
5. Retaining Walls:
- a. Continuous inspections by Geotechnical Engineer:
 - 1) Placement, compaction and inspection of soil per CBC Section 1705A.6.1 for fills supporting foundations.
 - 2) Segmental retaining walls; inspect placement of units, dowels, connectors, etc.
 - b. Concrete Retaining Walls: Provide tests and inspections as indicated on paragraphs below for concrete.
 - c. Masonry Retaining Walls: Provide tests and inspections as indicated on paragraphs below for masonry.
- B. Concrete:
1. Cast in Place Concrete: Inspection and testing in conformance to CBC Table 1705A.3:
 - a. Inspection of reinforcement, including prestressing tendons and verification of placement, per ACI 318, sections 25.2, 25.2, 25.5.1 through 26.5.3.
 - b. Reinforcing bar welding: Inspect per AWS D1.4, ACI 318 26.5.4.
 - 1) Verification of weldability of reinforcing bars other than ASTM A706.
 - 2) Inspect single-pass fillet welds, maximum 5/16".
 - 3) Inspect all other welds.
 - c. Inspect anchors cast in concrete per ACI 318, section 17.8.2.

- d. Inspect anchors post-installed in hardened concrete members:
 - 1) Continuous inspection of adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads, per ACI 318, section 17.8.2.4.
 - 2) Mechanical anchors and adhesive anchors, not defined in previous paragraph, per ACI 318, section 17.8.2.
 - e. Design Mix:
 - 1) Verify use of required mix, per ACI 318, chapter 19 and sections 26.4.3 and 26.4.4.
 - 2) Batch Plant Inspection: The quality and quantity of materials used in transit-mixed concrete and in batched aggregates shall be continuously inspected as required by CBC section 1705A.3.2. If approved by DSA, batch plant inspection may be reduced to periodic if plant complies with CBC section 1705A3.3.1, item 1, and requires first batch inspection, weightmaster, and batch tickets.
 - f. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete, per ASTM C172, ASTM C31, ACI 318, sections 26.4.5 and 26.12.
 - g. Inspect concrete and shotcrete placement for proper application techniques, per ACI 318, section 26.4.5.
 - h. Verify maintenance of specified curing temperature and techniques per ACI 318 sections 26.4.7 through 26.4.9 and CBC section 1908.9.
 - i. Inspect prestressed concrete for:
 - 1) Application of prestressing forces, per ACI 318 section 26.9.2.1
 - 2) Grouting of bonded prestressing tendons per ACI 318 section 26.9.2.3.
 - j. Inspection of erection of precast concrete members per ACI 318 chapter 26.8.
 - k. Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs per ACI 318 section 26.10.1.b.
 - l. Sampling and testing of reinforcing steel per ASTM A370, DSA IR 17-10 and CBC section 1910A.2. CONTRACTOR shall submit mill certificate indicating compliance with requirements for reinforcement, anchors, ties, and metal accessories.
2. Prestressed Concrete: In addition to the tests and inspections required for concrete listed above, the following tests and inspections will performed:
- a. Testing Laboratory will test prestressing tendons and anchorages per CBC section 1910A.3 and ASTM A370.
 - b. Special Inspector will check the materials, equipment, tensioning procedure and inspect placement of prestressing tendons and construction, per CBC section 1705A.3.4.
 - c. Special Inspector will verify in-situ adequate concrete strength prior to stressing tendons.
 - d. Continuous inspection by Special Inspector of application of prestressing forces and grouting of bonded prestressing tendons, per CBC section 1705A.3.4.
3. Precast Concrete: In addition to the tests and inspections required for concrete listed above, the following tests and inspections will be performed:
- a. Continuous inspection by Special Inspector of fabrication of precast concrete members.

- b. Inspection of erection of precast concrete members per ACI 318, chapter 26.8.
 - 4. Shotcrete: In addition to the tests and inspections required for concrete listed above, the following tests and inspections will be performed:
 - a. Continuous inspection by Special Inspector of placement of shotcrete per ACI 318 section 26.4.5.
 - b. Testing Laboratory will test strength of shotcrete in accordance to ASTM C1140 and ASTM C1604.
 - 5. Post-installed Anchors:
 - a. Special Inspector will inspect installation of post-installed anchors in hardened concrete members as required by CBC table 1705A.3, item 4.
 - 1) Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads, per ACI 318, section 17.8.2.4.
 - 2) Mechanical anchors and adhesive anchors not defined above, per ACI 318, section 17.8.2.
 - b. Testing Laboratory will test post-installed anchors in conformance to CBC section 1905A and ASTM E488.
- C. Structural Masonry:
 - 1. Material Verification and Testing:
 - a. Sampling and testing of reinforcing steel per ASTM A370, DSA IR 17-10 and CBC section 1910A.2. CONTRACTOR shall submit mill certificate indicating compliance with requirements for reinforcement, anchors, ties, and metal accessories.
 - b. Submit manufacturer's certificate of compliance for masonry units, mortar and grout materials. Test masonry units, mortar and grout (unit strength method).
 - c. Testing Laboratory will test masonry prisms in conformance with ASTM C1314.
 - d. Special Inspector will verify proportions of site-prepared, premixed or preblended mortar and grout, per ASTM C780.
 - e. Testing Laboratory will test core-drilled samples in conformance with CBC 2114.6.2.
 - 2. Inspection:
 - a. Special Inspector will continuously inspect preparation of prisms per ASTM C1314.
 - b. Special inspector will verify size, location and condition of dowels and construction supporting masonry.
 - c. Special inspector will verify size specified size, grade and type of reinforcement.
 - d. Special inspector will verify weldability of reinforcing bars other than ASTM A706. Special inspector to inspect reinforcing bar welding: Inspection to be in conformance with AWS D1.4, ACI 318 26.5.4.
 - e. Special inspector will inspect placement of reinforcement, connectors, masonry units and construction of mortar joints.
 - f. Special inspector will verify protection of masonry during cold weather temperature (temperature below 40° F) or hot weather (temperature above 90° F).
 - g. Special inspector will inspect type, size and location of anchors and all other items to be embedded in masonry, including other details of anchorage of masonry to structural members, frames and other construction.
 - h. Special inspector will inspect grout space prior to grouting and placement of grout.

3. Post-installed Anchors in Masonry:
 - a. Special inspector will inspect anchors cast in concrete per ACI 318, section 17.8.2.
 - b. Special inspector will inspect anchors post-installed in hardened concrete members:
 - 1) Continuous inspection of adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads, per ACI 318, section 17.8.2.4.
 - 2) Mechanical anchors and adhesive anchors, not defined in previous paragraph, per ACI 318, section 17.8.2.
 - c. Testing Laboratory will test post-installed anchors in conformance to CBC section 1905A and ASTM E488.

- D. Structural Steel:
 1. Special inspector will verify that all materials are properly marked in conformance with AISC 360, Section 3.3 and applicable ASTM standards.
 - a. Mill certificates indicating material properties that comply with requirements.
 - b. Materials, sizes, types and grades complying with requirements.
 2. Testing Laboratory will test unidentified materials in conformance with ASTM A370.
 3. Special inspector will examine seam welds of HSS shapes in conformance with DSA IR-17-3.
 4. Special inspections and non-destructive testing of structural steel elements shall be in conformance to CBC section 1705A.2.1.

- E. High Strength Bolts:
 1. Special inspector will verify identification markings and manufacturer's certificates of compliance conform to ASTM standards specified in the Contract Documents, per DSA IR 17-9.
 2. Testing Laboratory will test high-strength bolts, nuts and washers in conformance with ASTM F606, ASTM A370 and DSA IR 17-8.
 3. Special inspector will inspect bearing-type ("snug tight") bolt connections in conformance with AISC 360, section M2.5 and DSA IR 17-9.
 4. Special inspector will inspect slip-critical bolt connections in conformance with AISC 360, section M2.5.

- F. Welding:
 1. Verification of Materials, Equipment and Welders:
 - a. Special inspector will verify weld filler material identification markings per AWS designation listed on the Contract Documents and the WPS.
 - b. Special inspector will verify material manufacturer's certificate of compliance.
 - c. Special inspector will verify WPS, welder qualifications and equipment in conformance to DSA IR 17-3.
 2. Shop Welding: Special inspector will inspect the following, per CBC 1705A.2.1, AISC 360 (and AISC 341, as applicable) and DSA IR 17-3:
 - a. Groove, multi-pass fillet welds larger than 5/16", plug and slot welds.
 - b. Single-pass fillet welds equal or less than 5/16".
 - c. Inspect welding of stairs and railing systems.
 - d. Verification of reinforcing steel weldability.
 - e. Welding of reinforcing steel, per AWS D1.4.
 3. Field Welding: Special inspector will inspect the following, per CBC 1705A.2.1, AISC 360 (and AISC 341, as applicable) and DSA IR 17-3:
 - a. Groove, multi-pass fillet welds larger than 5/16", plug and slot welds.

- b. Single-pass fillet welds equal or less than 5/16”.
 - c. End welded studs (ASTM A108) installation, including bend test.
 - d. Floor and roof deck welds.
 - e. Welding of structural cold-formed steel.
 - f. Welding of stairs and railing systems.
 - g. Verification of reinforcing steel weldability.
 - h. Inspect welding of reinforcing steel.
4. Non-Destructive Testing: Testing Laboratory will test perform ultrasonic and magnetic particle testing in conformance to AISC 360 section N5.5, AISC 341 appendix Q5.2, AWS D1.1, AWS D1.8, ASTM E543, ASTM E1444, ASTM E164 and DSA IR 17-2.
- G. Steel Joists and Trusses: Continuous inspection, special inspector will verify size, type and grade for all chord and web members as well as connectors and weld filler material, verify joist profile, dimensions and chamber (if applicable); verify all weld locations, lengths and profiles; mark or tag each joist, in conformance with CBC section 2207.1 and DSA IR 22-3.
- H. Fire-Proofing:
- 1. Spray Applied:
 - a. Project inspector will examine structural steel surface conditions, inspect application, take samples, measure thickness, and verify compliance of all aspects of application with Construction Documents, in conformance with CBC sections and ASTM E.605.
 - b. Testing Laboratory will test bond strength in conformance with ASTM E605, per CBC section 1705A.14.6.
 - c. Testing Laboratory will test density in accordance with ASTM E605, per CBC section 1705A.14.5.
 - 2. Intumescent Fire-Resistant Coatings: Special inspector will inspect and test in accordance with AWCI 12-B, per CBC section 1705A.15.
- I. Anchor Bolts, Anchor Rods and Other Steel:
- 1. Testing Laboratory will sample and test not readily identifiable anchor bolts and anchor rods in accordance with DSA IR 17-11.
 - 2. Testing Laboratory will sample and test not readily identifiable threaded rod not used for foundation anchorage per procedures noted in DSA IR 17-11.
- J. Prefabricated Wood Structural Elements:
- 1. Special inspector will continuously inspect fabrication of glued-laminated timber in accordance with CBC section 1704A2.5.
 - 2. Special inspector will continuously inspect fabrication of manufactured open-web trusses in accordance with CBC 1704A2.5 and DSA IR 23-4.
 - 3. Special inspector will continuously inspect fabrication of manufactured metal plate connected trusses in accordance with CBC 1704A2.5 and DSA IR 23-8.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

SECTION 01 50 00

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes Temporary utilities, construction facilities and controls to be provided, maintained, relocated, and removed by CONTRACTOR

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 QUALITY ASSURANCE

- A. CONTRACTOR shall comply with applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
 - 1. Building Code requirements.
 - 2. Division of State Architect.
 - 3. Health and safety regulations.
 - 4. Utility company regulations.
 - 5. Police, fire department and rescue squad requirements.
 - 6. Environmental protection regulations.
- B. CONTRACTOR shall arrange for the inspection and testing of each temporary utility prior to use. Obtain required certifications and permits and transmit to OAR.
- C. CONTRACTOR provided facilities are to be in place and available for OWNER use and occupancy within 15 calendar days following the date of issue of the Notice to Proceed and shall remain in place and available for OWNER use and occupancy throughout the full term of the Contract.
- D. Interior Air Quality (IAQ) During Construction:
 - 1. Referenced Standards include:
 - a. ASHRAE 62.1 - 2004.
 - b. ASHRAE 52.2-1999.
 - c. CHPS Best Practices Manual- Volume III (Latest Edition).
 - 2. Interior Air Quality (IAQ) During Construction Plan: CONTRACTOR is required to develop and submit to the OWNER for review and approval a Construction Indoor Air Quality (IAQ) Plan using the blank form provided as Appendix A of this Specification. Plan shall be submitted within 30 days of NTP. Implementation of the approved (IAQ) Plan will be included in the project construction schedule.
 - 3. Construction Photos Requirement: CONTRACTOR shall submit photographs that demonstrate the Construction Ventilation, Preconditioning, Sequencing, and Protection measures taken during the project for complying with the IAQ plan, applicable specifications and referenced standards.

3.2 TEMPORARY UTILITIES

- A. CONTRACTOR shall submit to OAR reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.

- B. CONTRACTOR shall coordinate with the appropriate utility company to install temporary services. Where the utility company provides only partial service, CONTRACTOR shall provide and install the remainder with matching compatible materials and equipment.
- C. Temporary Water:
1. CONTRACTOR shall furnish, install and pay for all necessary permits, inspections, move ins/out, temporary water lines, connections and fees, extensions and distribution, metering devices and use charges, deliveries/pick ups, rentals, storage, transportation, taxes, labor, insurance, bonds, material, equipment and all other miscellaneous items for the temporary water system, and upon Substantial Completion of the Work, removal of all such temporary water system devices and appurtenances.
 2. CONTRACTOR shall provide and maintain temporary water service, including water distribution piping and outlet devices of the size and required flow rates in order to provide service to all areas of the Project site.
 3. CONTRACTOR shall provide and pay for all potable water needed for construction and all other uses associated with the Work.
 4. CONTRACTOR shall at their expense and without limitation, remove, extend and/or relocate temporary water systems as rapidly as required in order to provide for progress of the Work.
- D. Temporary Electric:
1. CONTRACTOR shall furnish, install, maintain and pay for all necessary permits, inspections, temporary wiring, metering devices and use charges, move ins/outs, connections and fees, service, extension and distribution, deliveries/pickups, rentals, storage, transportation, taxes, labor, insurance, bonds, materials, equipment and all other required miscellaneous items for the temporary electric systems and upon Substantial Completion of Work, removal of all such temporary electric systems and appurtenances.
 2. CONTRACTOR shall furnish, install, maintain, extend and distribute temporary electric area distribution boxes, so located that individual trades can obtain adequate power and artificial lighting, at all points required for the Work, for inspection and for safety.
 3. CONTRACTOR shall provide temporary electric for construction, temporary facilities, and connections for construction equipment requiring power or lighting, at all points required for the Work, for inspection and safety.
 4. CONTRACTOR shall provide 20 foot candles minimum lighting levels inside building(s) and 5 foot candles outside for safety and security.
 5. CONTRACTOR shall ensure welding equipment is supplied by electrical generators.
 6. CONTRACTOR shall at their expense and without limitation remove, extend and/or relocate temporary electric systems as rapidly as required in order to provide for progress of the Work.
- E. Temporary Gas:
1. CONTRACTOR shall furnish, install, maintain and pay for all necessary permits, inspections, metering devices and use charges, move ins/out, extension and distribution, deliveries/pickups, rentals, storage, transportation, equipment and piping, rentals, taxes, labor, material, insurance, bonds, and all other required miscellaneous items for the temporary gas systems necessary to perform the Work, and upon Substantial Completion of the Work, removal of all such temporary gas system devices and appurtenances.
 2. CONTRACTOR shall at their expense and without limitation remove, extend and/or relocate temporary gas systems as rapidly as required in order to provide for progress of the Work.
- F. Temporary Heating, Ventilation and Air Conditioning:
1. CONTRACTOR shall furnish, install, maintain, and pay for all necessary permits, inspections, move ins/out, extensions and distribution, connections and fees, use charges, metering devices and use charges, equipment, rentals, deliveries/pick ups, storage, transportation, taxes, labor, insurance, bonds, material, equipment and all other required miscellaneous items for temporary heat and ventilation needed for proper installation of the Work and to protect materials and finishes from damage due to weather. Upon Substantial Completion of the Work, CONTRACTOR shall remove all such temporary heating and ventilating system devices and appurtenances.

2. CONTRACTOR shall provide, maintain and pay for all temporary ventilation of enclosed Work areas to cure materials, disperse humidity, remove fumes, and to prevent accumulation of dust, irritants, or gases.
 3. OWNER will not accept utilization of the permanent HVAC system for temporary HVAC until Substantial Completion.
 4. CONTRACTOR shall maintain manufacturer required levels of room and/or space temperature, humidity and ventilation necessary to install products, materials and/or systems of the Work.
 5. CONTRACTOR shall at their expense and without limitation, remove, extend and/or relocate temporary heating and ventilating systems as rapidly as required in order to provide for progress of the Work.
- G. Temporary Telephone and Data:
1. CONTRACTOR shall furnish, install, maintain and pay for all necessary permits, inspections, move ins/outs, extensions and distribution, devices, connections and fees, use charges, rentals, deliveries/pickups, storage, transportation, taxes, labor, insurance, bonds, material, equipment and all other required miscellaneous items for temporary phone, data service and distribution to Project site temporary offices as required by this Section and Article 3.03.
 2. CONTRACTOR shall arrange for the supply, installation, and maintenance of one Project site exterior pay phone booth and/or equivalent facility.
 3. CONTRACTOR shall at their expense and without limitation, remove, extend and/or relocate temporary phone service and distribution as rapidly as required in order to provide for progress of the Work.
 4. Upon Substantial Completion of the Work, CONTRACTOR shall remove all such temporary phone service, distribution, devices and appurtenances.

3.3 CONTRACTOR PROVIDED FACILITIES

- A. Provide temporary offices, utilities, storage units, fencing, barricades, chutes, elevators, hoists, scaffolds, railings and other facilities or services as required. CONTRACTOR shall be responsible for providing, installation, maintenance, supplying, and all use charges for the items provided under this Section.
- B. Temporary Offices:
1. In addition to Project site temporary office facilities CONTRACTOR provides for use of CONTRACTOR, CONTRACTOR shall provide and maintain a minimum of one 12' x 40' new (or as approved by OAR) construction trailer on the Project site for use by OWNER for the duration of the Work. Construction trailer shall be accessible by OWNER and/or INSPECTOR on a 7 day a week 24-hour basis. CONTRACTOR shall provide the necessary materials and labor to provide the trailer with disable access on request by the OAR. Trailer shall include, at a minimum, the following:
 - a. Conference room with a table and adequate seating for twelve;
 - b. One bathroom;
 - c. An open work area with devising partitions as required by OWNER and
 - d. Two enclosed, separate offices with windows and lockable doors.
 2. Trailer shall be furnished with two exterior entrance doors with one located in a separate office. Each door shall be furnished with both a dead bolt and cylinder lock with six keys. Exterior doors and windows shall be provided with exterior mounted burglar bars. Windows shall be provided with operable window shades. Security of trailer and contents is a continuous obligation of CONTRACTOR and shall be equipped with local sounding security system.
 3. Trailer shall have ample headroom, 8-foot minimum, and shall be lighted, heated, ventilated, and air-conditioned. Provide an electrically chilled bottled water fountain of 5-gallon capacity. Purified water shall be supplied in 5-gallon containers, delivered weekly, with four spares on hand after each re-supply visit.
 4. The separate offices shall each be approximately 120 square feet in size and shall be furnished with a minimum of four 120 volt single phase convenience outlets with one

- telephone jack and one data/LAN outlet. The conference room shall be approximately 32 square feet in size and shall be furnished with a minimum of eight single phase convenience outlets with one telephone jack and one data/LAN outlet.
5. CONTRACTOR shall coordinate floor plan and location of electrical, telephone, data outlets with OAR prior to ordering and delivering the trailer.
 6. CONTRACTOR will provide furnishings in the following quantities, to be set in rooms and position as directed by OWNER upon delivery:
 - a. 2 rolling mid-back task chairs, with arms, Global or equal. (Similar to Staples Cat.# 396503)
 - b. 2 double pedestal metal desks, 29 by 72 by 36 inches, HON or equal. (Similar to Staples Cat.# 791368)
 - c. 2 metal bookcases, three shelf, 41 by 34 by 12 inches (Similar to Staples Cat.# 793638)
 - d. 4 resin folding tables, 29 by 30 by 72 inches (Similar to Staples Cat.# 392331)
 - e. 12 padded meeting chairs, Global or equal. (Similar to Staples Cat.# 709501)
 - f. 2 four drawer, legal size lateral files. HON 500 series or equal. (Similar to Staples Cat.# 465245)
 - g. Provide and install 1 "Plan-Hold" wall-mounted 42-inch wide plan racks with 36 individual plan holders each.
 - h. Provide and install 1 large white board in one conference room, 48 by 72 inches (Similar to Staples Cat.# 789834)
 - i. Provide and install 1 large tack board in the other conference room, 48 by 72 inches (Similar to Staples Cat.# 789842)
 7. CONTRACTOR shall provide phone, data transmission lines, related appurtenances, services, and equipment for use by OAR as specified below:
 - a. Provide LAN and phone connectivity to all equipment specified below from the point of connection (POC) to equipment, including, but not limited to all cabling, jacks, patch panel, and patch cables as required to connect all of the equipment listed in this section to the LAN. Cabling shall be CAT 6 or better;
 - b. Provide 2 separate phone lines, one dedicated fax line and 2 phone instruments each with speakerphone, intercom, conference call, flash, redial, call hold and voice mail. Each phone instruments shall have a 4- line or more capacity/selectivity. Provide supporting terminal blocks and any required switch, router, power supplies, and amplifiers.
 - c. Provide business class T1 data service with minimum 1.5 Mbps upload and download (or maximum available, but not less than 1.5 Mbps upload and download),
 - d. Where business class T1 service with minimum 1,5 Mbps upload and download is not available, provide a comparable broadband internet connection such as a Fiber Optic (FIOS) line or business class cable, with the same bandwidth and SLA requirements as the T1 line.
 - e. Provide, install, and maintain the following specified equipment:
 - 1) Cisco 1841 Integrated Services Router capable of providing Internet access. If a Fiber Optic or Cable line is installed, provide Netgear Model FR328SNA, Netgear Cable/DSL ProSafe Firewall Router w/back up port.
 - 2) If number of network connections required exceeds seven, provide a Netgear Model FS108, 8 port 10/100 Mbps fast Ethernet switch, If required connections exceeds fifteen provide a comparable Netgear 10/100 Mbps switch capable of supporting all required connections.
 - f. Provide, install, configure and maintain for network connectivity one LaserJet 4200TN Series printer with the following features and accessories:
 - 1) 300 MHz processor;
 - 2) 2 paper trays;
 - 3) 64 MB memory;
 - 4) Network capable
 - 5) 2 spare toner cartridges. Replace as necessary to maintain two spares;

- g. Provide, install, configure and maintain one HP Scanjet 8250 digital scanner, with Hi-Speed USB interface.
- h. Provide HP fax 1220 Fax machine with the following features and accessories:
 - 1) 150 sheet paper tray;
 - 2) 4 mb of memory with 270 pages of out of paper reception;
 - 3) 100 number auto-dial;
 - 4) 2 spare toner cartridges.
- i. Provide one digital copier (Toshiba e-Studio 35, Konica 7035 or equal.) with the following features and accessories:
 - 1) 100 Sheet RADF, lift-top, document feeder;
 - 2) Finisher with collation and one position stapling;
 - 3) Three paper trays integral with the equipment including 8-1/2 by 11-inch, 8-1/2 by 14 and 11 by 17.
 - 4) Additional 550 sheet paper feed pedestal or drawer;
 - 5) 32 MB Image Memory, 20 GB hard disk drive;
 - 6) 35 PPM Digital Imaging, 600 by 600 dpi;
 - 7) Zoom, Reduction and enlargement from 25 percent to 400 percent;
 - 8) Embedded Print Controller with minimum 166 Mhz processor and 10/100 BaseT Network Interface Card;
 - 9) Connect to jobsite LAN and configure as a printer option for all workstations, in addition to the HP4200;
 - 10) Two spare toner cartridges. Replace as necessary to maintain two spares;
 - 11) 24 hour on-call maintenance, including toner and repairs/parts;
- C. CONTRACTOR shall be responsible for maintaining all transmission lines, equipment and related devices. If equipment and/or transmission equipment becomes inoperable and downtime exceeds two days, CONTRACTOR shall replace and/or provide equivalent interim equipment
- D. Trailer, furniture, equipment, and related ancillary devices shall remain property of CONTRACTOR. CONTRACTOR shall remove such property upon Substantial Completion of Work or as otherwise determined in writing by OAR
- E. CONTRACTOR shall employ an experienced and qualified MCSE certified Network Administrator, who shall be responsible to set up and service the LAN equipment and appurtenances provided in OWNER trailer, so as to maintain the equipment in continuous operation. Service response shall be within one day of incident
- F. At CONTRACTOR'S expense and without limitation remove and/or relocate temporary office(s) and related facilities as rapidly as required in order to provide for progress of the Work.
- G. Electronic/office equipment to be new at the commencement of the project
- H. Trailer, furniture, equipment, and related ancillary devices shall remain property of CONTRACTOR
- I. CONTRACTOR shall remove waste bin trash from OAR'S trailer, vacuum OAR'S trailer floors and/or mop OAR'S trailer floors once per week. Provide trailer with bathroom paper goods, soap, broom, mop, door mats etcetera.
- J. Temporary Storage Units:
 - 1. CONTRACTOR shall provide secure and waterproof storage units for the temporary storage of furniture, equipment and other items requiring protection.
 - 2. Walls, roof and doors shall be a minimum of 16-gauge steel with floors of 1 inch tongue and groove hardwood or 3/4 inch minimum exterior type plywood. The undercarriage shall be designed to accommodate forklift blades 42-inch to 60- inch long. There shall be doublewide swing out lockable doors at one end equipped with waterproof gaskets.
 - 3. CONTRACTOR shall be responsible for delivery charges and will install the storage unit in an appropriate area.
 - 4. CONTRACTOR shall remove the storage unit from the Project site when the storage unit is no longer required for the Work or upon Substantial Completion of the Work.

5. CONTRACTOR shall at their expense and without limitation remove and/ or relocate storage units as rapidly as required in order to provide for progress of the Work.

K. Temporary Sanitary Facilities:

1. CONTRACTOR shall provide portable chemical toilet facilities. Quantity of portable chemical toilet facilities shall be based on total number of workers and shall be in accordance with CAUOSHA standards.
2. Portable chemical toilet facilities shall be maintained with adequate supplies and in a clean and sanitary condition and shall be removed from the Project site upon Substantial Completion of the Work. CONTRACTOR shall always keep both OWNER chemical toilet facilities and OWNER trailer restroom clean and operational.
3. CONTRACTOR employees shall not use school toilet facilities.
4. At CONTRACTOR'S expense and without limitation remove and/or relocate portable chemical toilet facilities as rapidly as required in order to provide for progress of the Work.
5. CONTRACTOR will contain their breaks and lunch periods to the areas designated by OAR or any public area outside the Project site. CONTRACTOR shall provide a suitable container within the break/lunch area for the placement of trash. Areas used for break/lunch must be maintained clean and orderly. Once finish flooring has been installed in a particular area, no food or beverages will be permitted in that area.

L. Temporary Security Fence/Barricade:

1. CONTRACTOR shall install temporary Project site security barricade(s) indicated on Drawings or as required for safety and as specified herein. New or used material may be furnished. Security of Project site and contents is a continuous obligation of CONTRACTOR.
2. Unless otherwise indicated or specified, security fence shall be constructed of 8- foot high chain link fencing with a 8-foot high windscreen. Space posts not to exceed ten feet on centers. Posts shall be of following nominal pipe dimensions: terminal, corner, and gatepost 2 Y.-inch, line posts 2-inch. Chain link fence shall be not less than #13 gauge, 2-inch mesh, and in one width. Posts, fence and accessories shall be galvanized and as follows:
 - a. Shall be set in the earth a depth of 30-inch with soil firmly compacted around post, unless required otherwise in writing by OAR.
 - b. Fence fabric shall be attached to posts with #14-gauge tie wire at 16 inches on center. A #6-gauge steel tension wire with turnbuckles shall be installed at top and bottom of barricade fencing. Wire tie fabric to tension wires at 18" centers.
 - c. Windscreen shall be attached to fence fabric and steel tension wires at 18-inch centers with a minimum of #14-gauge tie wire. Windscreen shall be maintained and all rips, tears, missing sections shall be corrected upon notification by OAR.
 - d. Chain link fencing shall be free from barbs, icicles or other projections resulting from galvanizing process. Fence having such defects will be replaced even if it has been installed.
 - e. Gates shall be fabricated of steel pipe with welded corners and bracing as required. Fence and fabric to be attached to frame at 12-inch centers. Provide all gate hardware of a strength and quality to perform satisfactorily until barricade is removed upon Substantial Completion of the Work. Each gate shall have a chain and padlock. Provide two gate keys to OAR. At Substantial Completion of the Work, remove barricade from Project site, backfill and compact fence footing holes. Existing surface paving that is cut into or removed shall be patched and sealed to match surrounding areas.
 - f. At CONTRACTOR'S expense and without limitation remove or relocate fencing, fabric and barricades or other security and protection facilities as rapidly as required in order to provide for progress of the Work.

M. Other Temporary Enclosures and Barricades:

1. Provide lockable, temporary weather-tight enclosures at openings in exterior walls to create acceptable working conditions, to allow for temporary heating and for security.
2. Provide protective barriers around trees, plants and other improvements designated to remain.
3. Temporary partitions shall be installed at all openings where additions connect to existing buildings, and where to protect areas, spaces, property, personnel, students and faculty and

to separate and control dust, debris, noise, access, sight, fire areas, safety and security. Temporary partitions shall be as designated on the Drawings or as specified by ARCHITECT. At CONTRACTOR'S expense and without limitation remove and/or relocate enclosures, barriers and temporary partitions as rapidly as required in order to provide for progress of the Work.

4. Since the Work of this Project may be immediately adjacent to existing occupied structures and vehicular and pedestrian right of ways, CONTRACTOR shall, in his sole judgment and in accordance with applicable safety standards, provide temporary facilities, additional barricades, protection and care to protect existing structures, occupants, property, pedestrians and vehicular traffic. CONTRACTOR is responsible for any damage, which may occur to the property and occupants of the property of OWNER or adjacent private or public properties which in any way results from the acts or neglect of CONTRACTOR.
5. CONTRACTOR shall be responsible for cleaning up all areas adjacent to the construction site which have been affected by the construction; and for restoring them to at least their original condition- including landscaping; planting of trees, sod, and shrubs damaged by construction; and raking and disposal of debris such as roofing shingles, paper, nails, glass sheet metal, bricks, and waste concrete. Construction debris shall be removed and properly disposed of. Culverts and drainage ditches with sediment from the construction area shall be cleared routinely to maintain proper drainage and re-cleaned prior to completion of the contract.
6. CONTRACTOR shall ensure sediment does not block storm drains. CONTRACTOR shall be responsible for cleaning storm drains blocked due to erosion or sediment from the work area.

N. Temporary Storage Yards:

1. CONTRACTOR shall fence and maintain storage yards in an orderly manner.
2. Provide storage units for materials that cannot be stored outside.
3. At CONTRACTOR'S expense and without limitation remove and/or relocate storage yards and units as rapidly as required in order to provide for progress of the Work.

O. Temporary De-watering Facilities and Drainage:

1. For temporary drainage and de-watering facilities and operations not directly associated with construction activities included under individual sections, comply with de-watering requirements of applicable Division 01 sections. CONTRACTOR shall maintain the Work, Project site and related areas free of water.
2. For temporary drainage and de-watering facilities and operations directly associated with new buildings, additions or other construction activities, comply with Divisions 01 and 31 Sections. CONTRACTOR shall be responsible for, but not limited to, de-watering of excavations, trenches and below grade areas of buildings, structures, the Project site and related areas.

P. Temporary Protection Facilities Installation:

1. CONTRACTOR shall not change over from using temporary facilities and controls to permanent facilities until Substantial Completion, except as permitted by OAR
2. Until permanent fire protection needs are supplied and approved by authorities having jurisdiction, CONTRACTOR shall provide, install and maintain temporary fire protection facilities of the types needed in order to adequately protect against fire loss. CONTRACTOR shall adequately supervise welding operations, combustion type temporary heating and similar sources of fire ignition.
3. CONTRACTOR shall provide, install and maintain substantial temporary enclosures of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security. Where materials, tools and equipment are stored within the Work area, CONTRACTOR shall provide secure lock up to protect against vandalism, theft and similar violations of security. OWNER accepts no financial responsibility for loss, damage, vandalism or theft.
4. CONTRACTOR operations shall not block, hinder, impede or otherwise inhibit the use of required exits and/or emergency exits to the public way, except as approved by OAR. CONTRACTOR shall maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fire fighting equipment and/or personnel.

5. With approval of OAR and at the earliest feasible date in each area of the Work, complete installation of the permanent fire protection facilities including connected services and place into operation and use. Instruct OWNER personnel in use of permanent fire protection facilities.
6. In the event of an emergency drill or an actual emergency, designated by the sounding of the fire alarm and/or other sounding device, all construction activities must cease. CONTRACTOR shall evacuate the Work area and remain outside the Work area until permitted to return. No Work shall be conducted during the evacuation of a building or during an emergency.

Q. Temporary Security and Safety Measures:

1. During performance of the Work in existing facilities and/or on a Project Site occupied by students, CONTRACTOR shall provide, install and maintain substantial temporary barriers and/or partitions separating all Work areas from areas occupied by students, faculty and/or administrative staff.
2. During performance of the Work in existing facilities or on a Project site occupied by students and where temporary barriers or partitions are not physically feasible, CONTRACTOR shall provide an employee meeting the requirements of Education Code Section 45125.2.(2) to continually supervise and monitor all employees of CONTRACTOR and Subcontractor. For the purposes of this Section, CONTRACTOR employee shall be someone whom the Department of Justice has ascertained has not been convicted of a violent or serious felony as listed in Penal Code Section 667.5(c) and/or Penal Code Section 1192.7(c). To comply with this Section, CONTRACTOR shall have his employee submit his or her fingerprints to the Department of Justice pursuant to Education Code Section 45125.1(a).
3. Penal Code Sections 290 and 290.4 commonly known as "Megan's Law", require, among other things, individuals convicted of sexually oriented crimes, to register with the chief of police where the convicted individual resides or with a county sheriff or other law enforcement officials. CONTRACTOR shall check its own employees and require each Subcontractor to check its employees and report to CONTRACTOR if any such employees are registered sex offenders. CONTRACTOR shall check monthly during the life of the Contract to ascertain this information and report same to OAR. Before starting the Work, and monthly thereafter during the life of Contract, CONTRACTOR shall notify OWNER in writing if any of its employees and/or if any Subcontractor's employees are a registered sex offender. If so, CONTRACTOR shall proceed in accordance with Section 01 5000.3.03 R.2 above.
4. CONTRACTOR shall employ and maintain sufficient security and safety measures to effectively prevent vandalism, vagrancy, theft, arson, and all other such negative impacts to the Work. Any impacts to the progress of the Work of CONTRACTOR, OWNER, or OWNER'S forces, due to loss from inadequate security, will be the responsibility of CONTRACTOR.

R. Temporary Access Roads and Staging Areas:

1. Due to the limited amount of on and off Project site space for the parking of staff and school visitor's vehicles there will be no parking of CONTRACTOR vehicles in areas designated for school use only. CONTRACTOR shall provide legal access to and maintain CONTRACTOR designated areas for the legal parking, loading, off-loading and delivery of all vehicles associated with the Work.. CONTRACTOR shall be solely responsible for providing and maintaining these requirements whether on or off the Project site. CONTRACTOR shall provide and maintain ample on-site parking spaces designated for the exclusive use of OWNER. CONTRACTOR shall erect signs as required by OWNER each of these spaces and prevent all unauthorized vehicles from parking in the OWNER- reserved spaces.
2. Temporary access roads are to be installed and maintained by CONTRACTOR to all areas of the Project site.
3. CONTRACTOR will be permitted to utilize existing facility campus roads as designated by OAR. CONTRACTOR shall only utilize those entrances and exits as designated by OAR and CONTRACTOR shall observe all traffic regulations of OWNER.
4. CONTRACTOR shall maintain roads and walkways in a clean condition including removal of debris and/or other deleterious material on a daily basis.

3.4 PROJECT SIGNAGE

1. CONTRACTOR shall furnish and install two Project signs on the Project site at a location established by OAR. OAR will provide the information to be posted on the sign. A draft of the proposed sign shall be submitted within 30 days to NTP for OAR to review before fabrication.
- B. Sign construction shall be 10 feet wide by six feet high with six-inch square posts and 1 inch exterior grade plywood, bolted to posts.
- C. Sign lettering shall be painted as indicated on Appendix B, by a professional sign painter, in accordance with details reviewed by ARCHITECT. The following shall be listed on sign:
 1. OWNER- Norwalk- La Mirada Unified School District.
 2. District Office.
 3. Name of NLMUSD School Superintendent.
 4. Name of School Board member from District in which project is located.
 5. Alphabetical listing of other Board Members.
 6. Name of the Architect/Engineer.
 7. Name of Contractor.
 8. Source of funding: "Your School Bond Funds at Work".
- D. No other signs shall be displayed without approval of OAR. At CONTRACTOR'S expense and without limitation remove and/or relocate Project signage and related facilities as rapidly as required in order to provide for progress of the Work.
- E. CONTRACTOR shall remove Project signage at Substantial Completion of the Work.
- F. Until Substantial Completion of the Work, CONTRACTOR shall employ appropriate means to remove all graffiti from buildings, equipment, fences and all other temporary and/or permanent improvements on the Project site within twenty-four (24) hours from the date of report or forty-eight (48) hours of each occurrence.
- G. CONTRACTOR shall provide and install signage to provide directional, identification, and contact information to construction personnel and visitors as follows and as reviewed by OAR.
 1. For construction traffic control/flow at entrances/exits, and as designated by OAR.
 2. To direct visitors.
 3. For construction parking.
 4. To direct deliveries.
 5. For Warning Signs as required.
 6. In accordance with CAUOSHA standards as necessary.
 7. For trailer identification and Project site address.
 8. For "No Smoking" safe work site at designated locations.
 9. Emergency contact information and phone number of CONTRACTOR.
 10. Emergency contact information and phone number of local police, fire, and emergency personnel.
 11. For Labor Compliance Program (LCP) as required under the General Conditions (Prevailing wage rates and Notice of LCP)
 12. Employee benefits payments paid to trust funds are required under the General Conditions.
- H. OWNER has established a program authorizing vendors to post advertisements and billboards along the perimeter of project site. CONTRACTOR shall provide access and shall allow advertising signage to be placed on top of temporary, perimeter, security barricade and/or fences.

3.5 TRENCHES

- A. Open trenches for installation of utility lines (water, gas, electrical and similar utilities) and open pits outside barricaded working areas shall be barricaded at all times in a legal manner determined by CONTRACTOR. Trenches shall be backfilled and patch-paved within twenty-four (24) hours after approval of installation by authorities having jurisdiction or shall have "trench plates" installed. Required access to buildings shall be provided and maintained. CONTRACTOR shall comply with all applicable statutes, codes and regulations regarding trenching and trenching operations. Open

trenches deeper than 3'- 6", and not located within a public street access, shall be enclosed within an 8'-0" high chain-link fence.

3.6 DUST CONTROL

- A. CONTRACTOR is responsible for dust control on and off the Project site. When Work operations produce dust the Project site and/or streets shall be sprinkled with water to minimize the generation of dust. CONTRACTOR shall clean all soils and debris from construction vehicles and cover both earth and debris loads prior to leaving the Project site. CONTRACTOR shall, on a daily basis, clean all streets and/or public improvements within the right of way of any and all debris, dirt, mud and/or other materials attributable to operations of CONTRACTOR.

3.7 WASH OUT

- A. CONTRACTOR shall provide and maintain a minimum of four (4) wash out boxes of sufficient size and strength to provide for concrete mixer wash out. CONTRACTOR shall locate and relocate both the wash out boxes and wash out areas in order to accommodate the progression of the Work. The wash out area shall be located as to minimize the amount of potential run off onto adjacent private and/or public property. CONTRACTOR shall legally dispose of the contents of the wash out boxes and area on an as needed basis or as required by OAR.

3.8 WASTE DISPOSAL

- A. CONTRACTOR shall provide and maintain trash bins on the Project site. Trash bins shall be serviced on an as needed basis and CONTRACTOR is responsible for the transportation of and the legal disposal of all contents.

3.9 ADVERSE WEATHER CONDITIONS

- A. Should warnings of adverse weather conditions such as heavy rain and/or high winds be forecasted, CONTRACTOR shall provide every practical precaution to prevent damage to the Work, Project site and adjacent property. CONTRACTOR precautions shall include, but not be limited to, enclosing all openings, removing and/or securing loose materials, tools, equipment and scaffolding.
- B. CONTRACTOR shall provide and maintain drainage away from buildings and structures.
- C. CONTRACTOR shall implement all required storm water mitigation measures as required under related Division 01 Sections.

3.10 DAILY AND MONTHLY REPORTS

- A. CONTRACTOR shall provide and maintain in the Project site office of CONTRACTOR, a daily sign in sheet for use by all employees of CONTRACTOR and all Subcontractors at whatever tier. At the beginning of each work day, the foreman, project manager, superintendent of CONTRACTOR and/or Subcontractors shall visit the site office of CONTRACTOR and shall enter onto the daily sign in sheet: all employee names; trade classification; and represented company. The completed sign in sheet shall serve as the basis of and shall be submitted with the daily construction report as set forth in Section milled.
- B. By the end of each workday, CONTRACTOR shall submit to OAR and INSPECTOR a daily construction report denoting the daily manpower counts and a brief description/location of the workday activities. Manpower shall be broken down by trade classification such as foreman, journeyman or apprentice. The report shall also note the date, day of the week, weather conditions, deliveries, equipment on the Project site whether active and/or idle, visitors, inspections, accidents and unusual events, meetings, stoppages, losses, delays, shortages, strikes, orders and requests of governing agencies, Construction Directive and/or Change Orders received and implemented, services disconnected and/or connected, equipment start up or tests and partial use and/or occupancies. CONTRACTOR shall also include on the daily construction report the above information for all Subcontractors at whatever tier.

3.11 FIELD OFFICE SUPPLIES

- A. CONTRACTOR shall provide the initial supply of field office supplies to OAR in the quantities listed as set forth below in Table A. If specified in Section 01 2100 - Allowances, CONTRACTOR shall provide additional supplies as required by OAR. CONTRACTOR shall not deduct the costs of the Initial Field Office Supplies (as shown in Table A) from the Allowance for the monthly replenishment of OWNER field office supplies listed in Section 01 2100- Allowances. CONTRACTOR shall deliver all of the initial field office supplies to OWNER Field Offices within fourteen days from the date established in the Notice to Proceed.
- B. CONTRACTOR may utilize different suppliers as the specified information is only to establish the required quantities and minimum levels of quality.
- C. Replenishment of Field Office Supplies: If an Allowance is identified in Section 01 2100- Allowances for the periodic replenishment of OWNER field office supplies. OWNER shall submit requests for replenishment of field office supplies to CONTRACTOR from those listed in Table 'A' below. CONTRACTOR shall provide a monthly accounting of items being requested, cumulative cost of replenishment of Field Office supplies previously ordered, and balance of allowance remaining. Upon Substantial Completion of the Work, CONTRACTOR shall file a Change Order Proposal crediting OWNER for any remaining balance or unspent portion of the Allowance. This Allowance specifically excludes the initial supplies listed in Table 'A' below and is to be used exclusively for the monthly replenishment of OWNER field office supplies. Supplies are to be delivered to OWNER'S trailer within twenty-four hours of OWNER'S request.
- D. Postage and Delivery Costs: CONTRACTOR shall provide postage and delivery services for OWNER generated materials in quantities and/or frequencies as requested by OWNER. The cost for these services shall be deducted from the Allowance identified in Section 01 2100 - Allowances. for the periodic replenishment of OWNER field office supplies. This allowance is for the OWNER'S use only. Postage and delivery costs for CONTRACTOR generated materials are the responsibility of the CONTRACTOR and shall not be charged to this allowance, regardless of whether the postage and/or delivery of CONTRACTOR generated materials resulted from a request and/or direction from OWNER.
- E. Other expendable field office support items specified elsewhere, including, but not limited to, furnishing toner cartridges, equipment maintenance, and bottled water, are to be supplied and paid for by CONTRACTOR. These costs are not to be deducted from the Allowance for the periodic replenishment of OWNER field office supplies identified in Section 01 2100.

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Table A

ITEM	DESCRIPTION	UNIT	QUANTITY	SUPPLIER/ITEM NUMBER
Wastebasket	N/A	Each	2	Staples / 125039-54
Suraf Si:ODressors	N/A	Each	2	Staples /481841-64
First Aid Kit	N/A	Each	1	Staples /503979-54
Pe:J s (blue, green and red)	N/A	12/Lot	1	Staples /441884-64
Pencils	N/A	48/Lot	1	Staples /711382-54
Pencil Sharpener	1900	1	1	Staples /330250-54
Wall Calendar	PM233-28	Each	2	Staples /527861-54
Steno Pad	N/A	12/Lot	1	Staples /163485-64
Post Its	N/A	12/Lot	2	Staples /130005-64
File Folders- 8-1/2 by 11	N/A	50/Lot	2	Staples /831099-54
Tape / Dispenser	N/A	Each	2	Staples /211540-54
Highlighters	N/A	12/Lot	2	Staples /479156-54
Rubber Bands	N/A	Each	2	Staples /363150-54
Push Pins	N/A	Each	2	Staples /480118-54
Drv Erase Board	S537	Each	2	Staples /518928-54
Binder Clip- Medium	N/A	24/Lot	2	Staples /831602-54
Binder Clip - Large	N/A	12/Lot	2	Staples /831610-54
Stapler	818	Each	2	Staples 395059-54
Heavy Duty Stapler	415	Each	1	Staples /386312-54
Heavy Duty Staples	SW1-35312	Each	1	Staples /504191-54
Paper Clips	N/A	Each	2	Staples 480108-54
Broom	N/A	Each	1	Staples 428881-54
Fire Extinguisher	First Alert	Each	2	Staples 238774-54
Copy Paper	8-1/2x11	5000/Case	1	Staples 122374-69
Copy Paper	11 X 17	500/Ream	2	Staples 238105-69
Hardhats	White	Each	2	Fiber Metal Model E-2
Safety Glasses	Clear and/or Tinted	Each	2	Crews Storm Series
Safety Vests, Zipper	Fluorescent Green	Each	2	Aramak Wearguard Model

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging, recycling, and disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
 - 1. Engage a preferred waste hauler that has been evaluated by third-party evaluators and is certified as reporting accurate, transparent, and reliable recovery, use and recycling rates according to the protocols and standards of the Recycling Certification Institute. Please refer to <https://www.recyclingcertification.org/certified-facilities/> for more information.

1.2 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to University's Representative.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS

- A. Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of a minimum of five (5) materials, including, but not limited to, the following:
 - 1. Demolition Waste:
 - a. Asphalt paving.
 - b. Concrete.
 - c. Concrete reinforcing steel.
 - d. Brick.
 - e. Concrete masonry units.
 - f. Wood studs.
 - g. Wood joists.
 - h. Plywood and oriented strand board.
 - i. Wood paneling.
 - j. Wood trim.
 - k. Structural and miscellaneous steel.
 - l. Rough hardware.
 - m. Roofing.

- n. Insulation.
- o. Doors and frames.
- p. Door hardware.
- q. Windows.
- r. Glazing.
- s. Metal studs.
- t. Gypsum board.
- u. Acoustical tile and panels.
- v. Carpet.
- w. Carpet pad.
- x. Demountable partitions.
- y. Equipment.
- z. Cabinets.
- aa. Plumbing fixtures.
- bb. Piping.
- cc. Supports and hangers.
- dd. Valves.
- ee. Sprinklers.
- ff. Mechanical equipment.
- gg. Refrigerants.
- hh. Electrical conduit.
- ii. Copper wiring.
- jj. Lighting fixtures.
- kk. Lamps.
- ll. Ballasts.
- mm. Electrical devices.
- nn. Switchgear and panelboards.
- oo. Transformers

2. Construction Waste:

- a. Masonry and CMU.
- b. Lumber.
- c. Wood sheet materials.
- d. Wood trim.
- e. Metals.
- f. Roofing.
- g. Insulation.
- h. Carpet and pad.
- i. Gypsum board.
- j. Piping.
- k. Electrical conduit.
- l. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Plastic pails.

1.4 SUBMITTALS

- A. Waste Management Plan: Submit plan within 15 days of date established for commencement of the Work.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:

1. Material category.
 2. Generation point of waste.
 3. Total quantity of waste to landfill, in tons.
 4. Quantity of actual waste salvaged, recycled or recovered in tons.
 5. Total quantity of waste diverted (salvaged plus recycled) as a percentage of total waste.
- C. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations and Sales: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations, or sold to individuals / organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with hauling and disposal regulations of University's Representative.
- B. Waste Management Meeting: Conduct onsite meeting and review methods and procedures related to waste management including, but not limited to, the following:
1. Review and discuss waste management plan including responsibilities of waste management coordinator.
 2. Review requirements for documenting quantities of each type of waste and its disposition.
 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 5. Review waste management requirements for each trade.

1.5 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall include the following:
1. Waste Identification: Indicate anticipated (a minimum of) five (5) types and quantities of demolition and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
 2. Waste diversion goals for the project: estimate an approximate percentage of the overall project waste these materials represent.
 3. Management strategies identifying whether these materials will be separated or commingled, and describe the diversion strategies for these materials
 4. Identify hauler and final disposal site by facility name and address, including site coordinator.
- B. Waste Diversion Strategies: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. General: Implement approved Waste Management Plan.

1. Establish on-site infrastructure, practices, and policies for on-site sorting, and develop a tracking system, as applicable.
2. Identify at least five material streams that will be diverted.
3. Track all the construction and demolition waste leaving the site.
4. Retain waste hauler reports for documentation.
5. Record weight or volume of materials that are reused on site or salvaged for reuse on other projects by subcontractors or vendors.
6. Retain receipts and estimate weight or volume of materials donated to charities, reuse retailers, or other recipients that can verify and track incoming and outgoing materials.
7. Furnish handling, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
8. Comply with operation, termination, and removal requirements in Section 015100 "Temporary Utilities".
9. Furnish a final report detailing all major waste
 - a. Alternative daily cover (ADC) does not qualify as material diverted from disposal. Land-clearing debris is not considered construction, demolition, or renovation waste that can contribute to waste diversion.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - 2. Comply with Section 015100 "Temporary Utilities" for controlling dust and dirt, environmental protection, and noise control.

3.2 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to University's Representative.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Burning: Burning of waste materials is permitted only at designated areas on University's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.
- D. Disposal: Remove waste materials and dispose of at designated spoil areas on University's property.
- E. Disposal: Remove waste materials from University's property and legally dispose of them.

END OF SECTION

DIVISION 02
EXISTING CONDITIONS

SECTION 02 41 00

DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Demolition, dismantling and cutting of existing building and site improvements as indicated, specified, and necessary for the completion of the Contract.
2. Capping active utilities.
3. Removing inactive utilities.
4. Protective measures.
5. Removing demolished materials from the site.

B. Related requirements:

1. Section 01 74 19 Construction Waste Management and Disposal.
2. Section 31 10 00 Site Clearing.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Scheduling and Sequencing:

- ###### B. Pre-Installation Meeting: See Section 01 31 00 Project Management and Coordination for meeting requirements.

1.3 SUBMITTALS

- ###### A. Waste management Plan: See Section 01 74 19 and submit to authorities having jurisdiction.

- ###### B. Record documents: At completion of this work, submit record documents showing the actual, dimensioned locations of capped utilities referenced to permanent features surrounding the site.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 GENERAL

1. Protection: Do not begin demolition until temporary barricades, warning signs and other forms of protection are installed.
 - a. Protect trees, plants, utilities and existing improvements not to be removed from injury or damage resulting from the Contractor's operation. Replace damaged improvements and utilities in kind at no cost to the Owner.
 - b. Provide all safeguards, including warning signs and lights, barricades, and the like, for protection of the public, Contractor's employees and adjacent property during demolition.
2. Noise control: Exercise caution and care to prevent generation of unnecessary noise. Keep noise levels to the minimum possible.
3. Dust control: Control dust by frequent sprinkling with water or other methods acceptable to the Architect. Assume liability for all claims related to flying dust.

4. Water control: Control the use of water to prevent damage to the existing facilities and site improvements to remain.
5. Drainage: Prevent debris from blocking items including, but not limited to, surface drainage inlets and systems, which must remain in operation.

3.2 PREPARATION

- A. Mark location of utilities.
- B. Shut-off, disconnect, cap-off and seal plumbing, mechanical, and electrical services, in accordance with the requirements of the authorities having jurisdiction, before starting deconstruction. Place markers to indicate location of disconnected services. Identify service lines and capping on record drawings.

3.3 EXISTING CONDITIONS

- A. Intent of Drawings and other reference documents is to show existing conditions with information developed from field surveys and to generally show the extent and type of demolition required.
- B. 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.
- C. Do not proceed where such conflicts or discrepancies occur prior to receipt of Architect's instructions.

3.4 DEMOLITION

- A. Perform demolition in a systematic manner. Use such methods as required to complete work in compliance with governing regulations.
- B. Where applicable, such as in public right-of-way, remove existing construction only to the extent indicated or necessary for installation of new construction and junction with existing materials.
- C. Cut back finished surfaces to straight, plumb or level lines as required.

3.5 PATCHING

- A. Patch materials to remain when damaged by demolition at no cost to the Owner.
- B. 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.

3.6 TITLE TO MATERIALS

- A. Except where indicated or specified otherwise, materials and equipment removed shall become the property of the Contractor and shall be removed from the site.
- B. The Owner will not be responsible for the condition or loss of, or damage to, such property after Notice to Proceed.
- C. Material and equipment shall not be viewed by prospective purchasers or sold on the site.

3.7 CLEAN-UP/DISPOSAL

- A. Debris, waste, and removed materials are Contractor's property for legal disposal off the site.
- B. Continuously clean-up and remove these items and do not allow to accumulate on or adjacent to the site. Refer to Section 01 74 19 for additional requirements on this subject.

END OF SECTION

DIVISION 03

CONCRETE

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
 - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.
- C. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.
- D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.6 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1.
 - 1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301.
 - 2. ACI 117.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.
- D. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.
- E. Galvanized-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from galvanized-steel wire into flat sheets.
- F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.4 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type II or Type V.
2. Fly Ash: ASTM C 618, Class F.

B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.

1. Maximum Coarse-Aggregate Size: As noted on plans.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C 260/C 260M.

D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

E. Water: ASTM C 94/C 94M and potable.

2.5 VAPOR RETARDERS

A. Refer to Section 07 26 00.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering].

G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering].

- H. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- I. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1752, cork or self-expanding cork.

2.8 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).
- B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.9 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Normal-Weight Concrete:
 - 1. Minimum Compressive Strength: As indicated at 28 days on structural drawings.
 - 2. Maximum W/C Ratio: As indicated on structural drawings.
 - 3. Slump Limit: 4 inches plus or minus 1 inch.

2.10 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete.

3.2 FORMWORK REMOVAL

- 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, forms shall not be removed in less than five days. In no case shall shoring be removed until member has acquired sufficient strength to support its weight, load upon it, and added load of construction.

3.3 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.4 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
 - 2. Reinforcement shall be bent cold prior to placement.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 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 matches 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. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
 1. Apply scratch finish to surfaces indicated
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area 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.
 1. Apply float finish to surfaces indicated.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system
 2. 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 surface does not exceed 1/4 inch.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.
 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lbs/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.10 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.11 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 033000

DIVISION 05

METALS

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes metal fabrications not classified as "structural steel", and not specified in other Sections.
- B. Related requirements:
 - 1. Division 03 for grouting and dry-packing other than required for the work of this Section.
 - 2. Divisions 05 and 09 for light-gage metal framing (studs, channels, etc.) for support of plaster and gypsum board, and backing plates for surface-applied items fastened to these materials.
 - 3. Division 08 for gate finish hardware.
 - 4. Division 09 for finish painting metal fabrications.
- C. Work installed but furnished in Division 32: Gate hardware.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Scheduling and sequencing: Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not comply with structural performance requirements.
- B. Deferred approval (delegated design): Certain metal assemblies require deferred approval from authorities having jurisdiction (AHJ) and shall be engineered by a California-licensed professional engineer paid by the Contractor or their manufacturer

1.3 SUBMITTALS

- A. Data:
 - 1. Specifications and installation instructions for manufactured items.
 - 2. Manufacturer's literature, including engineering data for anchors.
- B. Shop Drawings:
 - 1. Large scale, dimensioned Shop Drawings of metal fabrications indicating in detail methods of fabrication and assembly, weight, materials, holes, lugs, inserts, finishes and other pertinent data.
 - 2. For components to be embedded in concrete and masonry work, furnish templates supplemented by dimensioned Shop Drawings to trades placing those components in their work. Assist in location of these components where so requested by those trades.
- C. Samples: The following Samples, at least 6 inches long.
 - 1. Welded connection between the following components showing proposed weld quality and finish.
 - a. Pipe to pipe (railing).
 - b. Pipe to bar.
 - c. Tube to tube.
 - d. Tube and bar.

1.4 QUALITY ASSURANCE

- A. Qualifications for welding work:
 - 1. All welding shall be specifically inspected by an AWS-CWI qualified inspector approved by DSA.

1. Qualify welding procedures and welding operators in compliance with AWS "Qualification" requirements of AWS D1.1.
2. Examine that welders to be employed in this work have satisfactorily passed AWS qualification tests.
3. If recertification of welders is required, retesting shall be Contractor's responsibility.
4. Submit certificates of compliance to demonstrate compliance with the above requirement.
5. Costs for fabricator tests, inspections and quality control shall be borne by the Contractor.

B. Special inspections:

1. Except where otherwise specified, special inspections by Owner's testing laboratory, prescribed by Code, will not be required where work is performed on the premises of a licensed fabricator, registered and approved by authorities having jurisdiction to perform such work without special inspection.
2. Submit certificates of compliance to demonstrate compliance with the above requirement.
3. Costs for fabricator tests, inspections and quality control shall be borne by Contractor.

1.5 HANDLING

- A. Store metal fabrications above ground, under cover.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Provide railings and other load-bearing assemblies capable of safely withstanding the dead loads of the assemblies, plus the live loads prescribed by Code without exceeding allowable design working stress of materials involved, including anchors and connections. Apply each load to produce maximum stress in each component.
- B. Thermal movements: Provide exterior assemblies with expansion joints spaced so that no distortion or damage occurs when subjected to a surface temperature of plus 180 degrees and a temperature swing of 160 degrees (plus 20 to plus 180 degrees).
1. Make joints as small as possible but sufficiently wide to meet the design criteria.
 2. Show joint spacing on Shop Drawings.
 3. Space joints equally and symmetrically. Joint locations are subject to relocation at no additional cost to the Owner.
- C. Loads: In the absence of specific design loads on the Drawings and in the Specifications, the provisions of ASCE/SEI 7-10 "Minimum Design Loads for Buildings and Other Structures" apply to the work of this Section.
- D. Deflection: Limit deflection under uniform load to L/360; L/120 under concentrated load; or 1/4-inch maximum, whichever is more restrictive.

2.2 MATERIALS

- A. Metal surfaces - general: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and absence of surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.
- B. Steel plates, shapes, and bars: ASTM A 36.
- C. Steel tubing:
1. Cold-formed steel tubing: ASTM A 500, Grade A or B, as required for design loading, unless otherwise indicated.

- D. Steel pipe/tubing:
1. Handrails: One of the following.
 - a. Welded and Drawn Over Mandrel (DOM), ASTM A 513, Type S.
 - b. Cold Drawn Seamless (CDS), ASTM A 519.
 - c. Hot Finished Seamless (HFS), ASTM A 519, machined to match the finish of the DOM steel above.
 2. Elsewhere: ASTM A 53; finish, type, and weight class as follows.
 - a. Galvanized finish for exterior installations and where specified, black finish elsewhere.
 - b. Type S, Grade A, standard weight (schedule 40), unless another grade or weight or both required by design loading.
- E. Uncoated structural steel sheet: Product type (manufacturing method), quality, and grade, as follows.
1. Cold-rolled structural steel sheet: ASTM A 1008, Grade A, unless otherwise required by design loading.
 2. Hot-rolled structural steel sheet: ASTM A 1011, Grade 30, unless otherwise required by design loading.
- F. Uncoated steel sheet: Commercial quality, product type (method of manufacture) as follows.
1. Cold-rolled steel sheet: ASTM A 1008.
 2. Rolled steel floor plate (Checkered): ASTM A 786, Pattern No. 1, 4 or 5. Use same pattern throughout the Project.
 3. Hot-rolled steel sheet: ASTM A 1011.
- G. Galvanized steel sheet:
1. Structural quality: ASTM A 653 SQ, Grade 33, G90 designation, unless another grade required for design loading.
 2. Commercial quality: ASTM A 653 CQ, G90 coating designation.
- H. Concrete inserts:
1. Threaded or wedge type galvanized ferrous castings, either malleable iron complying with ASTM A 47, or cast steel complying with ASTM A 27.
 2. Provide bolts, washers, and shims as required, hot-dip galvanized in compliance with ASTM A 153.
- I. Welding rods and bare electrodes: Select in accordance with AWS specifications for the metal alloy to be welded.
- J. Fasteners: Provide zinc-coated fasteners for exterior use or where built into exterior walls, elsewhere fasteners may be uncoated. Select fasteners for type, grade, and class required.
1. Bolts and nuts: Regular hexagon-head bolts, ASTM A 307, Grade A, Property Class 4.6; with hex nuts, ASTM A 563; and flat washers, unless otherwise indicated.
 2. Anchor bolts: ASTM F 1554, Grade 36.
 3. Machine screws: ASME B18.6.3, ASME B18.6.7M.
 4. Plain washers: Round, carbon steel, ASME B18.22.1.
 5. Lock washers: Helical, spring type, carbon steel, ASME B18.21.1.
 6. Drilled-in expansion anchors:
 - a. Expansion anchors complying with FS FF-S-325, Group VIII (anchors, expansion, [non-drilling]), Type I (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-575, Grade S, by Hilti, Inc., or ITW Ramset/Red Head.
 - b. Select anchors with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in masonry and equal to 4 times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E 488.
 7. Chemical anchors:

- a. Set by Simpson Strong-Tie Co., Inc., or HY-150 by Hilti, both used with machine bolts complying with FS FF-B-575, Grade S.
- b. Select drilled-in and chemical anchors to resist loads imposed thereon with a safety factor of 4 minimum for static loads, and 10 minimum for dynamic and overhead loads.

8. Lock washers: Helical spring type carbon steel, FS FF-W-84.

K. Grout: Pre-packaged, non-shrink, non-metallic grout, non-staining, nongaseous grout complying with ASTM C 1107.

L. Cement (expansive): Factory-prepared with accelerators quick-setting hydraulic cement complying with ASTM C 595.

M. Shop primer for ferrous metal:

- 1. Interior surfaces: Tnemec "10-99," or "Unibond" (basis of design), or equal fast-curing, lead-free, universal modified alkyd primer selected for compatibility with finish paint systems specified in Section 09 90 00, and complying with performance requirements equal to or better than the basis of design.
- 2. Exterior surfaces: As specified in Section 09 96 00.

N. Galvanizing repair (zinc-rich) paint: "94-H20 Hydro-Zinc" by Tnemec Co., or equal.

O. Bituminous paint: Cold-applied asphalt mastic complying with SSPC Paint 12 but containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.3 PREFABRICATED UNITS

A. Metal Bollards

- 1. Fabricate metal bollards from Schedule 80 steel pipe.
- 2. Cap bollards with 1/4-inch- thick steel plate.
- 3. Where bollards are indicated to receive controls for door operators, provide cutouts for controls and holes for wire.
- 4. Where bollards are indicated to receive light fixtures, provide cutouts for fixtures and holes for wire.
- 5. Fabricate bollards with 3/8-inch- thick steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch anchor bolts.
- 6. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.
- 7. Prime bollards with zinc-rich primer.
- 8. Cap bollards with 1/4-inch- thick steel plate.
- 9. Where bollards are indicated to receive controls for door operators, provide cutouts for controls and holes for wire.
- 10. Where bollards are indicated to receive light fixtures, provide cutouts for fixtures and holes for wire.
- 11. Bollard Cover: Equal to Bollard Covers by Innoplast, T-(440) 543-8660.
 - a. Material: Lo-Density Polyethylene.
 - b. Wall Thickness: 1/4-inch nominal.
 - c. Color: As selected by Architect from manufacturer's standard colors.

B. Unistrut framing:

- 1. Multipurpose steel profiles by Unistrut, Power-Strut, Famet, or equal, complete with manufacturer's standard steel fasteners and connectors, nuts integrally self-locking or fitted with locking devices. Provide galvanized steel members where embedded in concrete or masonry, and factory-primed items elsewhere.
- 2. Provide hanger rods, nuts, bolts, connectors, and anchors with electro-galvanized finish.

2.4 FABRICATION - GENERAL

- A. Comply with the reference standards and the following.
 - B. Engineer, fabricate and install exterior components to allow for expansion and contraction for a temperature range of 150-degree F without causing buckling, excessive opening of joints, and over-stressing of welds and fasteners.
 - C. Drill holes for bolts and screws. For screws exposed to view in finished surfaces use FHCS type with screw slots filled and finished flush and smooth with adjacent surfaces.
 - D. Form exposed work true to line and level with accurate angles and surfaces, and straight, sharp edges, so assembling can be done without filler pieces.
 - E. Shear and punch metals cleanly and accurately. Remove burrs.
 - F. Remove sharp or rough areas on exposed surfaces. Projecting edges are not permitted. Ease exposed edges to a radius of approximately 1/32-inch.
 - G. Weld corners and seams continuously to comply with AWS recommendations and the following:
 - 1. Do not use stitch, spot or tack welds on exposed surfaces.
 - 2. For work exposed to view, provide weld quality and finish equal to NOMMA Finish #1. Elsewhere provide weld quality and finish equal to NOMMA Finish #4.
 - 3. Use materials, methods and welding sequence that minimize distortion and develop strength and corrosion resistance of base metals.
 - 4. Obtain fusion without undercut or overlap.
 - 5. Remove welding flux immediately.
 - 6. At exposed connections, undercut edges of components to be welded, weld and finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.
 - 7. Where welds will be exposed to the elements, weld connections between various pieces continuously to prevent water intrusion in the weld area, or seal welded parts, after weld is ground, with silicone sealant specified in Section 07 92 00.
 - H. Form bent metal corners to the smallest radius possible without causing grain separation or otherwise impairing the strength of the material.
 - I. Form exposed connections with flush, hairline joints, using concealed fasteners wherever possible. Cope intersections of rails and posts, weld joints, and grind smooth; butt weld end-to-end joints of railings or use welding connectors.
 - J. Bend pipe without collapsing or deforming its walls, to produce a smooth, uniform curved section and to maintain uniform sectional shape.
 - K. Fabricate joints that will be exposed to the weather with weep holes where water or condensation may accumulate.
 - L. Fabricate items to be galvanized in accordance with ASTM A 385. Limit use of vent and drain holes and locate where concealed from view in the finish work.
 - M. Cut, reinforce, drill, punch, thread and tap metal work as required to receive finish hardware and similar items of work.
 - N. Fabricate items in the largest Sections practical to minimize field jointing.
 - O. Provide supplementary parts necessary to complete each item of metal fabrication even though such parts may not be shown or specified. Provide all anchors, brackets, and sleeves for securing metal work to adjacent construction.
 - P. Remove blemishes by grinding before cleaning, treating, and applying specified finishes.
- 2.5 PIPE RAILING FABRICATION
- A. General: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

- B. Assemble handrails and railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
 - C. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
 - D. Connect members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose when acceptable to the Architect. Weld connections continuously to match approved Samples.
 - E. Brackets, flanges, fittings, and anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other work, unless otherwise indicated.
 1. Provide inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.
 2. For railing posts set in concrete, unless otherwise indicated, provide preset sleeves of steel not less than 6-inch long with inside dimensions not less than 1/2-inch greater than outside dimensions of post, and steel plate forming bottom closure.
 - F. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.
 - G. Fabricate joints to be exposed to weather to be watertight.
 - H. Close exposed ends of handrail and railing members.
 - I. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4-inch or less.
 - J. Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.
- 2.6 WELDING
- A. Weld shop and field connections continuously in compliance with AWS D1.1, Structural Welding Code - Steel, and AWS D1.3, Structural Welding Code - Sheet Steel, unless bolted connections are specifically shown.
 - B. Grind welds that will remain exposed, smooth and flush to match and blend with parent metal surfaces. Match approved weld Samples.
- 2.7 FABRICATION TOLERANCES
- A. Squareness: 1/8-inch maximum difference in diagonal measurements.
 - B. Maximum offset between components at joints: 1/16-inch except that at welded joints no offset is allowed.
 - C. Maximum misalignment of adjacent members: 1/16-inch.
 - D. Maximum bow: 1/8-inch in 48-inches.
 - E. Maximum deviation from plane: 1/16-inch in 48-inches.
- 2.8 GALVANIZING
- A. Follow procedures outlined in ASTM A 143 to safeguard against and test for possible embrittlement.

1. Exterior: Steel cleaning and preparation followed by hot-dip galvanizing all in accordance with the American Galvanizers Association's recommendations and Section 09 96 00 in the Specifications.
- B. Unless fabricated from galvanized materials, after fabrication hot-dip galvanize exterior ferrous metal items and items installed in exterior walls, which will be concealed when the work is completed and which are totally or partially exposed to the weather, in compliance with ASTM A 123 or A 153, as applicable
- C. Excessive dross, rough surfaces, blisters, lumpiness, runs, edge tears, spikes, and chromate quenching are unacceptable.
- D. Safeguard assemblies against steel embrittlement in compliance with ASTM A 143, and against distortion in compliance with ASTM A 384.
- E. Coating weight shall conform to Table 1 of ASTM A 123, or ASTM A 153, as applicable.
- F. Plug vent holes with lead or silicone sealant after galvanizing.
- G. If necessary to prevent humid storage staining, quench freshly galvanized steel in a passivating solution.

2.9 SHOP PRIMING

- A. Do not shop prime galvanized surfaces.
- B. Surfaces exposed in the Work comply with : SSPC SP6 followed by application of zinc-rich primer.
- C. Surfaces concealed from view: SSPC SP3 followed by rust inhibitive shop primer.
- D. Shop prime metal assemblies as follows, unless otherwise specified in Section 09 96 00:
 1. Prepare surfaces as specified above.
 2. Remove loose mill scale, rust, cutting and punching burrs, oil, grease and other deleterious materials before priming.
 3. Immediately after surface preparation, apply primer in compliance with its manufacturer's instructions to provide a uniform dry film thickness of not less than 1-1/2 mils per coat for rust-inhibitive primer and 3.5 to 3.5 mils for zinc-rich primer. Use painting methods that will result in full coverage of joints, corners, edges and all exposed surfaces.
 4. Apply primer to completely cover all exposed surfaces as well as surfaces concealed after assembly. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 5. Allow paint to dry thoroughly before handling.
 6. Apply one coat of primer to surfaces exposed in the finished work, and 2 coats to surfaces that will be inaccessible after their assembly or erection.

2.10 PROTECTIVE COATINGS

- A. Apply a heavy coat of bituminous paint to metal surfaces that will be in contact with cementitious materials. Do not apply on exposed surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Corrosion prevention: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials using heavy bituminous paint at least 10 DFT, hard plastic spacers, Teflon tape, or silicone or neoprene gaskets.

- B. Fastening:
1. Provide anchorage devices and fasteners required for attaching metal fabrications to in-place construction, including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors required.
 2. Dry-pack metal fabrications supported on concrete and masonry as specified in Section 03 30 00 to provide firm, level bearing surfaces.
- C. Cutting, fitting and placing:
1. Perform all cutting, drilling and fitting required for installation of metal fabrications.
 2. Set items accurately in their proper location, alignment and elevation, plumb, level, true and free of rack as measured from established lines and levels.
 3. Provide temporary bracing or anchors for items to be built into concrete, masonry or similar construction.
 4. Fit exposed connections accurately to form flush, hairline joints.
 5. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and flush with parent metal.
- D. Field welding: Comply with AWS Code for procedures of manual shielded arc welding, appearance and quality of welds made, and methods used to correct faulty welds.
- E. Installing metal bollards.
1. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
 - a. Do not fill removable bollards with concrete.
 2. Anchor bollards to existing construction with expansion anchors. Provide four 3/4-inch bolts at each bollard unless otherwise indicated.
 - a. Embed anchor bolts at least 4 inches in concrete.
 3. Anchor bollards in concrete in formed or core-drilled holes not less than 8 inches deep and 3/4 inch larger than OD of bollard. Fill annular space around bollard solidly with nonshrink grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward bollard.
 4. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
 5. Fill bollards solidly with concrete, mounding top surface to shed water.
- F. Prefabricated units: Install as specified, and in compliance with their manufacturer's instructions.
- G. Gate hardware:
1. Drill and tap gate frames on the job as required for installation of hardware.
 2. Attach hardware accurately fitted to gates and frames with tamper-resistant or concealed means. Install ground-set items in concrete for anchorage.
 3. Adjust to operate smoothly and without sticking and binding.
 4. Gates shall close uniformly against frame. When open in any position, gates shall remain stationary, without drifting.
 5. Latch shall engage strike and keeper regardless of the degree of force with which gates are closed.
 6. Where so required for smooth and noiseless operation, lubricate hardware in compliance with its manufacturer instructions.
- H. Installation tolerances: Adjust metal fabrications for squareness, alignment, twist, levelness and plumbness to the following tolerances.
1. Squareness where applicable: Plus or minus 1/16-inch, measured on the diagonal.

2. Alignment: Plus or minus 1/16-inch where fabrications are separated by one inch or more; where components join or are separated by less than one inch, components shall be aligned; no deviations permitted.
3. Twist: Plus or minus 1/16-inch, except that deviation shall be such that joined panelized components are flush at joints; no deviations permitted.
4. Plumbness: Plus or minus 1/16-inch, except that deviation shall be such that joined panelized components are flush at joints; no deviations permitted.
5. Levelness: 1/8-inch from level, except where tighter tolerances are required for joining or alignment with adjacent work.
6. Deviation from theoretical location in plan: 1/4-inch, except where tighter tolerances are required for joining or alignment with adjacent work.

3.3 FIELD QUALITY CONTROL

- A. Extent and Testing Methodology: Owner's Testing agency may randomly select completed railing assemblies for testing that are representative of different railing designs and conditions in the completed Work. Railings will be tested according to ASTM E 894 and ASTM E 935 for compliance with performance requirements.
 1. Remove and replace railings where test results indicate that they do not comply with specified requirements unless they can be repaired in a manner satisfactory to Architect and will comply with specified requirements.
 2. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- B. Touchup:
 1. General: Immediately after erection, clean field welds, bolted connections and abraded areas, and proceed as follows.
 2. Damaged primer: Clean the damaged area, sand smooth, re-clean and spot-prime with the same paint as that used for shop priming applied to the same dry film thickness as the undamaged primer; minimum thickness of 2 dry mils.
 3. Damaged zinc coating:
 - a. Clean abraded area in accordance with SSPC-SP11, "Power Tool Cleaning" to bare metal all welds and damaged zinc coating. Extend cleaning 2 inches past damaged area.
 - b. Spot prime damaged area with Tnemec "94-H20 Hydro-Zinc" applied at 2.5 to 3.5 Mils DFT.
 4. Where galvanized surface will remain exposed in the Work, repair damaged areas with zinc-based solder in accordance with ASTM A 780, regardless of the width of the abrasion (not limited to 3/16-inch).

END OF SECTION

DIVISION 07
THERMAL & MOISTURE PROTECTION

SECTION 07 26 00
VAPOR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Vapor barrier for below slab-on-grade.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 03 30 00: Cast-in-Place Concrete.
 - 3. Division 09: Finishes; flooring sections.

1.2 REFERENCES

- A. American Concrete Institute (ACI) Publication:
 - 1. ACI 302.2R - Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
- B. ASTM International (ASTM):
 - 1. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
 - 2. ASTM D1709 - Standard Test Methods of Impact Resistance of Plastic Film by the Free-Falling Dart Method.
 - 3. ASTM E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.
 - 4. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
 - 5. ASTM E1643 - Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for vapor barrier and accessories.
- B. Samples:
 - 1. 12 inch by 12 inch vapor barrier samples.
 - 2. Pressure-Sensitive Tape: 12 inch long sample.
- C. Test Reports: Conducted by nationally recognized independent testing agency indicating conformance with specified performance requirements.

1.4 QUALITY ASSURANCE

- A. ASTM tests referenced in this Section shall be performed on a single production roll per ASTM E1745 Section 8.1. Submit third party documentation certifying this requirement.

- B. Pre-Installation Conference: Contractor shall coordinate and conduct pre-installation conference in accordance to Section 01 31 19, Project Meetings, to review the progress of construction activities and preparations for the installation of vapor barrier.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, handle and protect in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging with labels intact.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Multi-layer plastic extrusion manufactured with high grade prime, virgin, polyolefin resins. Thickness shall be 15 mils minimum.
 - 1. Stego Wrap by Stego Industries LLC.
 - 2. Perminator by W.R. Meadows.
 - 3. Ecoshield-E by Epro.
 - 4. Equal.
- B. Physical Properties:
 - 1. Maintain permeance of less than 0.01 Perms as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
 - 2. Class Rating per ASTM E1745: Class A.
 - 3. Puncture resistance per ASTM D 1709: 2200 g or higher.
 - 4. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1
- C. Accessories: Provide manufacturer recommended accessories for seams, penetrations and perimeter edges, including tapes, mastics, termination for a complete vapor barrier installation per ASTM E1643.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine subsoil and notify OAR of deficiencies detrimental to proper vapor barrier installation; do not proceed until corrected.

3.2 INSTALLATION

- A. Install vapor barrier in accordance ASTM E1643 and manufacturer's instructions.
 - 1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
 - 2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise, where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself using manufacturer ASTM

E1643 compliant accessory designed to adhere to concrete. Seam tape shall not be used for sealing the vapor barrier to the foundation wall, grade beam or slab.

3. Overlap joints 6 inches and seal with manufacturer's seam tape.
 4. Seal vapor barrier penetrations per manufacturer's instructions.
 5. Avoid the use of non-permanent stakes driven through the vapor barrier.
- B. Prior to concrete placement inspect vapor barrier for damage. Clean damaged areas and with vapor barrier material cut a minimum 6 inches larger than damaged area on all sides. Seal to main vapor barrier with continuous seam tape.

3.3 CLEAN UP

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

3.4 PROTECTION

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

END OF SECTION

DIVISION 10

SPECIALTIES

SECTION 10 14 00

SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Exterior signs:
- B. Interior Signs:
 - 1. Room and door signs.
 - 2. Building identification signs.
 - 3. Code-compliance signs at exits, stairs and toilet rooms.
 - 4. Exit signs, unlighted.

1.2 SUBMITTALS

- A. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- B. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
- C. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment. Include the letters "B" and "H" in cast steel letters with paint.
- D. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- E. Verification Samples: Submit samples showing colors specified.
- F. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Uniformity: For each sign form and graphic image process indicated furnish products of a single manufacturer.
- C. Coordination: Before starting Shop Drawings, notify the Architect and arrange a meeting with the Owner's designated personnel to review in detail the work of this Section. Review and coordinate layouts for each sign, and obtain Architect's approval prior to manufacture.
- D. All tactile room identification and exit signs shall include Grade 2 Braille translation with the tactile portion of the sign following the requirements of ADA.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.

1.5 FIELD CONDITIONS

- A. Verify type of supporting construction; provide suitable attachments.

- B. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- C. Maintain this minimum temperature during and after installation of signs.
- D. Adhesive as the sole means of installation is only allowed where sign is to be on glazing.

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS

- A. Signage shall conform to the CBC and specifically to the following CBC chapters:
 - 1. Chapter 11B-201.1 for design and construction, 11B-603 and 11B-604.8 for passageways.
 - 2. Chapter 11B-216.6 for scoping for signs where accessible routes diverge from the regular circulation path
 - 3. Chapter 11B-703 for non-accessible existing entrances and general standards.
 - 4. Chapter 11B-703.3 for braille requirements.
 - 5. Chapter 11B-703.5.1, 6.2 and 7.3 for finish and contrast.
 - 6. Chapter 11B-703.2.4 and 2.6 for proportions.
 - 7. Chapter 11B-307.3 for pole-mounted objects, edges and corners.
- B. Braille Symbols:
 - 1. Character Type: Characters on signs shall be raised 1/32 inch minimum and shall be sans serif uppercase characters accompanied by contracted Grade 2 Braille (see Note 5 below).
 - 2. Character Size: Raised characters shall be a minimum of 5/8 inch and a maximum of 2 inch high.
 - 3. Finish and Contrast: Contrast between characters, symbols and their background must be 70% minimum and have a non-glare finish. CBC 1117B.5.2.
 - 4. Proportions: Characters on signs shall have a width-to-height ratio of between 3:5 and 1:1 and a stroke width-to-height ratio of between 1:5 and 1:10. CBC 1117B.5.3.
 - 5. Letters measured must be uppercase. After choosing a typestyle to test, begin by printing the letters I, X, and O at 1 inch height. Place the template's 1:1 square over the X or O, whichever is narrower. If the character is not wider than 1 inch, nor narrower than the 3:5 rectangle, the proportions are correct. Use the 1:5 rectangle to determine if the stroke of the I is too broad, and the 1:10 rectangle to see if it is too narrow. If all the tests are passed, the typestyle is compliant with proportion code.
 - 6. Braille: Contracted Grade 2 Braille shall be used whenever Braille is required in other portions of these standards. Dots shall be spaced 1/10 inch on center in each cell, with 2/10 inch space between cells, measured from the second column of dots in the first cell to the first column of dots in the second cell. Dots shall be raised a minimum of 1/40 inch above background. CBC Section 1117B.5.6.
 - 7. Provide rounded or domed Contracted Grade 2 Braille dots, each distinct and separate. Dots with straight sides and flat tops are not acceptable.
- C. Type Imagery:
 - 1. Type style: Sans Serif upper case.
 - a. Letter Size: See signage drawings.
 - b. Number Size: See signage drawings.
 - c. Raised Letters: Letters shall be raised a minimum of 1/32 inch above background.
 - d. Other Sizes: As specifically indicated.
 - 2. Arrangement: Use standard spacing between letters, words, numbers and lines; center text.
 - 3. Symbol Style: Recognized standard International Symbols of Accessibility, such as those developed by the American Institute of Graphics, for the U. S. Department of Transportation.
 - a. Accessible Restrooms shall include a 6 inch high wheelchair logo. Logo shall be raised a minimum of 1/32 inch above the background.

- b. On visual signs, characters and symbols shall be sized according – to view distance. Signs mounted 80 inch or more AFF shall have minimum 3 inch high characters.
 - c. Pictographs and ISA's (International Symbol of Accessibility) on interior signs at eye level, shall be minimum 3 inch high or twice as high as the height of text on the sign; whichever is greater. On signs where bottom is 72 inch or more AFF, minimum height shall be 6 inch or twice as high as the largest text on the signs; whichever is greater.
4. Colors:
- a. Background Colors: As selected by the Architect from manufacturer's standard color range (12 colors maximum); one color maximum, typically.
 - b. Type Imagery: White or black, as selected by Architect to contrast with background colors; one color maximum, each, for interiors and exteriors.
 - c. Code Required Colors for Symbols and Signs: Where colors are mandated by Codes or Regulations conform to their requirements including 11B-703; colors from the CBC.
 - d. Other colors: Certain colors are specifically noted.

2.2 MANUFACTURERS

- A. Acceptable Manufacturers:
- 1. Advance Corporation; Braille-Tac Division.
 - 2. ASI.
 - 3. Architectural Graphics, Inc.
 - 4. Architectural Signs and Directories.
 - 5. Vomar Products, Inc.
 - 6. Or equal.

2.3 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: All signs are required to comply with ADAAG and CBC Chapter 11B and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. All Signage Types: Unless otherwise indicated:
- 1. Character Font: Helvetica, or other sans serif font acceptable to the Architect.
 - 2. Character Case: Upper case only.
 - 3. Background Color: Clear.
 - 4. Character Color: Contrasting color.
- C. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
- 1. Sign Type: Flat signs with engraved panel media as specified.
 - 2. Provide "tactile" signage, see above.
 - 3. Braille shall be rounded or contracted domed top.
 - 4. Character Height: 1 inch.
 - 5. Sign Height: 2 inches, unless otherwise indicated.
 - 6. Office Doors: Identify with room numbers to be determined later, not the numbers shown on the drawings.
 - 7. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers shown on the drawings.
 - 8. Service Rooms: Identify with the room names and numbers shown on the drawings.

2.4 PLASTIC SIGN MATERIAL

- A. Material:
- 1. Type: Phenolic Resin Core with a three-ply melamine resin surface.
 - 2. Thickness: 1/8 inch.

- B. Adhesive: Pressure sensitive, hi-tack transfer tape with peel-back paper backing. Structural grade silicone adhesive for mounting on glazing.
- C. Mounting Screws: Non-corrosive, tamperproof screws. Match finishes to the door hardware for the door where the signs are mounted.
- D. Signs shall be non-static, fire retardant, and self-extinguishing.
- E. No. SP125 Manufacturing Specifications per basis of design manufacturer:
 - 1. Material thickness: 1/8 inch.
 - 2. Standard sheet size: 48 inch x 96 inch.
 - 3. Weight: 1/8 inch = 1 lb/ square foot.
 - 4. Maximum continuous operating temperature: 225°F.
 - 5. Flexural strength flat: 21,497 psi.
 - 6. Tensile strength: 22,000 psi.
 - 7. Shear strength: 22,729 psi.
 - 8. NEMA rated "self-extinguishing"

2.5 SIGN TYPES

- A. Graphic Process and Fabrication: All signs shall be manufactured using "Sand-Etched Process" or equivalent system, as per acceptable manufacturers stated methods, whereby characters are integral part of signage body.
 - 1. Tactile characters shall be raised the required 1/32 inch from sign face. Glue-on letters, images and/or symbols are not acceptable.
 - 2. Work to have sharp clean profiles.
 - 3. Text shall be accompanied by Contracted Grade 2 Braille. Braille shall be separated 1/2 inch from corresponding raised characters or symbols.
 - 4. Perimeter borders shall be 1/4 inch minimum.
 - 5. Edges: Finish edges smooth and clean, without chips or burrs.
 - 6. Corners: Provide radius corners; 1/8 inch diameter.
 - 7. Cut-outs For Hardware: Factory made, accurately, to templates.
 - 8. Mounting Holes: Factory drilled.
 - 9. Adhesive Backing: Completely cover rear surface of each sign.
- B. Room Identification Signs:
 - 1. Refer to Drawings for names, numbers, identification symbols, sizes, configurations, and locations.
 - 2. Colors for Type Imagery:
 - a. Room Name Signs:
 - 1) Type: Black or white, to be selected by Architect.
 - 2) Background: One color to be selected by the Architect from manufacturer's standard color range (12 colors, minimum) for interior signs, unless otherwise noted. Refer to signage schedule.
 - b. Room Number Signs:
 - 1) Type: Black or white, to be selected by Architect.
 - 2) Background: One color to be selected by the Architect from manufacturer's standard color range (12 colors, minimum) for interior signs, unless otherwise noted. Refer to signage schedule.
 - 3) Architect shall select a second color for signs located on exterior.
- C. Accessibility Symbol Signs:
 - 1. Refer to Drawings for identification symbols, sizes, configuration, and locations.
 - 2. Figure Symbols for Building Entrance Signs:
 - a. Size: 6 inch x 6 inch, typically.
 - b. Refer to Drawings.

3. Geometric Symbols for Toilet Rooms:
 - a. For Men/Boys: An equilateral triangle, 10 inch on a side; 1/8 inch thick.
 - b. For Women/Girls: A 12 inch diameter circle; 1/8 inch thick.
 - c. For Both Sexes: An equilateral triangle, 10 inch on a side, inlaid in 12 inch diameter circle; 1/8 thickness.
4. Directional Signs.
5. International Symbol for Access for the hearing impaired.
6. Colors for Symbols:
 - a. International Accessibility Symbols:
 - 1) Symbols: White.
 - 2) Background: Blue, Color No. 15090 per Federal Standard 595B.
 - b. Male and Female Symbols:
 - 1) Symbols: Blue.
 - 2) Background: White.

D. Room Capacity Signs:

1. Wording for sign at Assembly Room at Multi-Purpose Building: See Plans and Signage drawings. Number to be on Drawings or provided by Architect.
2. Refer to Drawings for identification.

E. Exit Signs; Floor Level, Self-Luminous:

1. General:
 - a. Conform to State Fire Marshal, Title 19.
 - b. UL listed 924 Floor-level exit signs.
 - c. UL listed 1994 floor-level exit markers and exit path marking.
 - d. ICBO No. ERS-5101.
2. Refer to Drawings for identification, symbols, sizes, configuration, and location.
3. Mounting Locations: Single-face for flat-to-wall mounting.
4. Acceptable Manufacturer and Product: Active Safety; Murray, Utah; 800-657-6324; Model #16.000 SWMA stencil-faced Exit Marker, or equal.

F. Metal Signs:

1. Sign Components:
 - a. Extruded anodized brushed aluminum sign casement with a thickness of 2mm dimensional curved profile. Color to be natural mill finish.
 - b. Protective Cover: Clear non-glare plastic cover of PETG, or Lexan with a 1mm thickness luminous insert.
 - c. Anti-Graffiti, 3M Scotchgard Multi-Layer Protective Film 1004 (0.5mm), ASTM D3652.
 - d. Aluminum end-caps, pre-drilled with a 3mm thickness.
2. Refer to Drawings for sign locations and configuration.
3. Photo-luminescent pigment PVC vinyl compound sheet with adhesive back.
 - a. Printing Method: Silkscreen printing.
 - b. Luminescent Properties: Yellowish green glowing color with brightness of afterglow of 12 hours (according to DIN 6210, Part 1).
 - c. Flame Retardant: 27.
 - d. Thickness: 0.79mm (luminous film of 0.63mm plus self-adhesive backing of 0.04mm).

2.6 ACCESSORIES

A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.

1. Exterior:
2. Interior: Bright finish.

- B. Tape Adhesive: Double sided tape, permanent adhesive.
 - 1. Completely cover the plate with adhesive.
- C. Where flat signs are mounted on glass walls:
 - 1. Provide an additional blank plate with same background color.
 - 2. Mount this plate on the inside of glass in alignment with sign plate.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.2 PREPARATION

- A. Layout: Accurately lay out work to maintain proper lines, levels and spacing.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions and CBC Chapter 11B.
- B. Install neatly, with horizontal edges level.
- C. Mounting location shall be determined so that a person may approach within 3 inches of signage without encountering protruding objects or standing within the swing of the door. CBC Section 1117B.5.7.
- D. Mounting:
 - 1. See drawings for locations.
 - 2. Press tape firmly to mounting surface, and secure each plaque or sign with minimum four tamper-proof screws for square or rectangular signs; minimum three tamper-proof screws for triangle, or round signs.
 - 3. Signs shall have pre-drilled holes when delivered, and mounted with non-corroding anchors and tamper-proof screws.
 - 4. When mounting on glazing, press silicone adhesive firmly to glazing. Clean excess adhesive from glazing.
- E. Protect from damage until Substantial Completion; repair or replace damage items.

END OF SECTION

DIVISION 31

EARTHWORK

SECTION 31 10 00

SITE CLEARING

PART 1 – GENERAL

1.1 SUMMARY

- A. Provisions of the general and supplementary conditions and Division One apply to this section.
- B. Section Includes:
 - 1. Removal of vegetation, grass, grass roots, shrubs, tree stumps, trees, upturned stumps, weed growth, tree roots, brush, masonry, concrete, rubbish, debris and other objectionable materials, within limits of construction.
 - 2. Removal of concrete and bituminous surfaces.
 - 3. Removal of existing fences and gates
- C. Related Sections:
 - 1. Section 31 22 00: Grading
 - 2. Section 02316: Excavating, Backfilling and Compacting for Pavement.
 - 3. Section 02315: Excavating, Backfilling and Compacting.
 - 4. Section 02319: Base Course

1.2 SUBMITTALS

- A. Shop Drawings
 - 1. Submit site plan showing extent of clearing, and indicating methods proposed.

1.3 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. Standard Specifications for Public Works Construction, current edition.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION

3.01 TREE AND STUMP REMOVAL

- A. Remove trees and stumps indicated to be removed. Remove trees, together with bulk of roots, to a minimum depth of four feet below existing grade, and within a radius of approximately seven feet beyond perimeter of trunk at ground line.

- B. Fill and compact holes resulting from tree and stump removal. Fill in six inch layers, each compacted to 90% of maximum density in accordance with ASTM D 1557.
 - 1. Prior to filling holes, schedule an inspection by District Inspector. Do not proceed until approved by District Inspector.

3.02 CONCRETE AND BITUMINOUS SURFACING REMOVAL

- A. Rehabilitation of existing asphalt per District instruction - Pulverize existing material to subgrade and use as base in accordance with section 3.03 – B.

Or

- B. Break up and completely remove all existing concrete surfacing, curbs, gutters, walks and bituminous surfacing to limits indicated to be removed. All cutting shall be done to a neat and even line with proper tools or concrete cutting saw with a new, sharp blade. Minimum depth of cut shall be 1-1/2 inch, unless otherwise indicated. Remove concrete broken beyond the indicated limits to the nearest joint or score line and replace with new concrete to match existing.

3.03 FENCING

- A. Existing fencing scheduled to remain, may be removed to facilitate the work, provide such are reinstalled to their original condition at completion of the work. Reinstall in accordance with requirements of section 32 31 13: Chain Link Fences and Gates: Section and Gates.
- B. Fencing that is indicated to be removed and not reinstalled shall be completely removed, including footings. Fill and compact holes resulting from removal. Remove materials and dispose of off-site.
- C. Reinstall chain link fencing indicated to be relocated or reset in accordance with applicable requirements specified under section 32 31 13: Chain Link Fences and Gates: Section and Gates.

3.04 DISPOSAL

- A. Remove Materials and debris and dispose of off-site.

END OF SECTION

SECTION 31 20 00

EARTHWORK

PART 1 - GENERAL

- A. Drawings and general provisions of the Contract, including general and supplementary conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Preparing and grading subgrades for slabs-on-grade, walks, pavements and landscaping
2. Excavating and backfilling for buildings and structures.
3. Drainage and moisture-control fill course for concrete slabs-on-grade.
4. Base course for concrete walks, asphalt and pavements.
5. Subsurface drainage backfill for walls and trenches.
6. Excavating and backfilling trenches for utilities and appurtenances outside building lines.

- B. Related Sections:

1. Division 01 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities.
2. Division 03 Section "Cast-in-Place Concrete" for granular course beneath the slab-on-grade.
3. Division 31 Section "Site Clearing" for site stripping, grubbing, and removal of above- and below-grade improvements and utilities.

1.3 REFERENCE SPECIFICATION

- A. Perform all work in accordance with applicable provisions of "Standard Specifications for Public Works Construction", 2018 Edition, City of Los Angeles Ordinances and Amendments, latest editions, UBC and 2019 CBC. Unless otherwise noted, mention herein of section numbers refers to sections of the Reference Specification. Where Reference Specification refers to "Agency", substitute the word "Owner". Where Reference Specification refers to "Engineer", substitute the word "Architect". Where Reference Specification is in conflict with these Specifications, these Specifications shall govern.
- B. The recommendations found in the Geotechnical Exploration Report prepared by Ninyo & Moore Geotechnical and Environmental Sciences Consultants dated September 9, 2014 apply to this Section.

1.4 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.

2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Aggregate layer placed between the subbase course and the surface pavement in paving system.
- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill when sufficient approved soil material is not available from excavations
- E. Drainage Fill: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered to subgrade elevations and the re-use or disposal of materials removed.
1. Authorized Additional Excavation: Excavation below subgrade elevations as directed by Architect.
 2. Unauthorized Excavation: Excavation below subgrade elevations without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within building lines.
- L. Compaction: Any method of mechanically stabilizing a material by increasing its density at a controlled moisture condition. "Degree of Compaction" is expressed as a percentage of the maximum dry density obtained by the test procedure described in ASTM D 1557 for general soil types abbreviated in this Specification as 90 percent of maximum dry density".
- M. Hard Material: Weathered rock, dense consolidated deposits or conglomerate materials which are not included in the definition of "rock" but which usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal
- N. Lift: A layer or course of soil placed on top of previously prepared or placed soil in a fill or embankment.
- O. Unsatisfactory Material: Soil or other material identified as having insufficient strength or stability to carry intended loads without excessive consolidation or loss of stability.

1.5 SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
 - 1. Warning Tape
 - 2. Geotextile
 - 3. Water Quality Filter Media
- B. Location of Borrow Materials.
- C. Material Test Reports
- D. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

1.6 QUALITY ASSURANCE

- A. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction
- B. Testing and Inspection Service: Owner will employ a qualified independent geotechnical engineering testing agency to classify proposed on-site and borrow soils to verify that soils comply with specified requirements and to perform required field and laboratory testing.
- C. Pre-excavation Conference: Before commencing earthwork, meet with representatives of the governing authorities, Owner, Architect, consultants, Geotechnical Engineer, independent testing agency, and other concerned entities. Review earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least 3 working days prior to convening conference. Record discussions and agreements and furnish a copy to each participant.

1.7 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted in writing by the Architect and then only after acceptable temporary utility services have been provided.
 - 1. Provide a minimum 48-hours' notice to the Architect and receive written notice to proceed before interrupting any utility.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies and owner to shutoff services if lines are active.
- C. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- D. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Architect.
- E. Utility Locator Service: Notify UNDERGROUND SERVICE ALERT for area where Project is located before beginning earth moving operations.
- F. Do not commence earth moving operations until temporary erosion/sedimentation control measures, specified in Division 01 are in place.
- G. Perched Groundwater was mapped at approximately 50 feet below the ground surface.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil materials imported or excavated on the property determined to be suitable as referenced in the project Geotechnical Investigation Report; and approved by the Geotechnical Engineer.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 or a combination of these groups.
 1. Refer to Geotechnical Investigation Report, for unsuitable materials and disposal methods for unsatisfactory soils.
- D. Backfill and Fill Materials: Satisfactory soil materials.
- E. Base Material: Shall conform to crushed aggregate base or crushed miscellaneous base, as specified on plan, in accordance with section 200-2.2 or 200-2.4, respectively, of the Reference Specification, and compacted to at least 95% of the maximum dry density as determined by ASTM Test Method D 1557.
- F. Engineered Fill: Base Materials and compacted fill materials
- G. Bedding Material: Shall be 1 sack slurry per soils report.
- H. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, ASTM D 448, coarse aggregate grading size 57, with 100 percent passing a 1-1/2-inch sieve and not more than 5 percent passing a No. 8 sieve
- I. Filtering Material: Evenly graded mixture of natural or crushed gravel or crushed stone and natural sand, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 50 sieve.
- J. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 GEOTEXTILES

- A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater

than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 157 lbf (700 N); ASTM D 4632.
3. Sewn Seam Strength: 142 lbf (630 N); ASTM D 4632.
4. Tear Strength: 56 lbf (250 N); ASTM D 4533.
5. Puncture Strength: 56 lbf (250 N); ASTM D 4833.
6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
7. Permittivity: 0.2 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.
6. White: Steam systems

- B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.
6. White: Steam Systems

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Tree protection is specified in the Section 31 10 00 "Site Clearing". Refer to landscape architectural plans for instructions.

- D. Prepare subgrade and place base materials in accordance with sections 301-1.2 and 301-2, respectively, of the Reference Specification.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Dewatering shall be done in accordance with NPDES waste discharge requirements. Contractor shall obtain all necessary Dewatering permits from state and local jurisdictions.
- C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

- A. General: Excavation shall be to the contours, elevations and dimensions indicated. Keep excavations free from water and debris while construction is in progress. Notify the Owner immediately in writing where it becomes necessary to remove hard, soft, weak, or wet material to a depth greater than indicated. Unless otherwise indicated, concrete placed below grade will be formed and excavations shall allow for placement and removal of forms. Side cuts shall be cribbed and shored as required.
- B. Unclassified Excavation: Excavation is unclassified and includes excavation to required subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions as described in the referenced Geotechnical Investigations Report.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials, replace with satisfactory soil materials.
 - 2. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and rocks.
 - 3. Rock fragments greater than 4 inches in diameter shall be taken off-site or placed in accordance with the recommendations of the Geotechnical Engineer in areas designated as suitable for rock disposal.

3.5 STABILITY OF EXCAVATIONS

- A. Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations.

- B. Unshored Temporary Excavations:
 - 1. Unshored temporary excavations may be sloped back at 1 to 1 (horizontal to vertical) or flatter up to 5 feet in height. Where sloped embankments are used, the tops of the slopes should be barricaded to prevent vehicles and storage loads within seven feet of the tops of the slopes. If the temporary construction slopes will be maintained during the rainy season, construct berms along the tops of the slopes where necessary to prevent run-off water from entering the excavation and eroding the slope faces.

3.6 EXCAVATION FOR STRUCTURES

- A. Excavation Limits: Shall be to a tolerance of plus-or-minus 0.10 foot and shall extend two (2) or more feet laterally beyond the building limits at the excavation level and two (2) feet below existing grade, or deeper to excavate existing fill. The excavation side slopes shall not exceed a slope ratio of 1.5 to 1, horizontal to vertical, up to 5 feet in height, unless they are positively retained by shoring or other approved methods. Over-excavation side slopes may be vertical, as long as they are no higher than allowed by the State of California Construction Safety Orders, in which case they shall be no steeper than 1.5 to 1. If cut below depths indicated, excavations shall be filled with concrete when the foundations or footings are placed. Revise first subparagraph below if footings and foundations are placed on engineered fill.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 - 2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot. Do not disturb bottom of excavations intended as bearing surfaces.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:
 - 1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

3.7 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.8 EXCAVATION FOR UTILITY TRENCHES

- A. Excavation made with power-driven equipment is not permitted within two feet of any known utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, use hand or light equipment excavation. Start hand or light equipment excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines and other existing work affected by the excavation work of this Section until approval for backfill is granted by the geotechnical engineer. Immediately report damage to utility lines or subsurface construction to the Owner.
- B. Where unidentified existing utilities are encountered, determine whether these are active or abandoned. Remove interfering portions of abandoned utilities and cap or plug open ends of pipe to remain. The cap or plug must seal the opening in such a manner that would permit remaining portions of the utility to be reactivated. Notify Owner for instructions on utilities which

are determined to be active. Do not proceed without instructions, except to correct an immediate hazard or emergency condition. Relocation work performed on an active utility without obtaining prior approval from Owner shall be done at the Contractor's expense and liability.

- C. In areas where compacted backfill has been placed, additional consolidation may occur after completion due to changes in moisture content and surcharge. Utility connections crossing this backfill, and improvements adjoining the building at the backfill line shall be installed taking into account this additional consolidation, or sufficient time shall be scheduled between backfilling operations and such improvements to allow this consolidation to take place. Damage to utilities or other improvements due to Contractor's negligence in regard to this paragraph shall be repaired at the Contractor's expense
- D. Protect newly backfilled areas and adjacent structures, slopes, or grades from traffic, erosion settlement, and any other damage. Repair and re-establish damaged or eroded grades and slopes and restore surface construction prior to acceptance
- E. Cutting Pavement, Curbs, and Gutters: Saw cut with neat, parallel, straight lines one foot wider than trench width on each side of trenches and one foot beyond each edge of pits. If an existing pavement joint or cracked area is within two feet outside of a designated sawcut line shown on the Drawings, removal and resurfacing shall be to that joint, and/or shall include the crack or cracked area, unless otherwise approved by Architect.
- F. Contractor shall pothole at all identifiable crossings of existing utilities prior to any trenching operations and provide Architect with a survey of the top elevations (and bottom elevations, if applicable), of possible interferences so that an evaluation of necessary adjustments to the current profile or alignment may be made. Additionally, Architect shall be given the opportunity to view possible conflicts in the field prior to providing revised designs.
- G. Provide a minimum cover from grade of 3 feet for water mains and gas mains unless otherwise indicated on plans and details. Storm drains and sewers shall be to the depths indicated. Where settlements greater than the tolerance allowed herein for grading occur in trenches and pits due to improper compaction, excavate to the depth necessary to rectify the problem, then backfill and compact the excavation as specified herein and restore the surface to the required elevation.
- H. Keep excavations free from water while construction is in progress.
- I. Notify the Owner immediately in writing if it becomes necessary to remove rock or hard, unstable, or otherwise unsatisfactory material to a depth greater than indicated. Excavate large rock, boulders, and other unyielding material to depth at least 6 inches below the bottom of the pipe, conduit, duct and appurtenances, unless otherwise indicated or specified. Over-excavate soft, weak, or wet excavations to an depth at least 6 inches below the bottom of the pipe, conduit, duct or appurtenances unless otherwise indicated or specified.
- J. Excavate trenches to indicated slopes, lines, depths, and invert elevations.
- K. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, except where sloping of sides is allowed. Sides of trenches shall not be sloped from the bottom of the trench up to the elevation of the top of the pipe. See plans for detail.
- L. At the option of the Contractor, the excavations may be overcut to depth of not less than 4 inches and refilled to required grade as specified.

- M. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove stones and sharp objects to avoid point loading.
1. For pipes or conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
 3. Dig bell holes and depressions for joints after trench has been graded. Dimension of bell holes shall be as required for properly making the particular type of joint to ensure that the bell does not bear on the bottom of the excavation.

3.9 APPROVAL OF SUBGRADE

- A. Notify Architect when excavations have reached required subgrade.
- B. If and when Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Roll subgrade below the building slabs and pavements with a pneumatic-tired roller to identify soft pockets and areas of excess yielding. Do not roll wet or saturated subgrades.
1. Completely roll subgrade in one direction, repeating rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).
 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- D. Unforeseen additional excavation and replacement material will be paid for according to Contract provisions for Changes in Work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.10 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending indicated bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used to bring elevations to proper position when acceptable to the Architect.
1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.11 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.12 SOIL TREATMENT

- A. All chemical applications used for soil treatment are subject to the approval of the Owner.
- B. Recommended termiticide: Chlorpyrifos "Dursban TC", or "Permetrin Torpedo" or "Dragnet", or approved equal.
- C. Do not apply soil treatment solution until excavating, filling and grading operations are completed and prior to any membrane being placed beginning concrete placement or other construction activities.
- D. To ensure penetration, do not apply soil treatment to excessively wet soils or during inclement weather. Comply with handling and application instruction of soil toxicant manufacturer.
- E. Remove foreign matter which could decrease effectiveness of treatment on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under foundations.
- F. Apply soil treatment solution at rates recommended by soil toxicant manufacturer.
- G. Allow not less than 12 hours for drying after application, before beginning concrete placement or other construction activities
- H. Reapply soil treatment solution to areas disturbed by subsequent excavation or other construction activities following application.

3.13 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 1. Acceptance of construction below finish grade including, where applicable, subdrainage, damp-proofing, waterproofing, and perimeter insulation.
 2. Surveying locations of underground utilities for Record Documents.
 3. Testing and inspecting underground utilities.
 4. Removing concrete formwork.
 5. Removing trash and debris.
 6. Removing temporary shoring and bracing, and sheeting.
 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.14 UTILITY TRENCH BACKFILL AND COMPACTION

- A. Backfilling of exterior utility trenches shall not be undertaken until geotechnical engineer has received 24-hours notice, until required tests and inspections have been completed, and until as-built location notes have been furnished. Remove uninspected backfill in accordance with requirements of this specification. Use hand-operated, plate-type, vibratory, or other suitable hand tampers in areas not accessible to larger rollers or compactors. Avoid damaging pipes and protective pipe coatings.

- B. Place backfill material in accordance with Section 306-1.3.2 of the Reference Specifications and achieve at least 90% of the maximum density. The top 12 inches of backfill in the building or paved areas shall be compacted to 90% of maximum density.
- C. Compaction by ponding or flooding will not be permitted.
- D. Place and compact bedding course on rock and other unyielding bearing surfaces and to fill unauthorized excavations. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- E. Concrete backfill trenches that carry below or pass under footings and that are excavated within 18 inches of footings. Place concrete to level of bottom of footings
- F. Provide 4-inch-thick concrete base slab support for piping or conduit less than 2'-6" below surface of roadways. After installation and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway base.
- G. Place and compact initial backfill of satisfactory soil material or base material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit.
 - 1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

3.15 FILL

- A. Preparation: Scarify and remove vegetation, topsoil, debris, wet, and unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placing fills.
 - 1. The scarified ground shall be brought to optimum moisture, mixed as required, and compacted as specified. If the scarified zone is greater than 12 inches in depth, the excess shall be removed and placed in lifts restricted to six inches.
 - 2. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.
 - 3. Under steps and ramps, use base materials
 - 4. Under building slabs, use base materials
 - 5. Under footings and foundations, use drainage fill materials.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.16 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

- a. Stockpile or spread and dry removed wet satisfactory soil material.

3.17 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 8 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure. Keep rollers and other heavy equipment at least 18 inches from footings, foundations, piers and walls of buildings and accessory construction. Use mechanical and hand tampers weighing at least 90 pounds with a maximum face area of 48 inches square to compact backfill within 18 inches of construction and where access is restricted.
- C. Percentage of Maximum Dry Density Requirements: Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
 - 1. For general site fills, compact each layer of backfill or fill material at 90 percent maximum dry density.
 - 2. Under structures, building slabs, and steps, scarify and recompact top 24 inches below footing or slab and each layer of backfill or fill soil material at 90 percent maximum dry density.
 - 3. Under walkways and paving, scarify and recompact top 12 inches below subgrade and compact each layer of backfill or fill soil material at 90 percent maximum dry density.
 - 4. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 90 percent maximum dry density.

3.18 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
 - 3. If necessary, the Contractor's selected equipment and construction procedure shall be altered, changed or modified in order to meet the specified compaction requirements. Flooding and water jetting is prohibited.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Lawn or Unpaved Areas: ± 0.10 foot, unless otherwise indicated.
 - 2. Concrete Walks: ± 0.025 foot.
 - 3. Pavements:
 - a. Concrete: 0.025 foot minus, with no high spots.
 - b. Asphalt: 0.05 foot minus, with no high spots.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of $\frac{1}{2}$ inch when tested with a 10-foot straightedge.

3.19 SUBSURFACE DRAINAGE

- A. Subdrainage Pipe: Specified in Division 33 Section "Storm Drainage."
- B. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches x 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
 - 1. Compact each filter material layer to 90 percent of maximum dry unit weight
- C. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
 - 1. Compact each filter material layer to 90 percent of maximum dry unit weight
 - 2. Place and compact impervious fill over drainage backfill in 6-inch thick compacted layers to final subgrade.

3.20 BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place base course under pavements and walks as follows:
 - 1. Compact base courses at optimum moisture content to required grades, lines, cross sections and thickness to not less than 95 percent of ASTM D 4254 relative density.
 - 2. Shape base to required crown elevations and cross-slope grades.
 - 3. When thickness of compacted base course is 6 inches or less, place materials in a single layer.
 - 4. When thickness of compacted base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.21 PAVEMENT REPAIR

- A. Repair or patch asphalt pavement as specified in Section 32 12 16 Asphalt Paving. Repair or patch concrete pavement, curbs and gutters as specified in Section 32 1313 Concrete Paving. Do not repair pavement until trench has been backfilled and compacted as herein specified. As a minimum, maintain one-way traffic on roads and streets crossed by trenches.

3.22 FIELD QUALITY CONTROL

- A. Testing Agency Services: Allow testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.
 - 1. Perform field in-place density tests according to ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method), or ASTM D 2937 (drive cylinder method), as applicable.

- a. Field in-place density tests may also be performed by the nuclear method according to ASTM D 2922, provided that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. With each density calibration check, check the calibration curves furnished with the moisture gages according to ASTM D 3017
 - b. When field in-place density tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Architect.
- B. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
 - C. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, perform at least one field in-place density test for every 2,000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
 - D. Foundation Wall Backfill: In each compacted backfill layer, perform at least one field in-place density test for each 100 feet or less of wall length, but no fewer than two tests along a wall face.
 - E. Trench Backfill: In each compacted initial and final backfill layer, perform at least one field in-place density test for each 150 feet or less of trench, but no fewer than two tests.
 - F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.23 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact at optimum moisture content to the required density.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.24 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
 - 1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 31 22 00

GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this section shall include excavation, unclassified cut, unclassified fill, removing existing unsatisfactory material, preparing areas to be filled, spreading and compacting of fill in the areas to be filled, and all other work necessary to complete the grading of the site. It shall be the Contractor's responsibility to place, spread, moisten or dry, and compact the fill in strict accordance with these specifications to the lines and grades indicated on project plans or as directed in writing by the Geotechnical Engineer. Included with this Work are the following:

1. General exterior grading, cutting and filling, including grading for building area, paving, planting areas, banks and hillsides.
2. Excavating, filling, backfilling, and compacting for Project site pavement, planting areas, buildings, and other structures.
3. Base course for walks and pavements.
4. Excavating and backfilling trenches within buildings lines.
5. Excavating and backfilling for underground mechanical and electrical utilities and appurtenances.
6. Shoring plan guidelines.

B. Related Sections: The following Sections contain requirements that relate to this Section.

1. Project Specific Geotechnical Report.

1.2 DEFINITIONS

- A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.
- B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- C. Borrow: Soil material obtained off site when sufficient approved soil material is not available from excavations.
- D. Base Course: The layer placed between the subgrade and surface pavement in a paving system.
- E. Permeable Backfill: Provide permeable backfill material behind retaining structures consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations.
- F. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Architect. Unauthorized excavation, as well as remedial work directed by the Architect, shall be at the Contractor's expense.
- G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and

electrical appurtenances, or other man made stationary features constructed above or below ground surface.

- H. Utilities include underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

1.3 QUALITY ASSURANCE

A. Codes and Standards:

1. 2013 California Building Code, Title 24, Part 2, Volume 2 of 2, Appendix J, Grading.
2. ASTM D422 - Method for Particle Size Analysis of Soils
3. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
4. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-1b (4.54 kg) and 18-inch (457-mm) Drop.
5. ASTM D2216 - Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil Aggregate Mixtures.
6. ASTM D2922 - Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths).
7. ASTM D3017 - Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths).
8. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
9. ASTM D4829 - Expansion Index Test.

- B. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("GREENBOOK"), 2015 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".

- C. Professional Observation: A soils engineer will be retained by the Owner for purposes of inspection, testing and approval of all work under this section. Perform work of this section under inspection and approval of the soils engineer. Give soils engineer not less than 48 hours advance notice of readiness for inspection.

- D. The soils engineer will have the authority over all filling, grading, and compaction operations, including interruption of work if deemed necessary due to improper work.

1.4 CONSTRUCTION MONITORING

- A. All earthwork and foundation construction should be monitored by a qualified engineer/technician under the supervision of a Geotechnical Engineer, including;

1. Observation of all site preparations;
2. Observation of shoring installation, if needed;
3. Observation of all site excavations;
4. Test and approval of all import soil;
5. Observation of placement of all compacted fills and backfills;
6. Observation of all surface and subsurface drainage systems;
7. Observation of all foundation and pile excavations;
8. Observation of subgrade preparation for paved and building areas.

- B. The Geotechnical Engineer of Record should be notified at least three (3) days in advance of the start of construction. A joint meeting between the Contractor and Geotechnical Engineer is recommended prior to the start of construction to discuss specific procedures and scheduling. The Geotechnical Engineer should be present to observe the soil conditions encountered during construction, to evaluate the applicability of the recommendations presented in the Soils Report to the soil conditions encountered, and to recommend appropriate changes in design or construction if conditions differ from those described herein. The Geotechnical Engineer of Record should inspect and approval all imported backfill material prior to its placement as backfill, approve the subgrade beneath all fills, fill placement and bottom of all foundation excavations before concrete or steel is placed.
- C. The Geotechnical Engineer shall submit compaction reports to the Construction Manager and the Civil Engineer at the completion of the work, including test results and plot plans indicating the locations from which the tested samples of fill were taken. The Geotechnical Engineer shall keep the Construction Manager informed on the progress of the grading work.

1.5 IMPORT AND EXPORT OF EARTH MATERIALS

- A. Fees: Pay as required by government authority having jurisdiction over the area.
- B. Bonds: Post as required by government authority having jurisdiction over the area.
- C. Hauling Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.6 DIG ALERT NOTIFICATION

- A. Before any excavation in or near the public right-of-way, the Contractor must contact the Underground Service Alert of Southern California (Dig Alert) at 811 for information on buried utilities and pipelines.
- B. Delineation of the proposed excavation site is mandatory. Mark the area to be excavated with water soluble or chalk based white paint on paved surfaces or with other suitable markings such as flags or stakes on unpaved areas.
- C. Call at least Two (2) full working days prior to digging.
- D. If the members (utility companies) have facilities within the work area, they will mark them prior to the start of your excavation and if not, they will let you know there is no conflict. A different color is used for each utility type (electricity is marked in red, gas in yellow, water in blue, sewer in green, telephone and cable TV in orange).
- E. The Law requires you to hand expose to the point of no conflict 24" (inches) on either side of the underground facility, so you know its exact location before using power equipment.
- F. If caught digging without a Dig Alert ticket you can be fined as much as \$50,000 per California government code 4216.

1.7 PROJECT CONDITIONS

- A. Data: Maps, boring logs, geotechnical and foundation investigation reports, and like reference data, not included in Contract Documents but made available to Contractor by Owner are for information only, and the Owner assumes no responsibility for any conclusions Contractor may draw from such information. Should questions or issues arise, contact Owner for clarification.
- B. Contractor shall determine existing conditions under which the Contractor will operate in performing the Work

- C. A geotechnical investigation report prepared by Ninyo & Moore (Report No. 209800001), dated September 22, 2016 has been prepared for this project. Prior to bidding or performing the work of this project, contractor shall obtain a copy of this report, and shall thoroughly familiarize himself/herself with its contents. Any information obtained from such report, or any information given on any drawings as to subsurface soil conditions or to elevations of existing elevations or elevations of underlying rock, is approximate only, is not guaranteed. The Contractor is required to make a visual inspection of the Project Premises and must (and is permitted to) make whatever tests the Contractor deems appropriate to determine and assess the underground condition of the soil.
- D. Information on Drawings does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.
- E. Based on exploratory borings, the site is underlain by undocumented fill and alluvium. The fill encountered in borings ranges in depth from approximately 2 to 6 feet and consisted of loose to medium dense, silty sand. Due to the unknowns regarding the original ground preparation and the compaction of the existing fill soils, there is a potential for settlement of the fill and/or shallow, loose alluvium under the new improvements. Accordingly, remedial earthwork to excavate and recompact existing fill and loose alluvium is appropriate for preparation of the field building pads.
- F. Seepage was encountered in boring B-9 at a depth of approximately 50°/« feet below the ground surface. Historical high groundwater is reportedly 7 feet below the ground surface. However, wells at the site and within approximately 500 feet of the site report groundwater levels ranging from approximately 19 to 120 feet below the ground surface. Fluctuations in the groundwater level will occur as a result of variations in seasonal precipitation, irrigation practices, and other factors.
- G. Existing utilities: Locate existing underground utilities in all areas of work prior to excavation or commencement of work. If utilities are to remain in place provide adequate means of protection during earthwork operations.
 - 1. Should uncharted, or incorrectly charted piping or other utilities be encountered during excavation, consult Utility Owner immediately for direction. Cooperate with Owner and Utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of Utility Company.
 - 2. Do not interrupt existing utilities serving facilities occupied or used by Owner, or others, except when permitted in writing by Owner's Representative, and then only after acceptable temporary services have been provided.
 - 3. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut off of services if lines are active.
- H. Noise and Dust Abatement: Exercise all reasonable and necessary means to abate dust, dirt rising and undue noise. Perform necessary sprinkling and wetting of construction site to allay dust as required by applicable codes and ordinances.
- I. Water for Grading: Contractor shall obtain and pay for all water required for his grading operation. This may include, but is not limited to, payment of deposits to utility for construction meter, and payment of all monthly service and water charges. Construction meter shall be in place throughout construction period unless alternative arrangements are made with the Owner to provide construction water for all purposes. Contractor shall be aware of water moratoriums and restrictions, and shall immediately advise Owner of effects on construction schedules.
- J. Existing Conditions: Prior to commencing work at site, verify agreement of existing conditions with indicated conditions. Notify Owner's Representative in writing of discrepancies found. Start of work without notification constitutes acceptance of conditions, without cause for extra compensation.

PART 2 - PRODUCTS

2. SOIL MATERIALS

- A. General: All soils materials to be used throughout the site shall be approved for use by the Geotechnical testing engineer. Provide approved borrow soil materials from off site when sufficient approved soil materials are not available from excavations.
- B. The Contractor is solely responsible for verifying the earthwork quantities necessary to complete the project.
- C. For earthwork volume estimating purposes, an average shrinkage volume of 10 percent and subsidence of a 1/2-inch may be assumed for the surficial soils. These values are estimates only and exclude losses due to removal of vegetation and debris. Actual shrinkage and subsidence will depend on the types of earthmoving equipment used and should be determined during grading.
- D. Satisfactory Soil Materials: In general, the on-site earth materials should be suitable for reuse as fill, provided that environmentally impacted soils found during Ninyo & Moore's preliminary endangered assessment, if any, are first excavated and removed from the site. Fill material should also be free of trash, debris, roots, vegetation, or other deleterious materials. Fill should generally be free of rocks or lumps of material in excess of 4 inches in diameter. Rocks or hard lumps larger than approximately 4 inches in diameter should be broken into smaller pieces or should be removed from the site. Fill used as structural backfill, should be comprised of granular, non-expansive soil that conforms to the latest edition of "Greenbook" Standard Specifications for Public Works Construction (Greenbook) for structural backfill. "Non- expansive" is defined as soil having an EI of 20 or less in accordance with ASTM International (ASTM) D4829 (CBC, 2013).
- E. Import Fill Material: Imported materials should consist of clean, non-expansive granular material which conforms to the 2015 edition of Greenbook. The imported materials should meet the Caltrans (2012) criteria for non-corrosive soils (i.e., soils having a chloride concentration of 500 parts per million [ppm] or less, a soluble sulfate content of approximately 0.20 percent [2,000 ppm] or less, a pH value of 5.5 or higher and a minimum resistivity of 1,000 ohm-centimeters [ohm-cm] or higher). Materials for use as fill should be evaluated by the geotechnical consultant prior to importing. The contractor should be responsible for the uniformity of import material brought to the site.
- F. Base Course Material For Use Under Hardscape: Crushed Aggregate Base (CAB) per Section 200-2.2, 3/4" maximum of the Standard Specifications for Public Works Construction (Green Book).
- G. Engineered Fill: Satisfactory Soil Materials / Borrow Fill Material, as described above, placed in lifts no greater than 8 inches thick (loose measurements) and each lift moisture conditioned per the soils report. All engineered fill should be densified to a minimum relative compaction of 90 percent per ASTM D 1557.
- H. Bedding Material for Trenches:
1. Bedding sand shall be as defined by Standard Specifications, Section 200-1.5, and shall be free of expansive material and organic matter. Bedding material for utility lines outside the property lines shall be as required by the agency having jurisdiction. On-site soils are not considered suitable for bedding of utilities.
 2. Sand providing a sand equivalent of at least 35. All of the sand bedding shall be compacted

to a minimum 90 percent of maximum density by mechanical means. Flooding and jetting shall not be permitted without prior written approval from the Geotechnical Engineer. Where sheeting or shoring is used densification of the bedding shall be accomplished after the sheeting or shoring has been removed from the bedding zone, unless the sheeting or shoring is to be cut off or left in place. Pipe bedding material shall be placed in horizontal layers not exceeding (8) eight inches.

I. Backfill Material for Trenches:

1. The on-site soils have been determined to be suitable for being used for backfilling purposes in trenches. Utility trenches should be backfilled with granular materials and mechanically compacted to at least 90% of the maximum dry density of the soils.

J. Permeable Base Course Material Under Synthetic Turf: Permeable base material meeting Caltrans 2015 Specification section 68-2.02F(3).

K. Base Material Around Perimeter Subdrains: 3/4-inch washed crushed rock per ASTM #67.

3. ACCESSORIES

A. The soil isolation fabric is a standard nonwoven geotextile fabric of polypropylene geotextile, "Mirafi 140N" or approved equal.

B. Detectable Warning Tape: Acid and alkali-resistant polyethylene film metallic warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick minimum, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep.

1. Tape Colors: Provide tape colors to utilities as follows:

- a. Red: Electric.
- b. Yellow: Gas, oil, steam, and dangerous materials.
- c. Orange: Telephone and other communications.
- d. Blue: Water systems, with "Caution: Water Line Below."
- e. Red Water systems, with "Caution: Fire Water Line Below."
- f. Green: Sewer systems, with "Caution: Sewer Line Below."

4. EXCAVATION SUPPORT & PROTECTION — SHORING PLAN

A. The Contractor shall have at the Worksite, copies or suitable extracts of: Construction Safety Orders, Tunnel Safety Orders and General Industry Safety Orders issued by the State Division of Industrial Safety. The Contractor shall comply with provisions of these and all other applicable laws, ordinances, and regulations.

B. Before excavating any trench 5 feet or more in depth, the Contractor shall submit a detailed plan to the Owner showing the design of shoring, bracing, sloping, or other revisions to be made for the Workers' protection from the hazard of caving ground during the excavation of such trench. If the plan varies from the shoring system standards, the plan shall be prepared by a registered Civil Engineer. No excavation shall start until the OWNER has accepted the plan and the CONTRACTOR has obtained a permit from the State Division of Industrial Safety. A copy of the permit shall be submitted to the OWNER.

C. The Inspector will provide a competent person trench/excavation certification form to the

Contractor. It shall be completely filled out before any worker has access to trench or excavation and returned to the Inspector before the end of the first working day. The Contractor shall certify by this form the name of the competent person administering the Work, the soil classification, and the type of excavation protective system provided and/or installed.

- D. The Contractor shall completely fence all excavations to provided protection against anyone falling into the excavation and to the satisfaction of the Inspector. The fencing shall be in place at all times except when workers are present and actual construction operations are in progress.
- E. The fencing material shall be chain link fabric or welded wire fabric (6x6-W9xW9 minimum) and 6 feet high, constructed according to one of the following:
 - 1. Tensioned fencing material and have top and bottom tension wires securely fastened to driven steel posts or other equally rigid elements at a maximum spacing of 12 feet; or
 - 2. Untensioned fencing materials securely fastened to extended trench shoring elements at a maximum spacing of 8 feet and fastened to continuous top and bottom rails constructed of nominal 2 in x 4 in lumber or equally rigid material. Framed panels with suitable supporting elements fastened together to form a continuous fence may also be used.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Use Laser technology to verify construction and accurate elevations and slopes required.
- B. Protect adjacent property and existing improvements and structures as necessary to prevent undermining, caving of cuts, and miscellaneous damage.
- C. Provide cribbing, sheeting, and shoring necessary to safely retain the earth banks and protect excavations and adjoining grades from caving and other damage resulting from excavating together with suitable forms of protection against bodily injury to personnel employed on the work and the general public. Be responsible for the design, installation, and maintenance of required cribbing and shoring and shall meet the approval of the State Division of Industrial Safety and local governing agencies requirements.
- D. Utility lines and structures shown shall be protected and treated as indicated. Where work not shown is encountered, report it to the Architect before proceeding with excavation. Encase active lines in sleeves where they pass through concrete; remove inactive lines as directed, and plug the remaining ends. Bear the costs for repairs to damaged or broken utilities and any damages related thereto.
- E. Protect existing improvements and adjacent properties from storm damage and flood hazard originating on this project until final acceptance by the Owner. Prevent silt run-off from the limits of work in accordance with governmental requirements.

3.2 DEWATERING

- A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area. Any water entering an excavation shall be immediately pumped out and the exposed excavation allowed to dry.

- B. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

3.3 GRADE STAKES

- A. The Contractor's Surveyor will set grade stakes. The Surveyor shall be a California registered land surveyor or licensed Civil Engineer. The Surveyor shall be hired and paid by the Contractor, and shall be subject to the approval of the Owner. Contractor shall notify the Owner at least 48 hours before staking is to be started. The Owner will determine if work is ready for staking.
- B. All work shall conform to the lines, elevations, and grades shown on the Construction Plans. Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, the Contractor shall be responsible for any error in the grade of the finished work.
- C. Protect and maintain stakes in place until their removal is approved by the Owner. Grade or location stakes lost or disturbed by Contractor, shall be reset by the Surveyor at the expense of Contractor.
- D. Grades for underground conduits will be set at the surface of the ground. The Contractor shall transfer them to the bottom of the trench.

3.4 FIELD FINISHED PERMEABLE BASE CONTOUR AND FLATNESS

- A. The permeable base contours of the field, after final compaction and grading, shall not have deviations in surface shape greater than 3/16" over a 10' span. Final contour shall be plotted on a table of laser-sighted grade elevations using a rectangular grid size of 120 yards by 60 yards with measurements every 20 yards (28 total elevation points). Grade elevations to be reviewed and approved prior to installation of the soil isolation fabric. Fine grade to the required tolerances leaving behind no tire tracks or indentations.

3.5 TEMPORARY EXCAVATION & SHORING

- A. Per section 10.1.3 of the soils report.

3.6 BUILDING PAD PREPARATION

- A. Per section 10.1.4.1 of the soils report.

3.7 HARDSCAPE PREPARATION

- A. It is recommended that the native soil below proposed crushed base material under hardscape areas, be over excavated to the recommended minimum depth of 12" (inches) below the base layer, brought to near optimum moisture content and rolled with heavy compaction equipment. Soil should be re-compacted to at least 90% of the maximum dry density obtainable by ASTM D1557 method of compaction.
- B. The exposed bottom surface soils, below over-excavation, shall be scarified to the recommended minimum depth of 8" (inches), brought to near optimum moisture content and rolled with heavy compaction equipment. Exposed soil should be compacted to at least 90% of the maximum dry density obtainable by ASTM D1557 method of compaction. Potentially expansive fine-grained silts and clays, if present, should be removed to a depth of approximately 12 inches and replaced with on-site low-expansion sandy soil.

3.8 ATHLETIC FIELDS PREPARATION

- A. In the athletic field, in the areas where the finish grade is more than 12 inches below the existing grade no over excavation will be required. In the areas where the finish grade is less than 12 inches below the existing grade, 12 inches of over excavation along with the 8 inches of scarification of the bottom of the over excavation as recommended in the soils report should be implemented. Over excavation of 12 inches plus the scarification of 8 inches of the bottom of the over excavation should apply to all areas receiving fill.

3.9 EXCAVATION, BACKFILL & COMPACTION FOR UTILITIES

- A. Field conditions may require deviations from information indicated on Drawings. Such changes in work shall be covered by a Change Order, indicating an increase or decrease in the Contract sum.
- B. Before excavation, Contractor shall contact the "Underground Service Alert of Southern California" (USASC) for information on buried utilities and pipelines.
- C. When connections are to be made to any existing pipe, conduit, or other appurtenances, the actual elevation or position of which cannot be determined without excavation, the Contractor shall excavate for, and expose, the existing improvement before laying any pipe or conduit. The Engineer shall be given the opportunity to inspect the existing pipe or conduit before connection is made. Any adjustments in line or grade which may be necessary to accomplish the intent of the plans will be made, and the Contractor will be paid for any additional work resulting from such change in line or grade.
- D. Trenches, ditches, pits, sumps, and similar items which are outside the barricaded working area shall be barricaded to conform to Cal OSHA standards.
- E. Trenches over 5'-0" in depth shall conform to the Construction Safety Orders of the California Division of Industrial Safety, see Section 2.3 Excavation Support & Protection — Shoring Plan.
- F. Safe and suitable ladders which project 2 feet above the top of the trench shall be provided for all trenches over 4 feet in depth. One ladder shall be provided for each 50 feet of open trench, or fraction thereof, and be so located that workers in the trench need not move more than 25 feet to a ladder.
- G. Where indicated and/or required to excavate in lawn areas, protect adjoining lawn areas outside of the Work area. Replace or install removed sod upon completion of backfill by installing sod level with adjacent lawns. If installation of removed sod fails, furnish sod and install to match existing lawns.
- H. All trenches should be backfilled with approved fill material compacted to relative compaction of not less than 90 percent of maximum density determined in accordance with ASTM D 1557. Backfill shall be placed in layers not exceeding 8" (inches) in thickness.
- I. Backfill over excavations to the required elevations with earth, gravel, sand, or concrete and compact as required. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. Slope adjacent grades away from excavations to minimize entry of water.
- J. Do not excavate trenches parallel to footings closer than 18" from the face of the footing or below a plane having a downward slope of 2 horizontal to one vertical, from a line 9" above bottom of footings.

- K. Unless indicated otherwise on the plans are within this specification, excavate trenches to the required depths for utilities, such as pipes, conduit and tanks, with minimum allowances of 6 inches at the bottom for bedding of unprotected piping or as required for concrete encasement of conduits as indicated on Drawings. Maximum allowances at the sides for trenching shall be 12 inches. Grade bottom of trenches to a uniform smooth surface. Remove loose soil from the excavation before installing sand bedding or concrete encasement.
- L. Where portions of existing structures, walks, paving, etc. must be removed or cut for pipe or conduit installation, replace the material with equal quality, finished to match adjacent work
- M. Provide a minimum clear dimension of 6 inches from sides of wall excavation to outer surfaces of buried pipes or conduits installed in the same trench or outside surfaces of containers and/or tanks.
- N. DO NOT place backfill until the bedding and pipe work installed has been inspected, tested and approved by the County Inspector. Remove excavated rocky material unsuitable for backfill from the site prior to final backfilling.
- O. Bedding material immediately around a utility line and to a point 6 inches above the line should consist of sand to support the line and protect it.
- P. Bedding zone shall be defined as the area containing the material specified that is supporting, surrounding, and extending to 6" (inches) above the top of pipe for storm drains. Compaction requirements in this area must meet 90% minimum.
- Q. Bedding material shall first be placed on a firm and unyielding subgrade so that the pipe is supported for the full length of the barrel. There shall be 6" (inch) minimum of bedding below the pipe barrel and 1" (inch) clearance below a projecting bell for storm drain pipe. The material in the bedding zone shall be placed and densified by mechanical compaction only.
- R. Mechanically compacted backfill shall comply with section 306-1.3.2 of the Standard Specifications for Public Works Construction.
- S. Above the bedding, up to finished subgrade at areas other than landscape areas and up to one foot below flatwork and pavements, utility trenches should be backfilled with granular materials and mechanically compacted to at least 90%.
- T. Concrete backfill trenches that carry below or pass under footings and that are excavated within 18 inches of footings. Place concrete to level of bottom of footings.
- U. Fill voids with approved backfill materials as shoring bracing and sheeting is removed.

3.10 INSPECTION & TESTING AT TRENCHES

- A. Pipe will be inspected in the field before and after laying. If any cause for rejection is discovered in a pipe after it has been laid, it shall be subject to rejection. Any corrective work shall be approved by the civil engineer of record and shall be at NO cost to the Owner.
- B. The Inspector and/or Geotechnical Engineer will inspect all subgrades and excavations prior to placing bedding & backfill materials.
- C. DO NOT place backfill until the bedding and pipe work installed has been inspected, tested and approved by the Inspector. Remove excavated rocky material unsuitable for backfill from the site prior to final backfilling.

- D. Utility backfill compaction test shall be performed in accordance with ASTM D1557, method "C".
- E. Utility backfill in place density test per ASTM D1556 (sand cone) or other test method as considered appropriate by the Geotechnical Engineer.
- F. Hydrostatic pressure tests shall be done only after backfill has been placed and final compaction has been achieved.

3.11 APPROVAL OF SUBGRADE

- A. Notify Geotechnical Engineer when excavations have reached required over-excavation subgrade.
- B. When Geotechnical Engineer determines that unforeseen unsatisfactory soil is present, continue work only after receiving direction from the Owner.
- C. Reconstruct subgrades damaged by rain, accumulated water or construction activities as directed by the Soils Engineer.

3.12 UNAUTHORIZED EXCAVATION

- A. Fill of unauthorized excavation below bottoms of foundations or wall footings will be engineered fill.
- B. Fill unauthorized excavations under other construction as directed by the Soils Engineer.
- C. Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by the Geotechnical Engineer.

3.13 PLACEMENT OF ENGINEERED FILL

- A. Spreading and Compacting Fill Material:
 - 1. Fill and trench backfill should be compacted in uniform horizontal lifts to a relative compaction of 90 percent or more as evaluated by the latest edition of ASTM D 1557. Fill soils should be moisture-conditioned to above the optimum moisture content as evaluated by the latest edition of ASTM D 1557. The optimum lift thickness of fill will depend on the type of compaction equipment used but generally should not exceed 8 inches in loose thickness. Special care should be taken to avoid pipe damage when compacting trench backfill above pipes. Placement and compaction of the fill soils should be in general accordance with the appropriate governing agencies and good construction practices.
- B. Compaction Testing:
 - 1. The Geotechnical Engineer's representative shall observe the excavation, filling, and compacting operations and shall make density tests in the fill material so that he can state his opinion as to whether or not the fill was constructed in accordance with the specifications. If the surface is disturbed, the density tests shall be made in the compacted materials below the disturbed zone. When these tests indicate that the density or moisture content of any layer of fill or portion thereof does not meet the specified density or moisture content, the particular layer or portions shall be reworked until the specified density and moisture content have been obtained.
 - 2. Sampling and testing of materials for determination of compliance with the specified compaction requirements will be conducted by the Geotechnical Engineer's representative at any location and time as the Owner may determine.

3. The Contractor shall be responsible for excavation of the test pits and for providing and installing any shoring, ladders, or other equipment necessary to protect the testing personnel. The Contractor shall also suspend operations as necessary and at no cost to the owner for the purpose of conducting such testing.
4. Test pits shall be excavated in the backfill by the Contractor as directed by the Engineer for the purpose of testing the backfill compaction. At the option of Engineer, density tests may be taken on a lift of compacted backfill immediately before placing the next lift.
5. Any settlement noted in backfill, fill, or in structures built over the backfill or fill within the one-year warranty period will be considered to be caused by improper compaction methods and shall be corrected at the Contractor's expense. Structures damaged by settlement shall be restored to their original condition by the Contractor at the Contractor's expense.
6. When initial compaction testing performed by the Engineer indicates the required density has not been obtained, the Contractor shall re-compact or replace the backfill as necessary to meet the specified minimum density.
7. The Contractor shall be responsible for rescheduling compaction testing with the Engineer and shall bear all costs for subsequent retesting in the areas of noncompliance. Costs associated with retesting and scheduling delays shall be the sole responsibility of the Contractor. The Engineer will deduct the costs for testing of materials and work found to be unacceptable, as determined by the tests performed by the Owner and the costs for testing of material sources identified by the Contractor which are not used for the work, from moneys due or to become due to the Contractor. The amount deducted will be determined by the Engineer.

3.14 BACKFILL - GENERAL

- A. Backfill excavations promptly, but not before completing the following:
 1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 2. Provide red line mark ups for locations of installed underground utilities that vary from the County approved version for as-built plan purposes.
 3. Testing, inspecting, and approval of underground utilities.
 4. Concrete formwork removal.
 5. Removal of trash and debris from excavation.
 6. Removal of temporary shoring and bracing, and sheeting.
 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.15 FIELD QUALITY CONTROL

- A. A Geotechnical Engineer, designated by the Owner, will be engaged to perform continuous inspection of the placing and compacting of all fills and backfills within the limits of grading of this project. All work shall be done in accordance with the approved plans and these specifications and as recommended and approved by the Geotechnical Engineer. Revised recommendations relating to conditions differing from the approved soils engineering and engineering geology reports shall be submitted to the owner, inspector, architect and the civil engineer. Costs for all such inspections and tests shall be paid by the Owner. The Contractor shall be responsible for notifying the Geotechnical

Engineer in advance so that he may be present to perform his services as needed.

- B. The Geotechnical Engineer shall submit compaction reports to the Construction Manager and the Architect at the completion of the work, including test results and plot plans indicating the locations from which the tested samples of fill were taken. The Geotechnical Engineer shall keep the Construction Manager informed on the progress of the grading work.
- C. Testing Agency Services: Allow testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.
 - 1. Perform field in-place density tests according to ASTM D1556 (sand cone method) or other test method as considered appropriate by Geotechnical Engineer.
 - a. Field in place density tests may also be performed by the nuclear method according to ASTM D 2922, provided that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. With each density calibration check, check the calibration curves furnished with the moisture gages according to ASTM D 3017.
 - b. When field in place density tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Architect.
 - 2. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, perform at least one field in-place density test for every 2,000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
 - 3. Trench Backfill: In each compacted initial and final backfill layer, perform at least one field in place density test for each 150 feet or less of trench, but no fewer than two tests.
- D. When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.
- E. Owner's inspector will inspect foundation excavations when completed and ready for forms, after forms are in place, and before first placement of concrete.

3.16 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and re establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace material to depth directed by the Architect; reshape and recompact at optimum moisture content to the required density.
- C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.17 MAINTENANCE

- A. Install and maintain all temporary erosion control devices, including gravel bags, de-silting basins, inlet barricades, vehicle wash traps, and other features called for on the Erosion Control Plans and as required per Storm Water Pollution Prevention Plan.
- B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape to required tolerances, and compact to required density prior to further construction.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION

DIVISION 32
EXTERIOR IMPROVEMENTS

SECTION 32 13 13

SITE CONCRETE WORK

PART 1 - GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall furnish all materials for concrete in accordance with the provisions of this Section and shall form, mix, place, cure, repair, finish, and do all other work as required to produce finished concrete, in accordance with the requirements of the Contract Documents.

- 8. The following types of concrete shall be covered in this Section:
 - 1. Portland cement concrete pavement, cement walks, flatwork, curbs, gutters, retaining curbs, swales, trash pick-up areas, ramps, mowing strips, fence post footings, sliding gate concrete, catch basins, pipe bedding and encasements, transition structures, flagpoles and light standard bases and footings, splash blocks and equipment pads.
 - 2. Portland cement concrete paving shall be stable, firm and slip resistant and shall comply with CBC sections 11B-302 and 11B-403.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Comply with the reference specifications of the GENERAL REQUIREMENTS.

- B. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("GREENBOOK"), 2015 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".

- C. Comply with the current provisions of the following Codes and Standards.
 - 1. Federal Specifications:
 - a. UU-B-790A (Int.Amd. 1) Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellant and Fire Resistant).

 - 2. Standards:
 - a. ACI 214 Recommended Practice for Evaluation of Strength Test Results of Concrete.
 - b. ACI 301 Specifications for Structural Concrete for Buildings.
 - c. ACI 315 Details and Detailing of Concrete Reinforcement.
 - d. ACI 318 Building Code Requirements for Reinforced Concrete.
 - e. ACI 347 Recommended Practice for Concrete Formwork.
 - f. ACI 350 Recommended Practice for Sanitary Structure.

- g. ASTM C 31 Practices for Making and Curing Concrete Test Specimens in the Field.
- h. ASTM C 33 Specification for Concrete Aggregates.
- i. ASTM C 39 Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- j. ASTM C 40 Test Method for Organic Impurities in Fine Aggregates for Concrete.
- k. ASTM C 42 Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
- l. ASTM C 78 Specification for Flexural Strength.
- m. ASTM C 88 Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate.
- n. ASTM C 94 Specification for Ready-Mixed Concrete.
- o. ASTM C 114 Method for Chemical Analysis of Hydraulic Cement.
- p. ASTM C 131 Test Method for Resistance to Degradation of Small-Sized Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- q. ASTM C 136 Method for Sieve Analysis of Fine and Coarse Aggregate.
- r. ASTM C 143 Test Method for Slump of Portland Cement Concrete.
- s. ASTM C 150 Specification for Portland Cement.
- t. ASTM C 156 Test Method for Water Retention by Concrete Curing Materials.
- u. ASTM C 157 Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete.
- v. ASTM C 172 Specification for Sampling Fresh Concrete.
- w. ASTM C 192 Method of Making and Curing Concrete Test Specimens in the Laboratory.
- x. ASTM C 260 Specification for Air-Entraining Admixtures for Concrete.
- y. ASTM C 289 Test Method for Potential Reactivity of Aggregates (Chemical Method).
- z. ASTM C 311 Method for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete.
- aa. ASTM C 494 Specification for Chemical Admixtures for Concrete.
- bb. ASTM C 618 Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
- cc. ASTM D 1751 Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

- dd. ASTM E 119 Method for Fire Tests of Building Construction and Materials.

1.3 CONTRACTOR SUBMITTALS

- A. Submittals shall be made in accordance with general requirements.
- B. The following submittals and specific information shall be provided.
 - 1. Mix Designs: Prior to beginning the Work, the Contractor shall submit to the Engineer, for review, and approval, preliminary concrete mix designs for each class and type of concrete specified herein. The mix designs shall be designed by an independent testing laboratory acceptable to the Engineer. All costs related to such mix design shall be borne by the Contractor.
 - a. Each concrete mix submittal shall contain the following information:
 - 1) Slump on which the design is based.
 - 2) Total gallons of water per cubic yard.
 - 3) Brand, type, composition and quantity of cement.
 - 4) Brand type, composition and quantity of fly ash.
 - 5) Specific Gravity and gradation of each aggregate.
 - 6) Ratio of fine to total aggregate per cubic yard.
 - 7) Weight (surface dry) of each aggregate per cubic yard.
 - 8) Brand, type, and ASTM designation, active chemical ingredients and quantity of each admixture.
 - 9) Copy of the Building and Safety Research Report Approval for each concrete admixture.
 - 10) Air content.
 - 11) Compressive strength based on 7 day and 28 day compression tests, including standard deviation calculations, corroborative data (if applicable), and required average comprehensive strength per ACI 318, Section 5.
 - 12) Time of initial set.
 - 13) Certification stamp and signature by a Civil or Structural engineer registered in state of California.
 - 14) Certificate of Compliance for Cement.
 - 2. Certified Delivery Tickets: Where ready-mix concrete is used, the Contractor shall provide certified weighmaster delivery tickets at the time of delivery of each load of concrete. Each certificate shall show the public weighmaster's signature, and the total quantities, by weight of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate and added at the batching plant as well as the amount of water allowed to be added at the site for the specific design mix. Each certificate shall, in addition, state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to when the batch was dispatched, when it left the plant, when it arrived at the job, the time that unloading began, and the time that unloading was finished.
 - 3. When a water reducing admixture is to be used, the Contractor shall furnish mix designs for concrete both with and without the admixture.
 - 4. The Contractor shall furnish a Certificate of Compliance signed by the supplier identifying the type of fly ash and stating that the fly ash complies with ASTM C

618 and these Specifications, together with all supporting test data prior to the use of the fly ash the sample represents. The supporting data shall also contain test results confirming that the fly ash in combination with the cement and water to be used meets all strength requirements and is compatible with air- entraining agents and other admixtures.

5. The Contractor shall submit to the Engineer for review the design mix for fly ash concrete together with the design mix for Portland cement (non-fly ash) concrete as specified in this Section.

1.4 QUALITY ASSURANCE

- A. Testing for Portland Cement Concrete shall be sampled and tested in accordance with the ASTM and California Tests listed in the Standard Specifications for Public Works Construction, Latest Edition, Section 201-1.1.5.
- B. Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards of concrete, or not less than once for each 2,000 square feet of surface area for slabs. Additional samples for seven-day compressive strength tests shall be taken for each class of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed.
- C. The cost of all laboratory tests on cement, aggregates, and concrete, will be borne by the Contractor.
- D. Concrete for testing shall be supplied by the Contractor at no cost to the Owner, and the Contractor shall provide assistance and facilities to the Inspector in obtaining samples, and disposal and cleanup of excess material.
- E. Curbs and gutters shall be staked by a Land Surveyor licensed to practice in the State of California.
- F. Job Mock-Up
 1. General
 - a. Make samples on-site; revise as required; obtain Architect's approval, 10 days prior to casting finished work.
 - b. Finished work to match approved samples.
 - c. Approved sample may be incorporated into the work. Retain samples until completion of all concrete work.
 - d. Include typical tooled joint control in sample.
 2. Broom Finished Concrete; Exterior Flatwork: Provide sample, 20 s.f. minimum area.
 3. "Sacked" Vertical Surface; Exterior Wall: Provide sample, 5 sf. minimum *area*.
- G. Construction Tolerances: The Contractor shall set and maintain concrete forms and perform finishing operations so as to ensure that the completed work is within the tolerances specified herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the specified permissible variation from lines, grades, or dimensions shown. Where tolerances are not stated in the specifications, permissible deviations will be in accordance with ACI 347.
- H. Construction tolerances shall not violate dimensions, grades, slopes required by CBC for accessibility requirements. Adjust work accordingly to comply with requirements.
- I. The following construction tolerances are hereby established and apply to finished walls and slab unless otherwise shown:

Item	Tolerance
Variation of the constructed linear outline from the established position in plan.	In 10 feet: 1/4-inch;
Variation from the level or from the grades shown.	In 10 feet: 1/4-inch;
Variation from the plumb	In 10 feet: 1/4-inch;
Variation in the thickness of slabs and walls.	Minus 1/8-inch; Plus 1/4-inch
Variation in the locations and sizes of slabs And wall openings.	Plus or minus 1/8-inch

PART 2 – PRODUCTS

2.1 CONSTRUCTION MATERIALS

- A. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. All cement shall be used in the sequence of receipt of shipments.
- B. All materials furnished for the work shall comply with the requirements of Sections 201, 203, and 204 of ACI 301, as applicable.
- C. Storage of materials shall conform to the requirements of Section 205 of ACI 301.
- D. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces. Conform to Section 303-5.2 of the Standard Specifications.
 - 1. Use flexible or curved forms for curves of a 100-foot or less radius.
- E. Reinforcing Materials: As follows:
 - 1. Steel Reinforcing Bars: ASTM A 615 deformed grade 40 billet steel, plain finish, unless otherwise specified on Construction Document. Fabrication, sampling and jobsite handling shall conform to the requirements in ASTM Designation: D 3963, except the 2 samples shall be 30 inches long.
 - 2. Dowels:
 - a. Dowel bars shall be plain round smooth conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 40 except that the two samples required in ASTM Designation: D 3963/D 3963M shall be 18 inches long. Dowel bars shall be free from burrs or other deformations detrimental to free movement of the bars in the concrete
 - b. Dowel bars shall be lubricated with a bond breaker over the entire bar. A bond breaker application of petroleum paraffin based lubricant or white-pigmented curing compound shall be used to coat the dowel bars completely prior to placement. Oil and asphalt-based bond breakers shall not be used. Paraffin based lubricant shall be Dayton Superior DSC BB-Coat or Valvoline Tectyl 506 or an approved equal. Paraffin based lubricant shall be factory applied. White pigmented curing compound shall conform to the requirements of ASTM Designation: C 309, Type 2, Class A, and shall contain 22 percent minimum nonvolatile vehicles consisting of at least 50 percent paraffin wax. Curing compound

shall be applied in 2 separate applications, the last application not more than 8 hours prior to placement of the dowel bars. Each application of curing compound shall be applied at the approximate rate of one gallon per 15 square yards.

3. Epoxy for bonding tie bars and dowel bars to portland cement concrete shall be a two-component, epoxy-resin, conforming to the requirements of ASTM Designation: C 881, Type V, Grade 3 (Non-Sagging), Class B or C. The class used shall be dependent on the internal temperature of the hardened concrete at the time the epoxy is to be applied. Class B shall be used when the internal temperature is from 40 °F to 60 °F. Class C shall be used when the internal temperature is above 60 °F, but not higher than recommended by the manufacturer. A copy of the manufacturer's recommended installation procedure shall be provided to the Engineer at least 7 days prior to the start of work. Epoxy shall be applied in conformance with the manufacturer's recommendations.
 - a. Simpson Strong Tie Set-XP Epoxy (or approved equal) ICC-ES ESR- 2508.

F. Concrete Materials: As follows:

1. Cement shall be standard brand portland cement conforming to ASTM C 150 for Type II. Portland cement shall contain not more than 0.60 percent alkalis. The term "alkalis" referred to herein is defined as the sum of the percentage of sodium oxide and 0.658 times the percentage of potassium oxide ($Na_2O + 0.658 K_2O$). These oxides shall be determined in accordance with ASTM C 114. A single brand of cement shall be used throughout the work, and prior to its use, the brand shall be acceptable to the Engineer. The cement shall be suitably protected from exposure to moisture until used. Cement that has become lumpy shall not be used. Sacked cement shall be stored in such a manner so as to permit access for inspection and sampling. Certified mill test reports for each shipment of cement to be used shall be submitted to the Inspector.
2. Concurrent with strength design criteria, concrete shall also be proportioned to provide the requisite durability to satisfy the exposure conditions imposed by either environment and/or service. Durability, in this context, refers to the ability of the concrete to resist deterioration from the environment or service in which it is placed. Concrete proportioned in accordance with ACI 318, chapter 4, Durability Requirements, will meet this criteria.
3. Combined Aggregate: 1" maximum coarse aggregate size conforming to Grading C of Standard Specifications Section 201-1.3.2(A). Aggregates shall be obtained from pits acceptable to the Inspector, shall be non-reactive, and shall conform to ASTM C 33.
4. Water: Shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts and other impurities. The water shall be considered potable, for the purposes of this Section only, if it meets the requirements of the local governmental agencies.
5. "Pea gravel" mix is not acceptable, unless specifically approved in writing by the Civil Engineer of Record prior to construction.

G. Admixtures:

1. The Engineer may require the use of admixtures or the Contractor may propose to use admixtures to control the set, effect water reduction, and increase workability. In either case, the addition of an admixture shall be at the Contractor's expense. The use and continued use of an admixture shall be approved by the Engineer. Admixtures specified herein, other than calcium chloride, shall conform to the requirements of ASTM C 494. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used. Admixtures shall contain no free chloride ions, be non-toxic after 30 days, and shall be compatible with and made by the same manufacturer as the air

entraining admixture.

2. These admixtures shall not be used in greater doses than those recommended by the manufacturer or permitted by the Engineer. The permitted dosage of the admixture shall not exceed that which will result in an increase in the driving shrinkage of the concrete in excess of 20 percent when used in precast or prestressed concrete, or 10 percent when used in any other structural concrete. The strength of concrete containing the admixture in the amount of proposed shall, at the age of 48 hours and longer be not less than that of similar concrete without the admixture. The admixture shall not adversely affect the specified air content, unless permitted by the Engineer.
3. Set controlling admixture shall be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently over 80 degrees F, a set retarding admixture such as [Sika Chemical Corporation's Plastiment], [Master Builder's Pozzoloth 300R], or equal shall be used. Where the air temperature at the time of placement is expected to be consistently under 40 degrees F, a set accelerating admixture such as [Sika Chemical Corporation's Plastocrete 161FL], [Master Builder's Pozzoloth SOC], or equal shall be used.
4. Low range water reducer shall conform to ASTM C 494, Type A. It shall be either a hydroxylated carboxylic acid type or a hydroxylated polymer type. The quantity of admixture used and the method of mixing shall be in accordance with the manufacturer's instructions and recommendations.
5. High range water reducer shall be sulfonated polymer conforming to ASTM C 494, Type F or G.
 - a. If the high range water reducing agent is added to the concrete at the batch plant, it shall be second generation type, [Daracem 100, as manufactured by W.R. Grace & Co.]; [Pozzoloth 430R, as manufactured by Masterbuilders]; or equal. High range water reducer shall be added to the concrete after all other ingredients have been mixed and initial slump has been verified.
 - b. If the high range water reducer is added to the concrete at the job site, it shall be used in conjunction with a low range water reducer and shall be [Pozzoloth 400N and Pozzoloth MBL82, as manufactured by Masterbuilders]; [WRDA 19 and WRDA 79, as manufactured by W.R. Grace & Co.]; or equal. Concrete shall have a slump of 3-inches + 1/2-inch prior to adding the high range water reducing admixture at the job site. The high range water reducing admixture shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day's operation of the job site system.
6. Air-entraining agent meeting the requirements of ASTM C 260, shall be used. Sufficient air-entraining agent shall be used to provide a total air content of 3 to 4 percent; provided that, when the mean daily temperature in the vicinity of the worksite falls below 40 degrees F for more than one day, the total air content provided shall be 5 to 6 percent. The Owner reserves the right, at any time, to sample and test the air-entraining agent received on the job by the Contractor. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement.
7. Calcium Chloride: Except as otherwise provided herein, calcium chloride will not be permitted to be used in concrete.
8. Fly ash/pozzolan shall conform to ASTM C618 and the following supplementary requirements:
 - a. Class F fly ash
 - o Loss on ignition, maximum 4 percent

- o S03 content, maximum 3 percent
 - o Moisture content, maximum 1 percent
 - b. Class F fly ash, as a percent by weight of total cementitious material, shall not exceed 15 percent
 - c. When Sulfate Resistant or Special Exposure Concrete is specified, test results shall be submitted to the Engineer as specified in Section 2-5.3 of the Standard Specifications. The test result shall show that the fly ash to be used is effective in contributing to sulfate resistance in conformance with ASTM C618, Table 3 (optional physical requirements) as tested in accordance with ASTM C 1012. The data submitted shall be less than 6 months old.
- H. Curing Materials:
1. Concrete curing compound shall conform to the requirements of ASTM C309 Type 1-D (clear or translucent with fugitive dye), Class B (Resin Type Only), except the loss of water shall not exceed 0.15 kilograms per square meter in 24 hours nor 0.45 kilograms per square meter in 72 hours when tested in accordance with ASTM C 156. The Contractor shall provide, when requested by the Engineer, certified copies of vendor's test report showing compliance with ASTM C 309 and these specifications. The testing and the report shall be supplied without cost to the Agency. All compounds shall be furnished by the Contractor in sealed original containers labeled in accordance with ASTM C 309 and with the date of manufacture.
 2. Polyethylene sheet for use as concrete curing blanket shall be white and conform to ASTM C 171. The loss of moisture when determined in accordance with the requirements of ASTM C 156 shall not exceed 0.055 grams per square centimeter of surface.
 3. Polyethylene-coated burlap for use as concrete curing blanket shall conform to ASTM C 171. The loss of moisture, when determined in accordance with the requirements of ASTM C 156, shall not exceed 0.055 grams per square centimeter of surface.
- I. Expansion Joint Filler Material
1. Curb & Gutter: Nonextruding and Resilient Filler: Celotex "Flexcell", or approved equal, 1/4-inch thick material conforming to ASTM D 1751.
 2. Concrete Walk and Slab: Joint filler material shall be preformed expansion joint filler conforming to the requirements of ASTM D994. A Certificate of Compliance for the joint filler material shall be furnished to the Engineer. The certificate shall be accompanied with a certified test report of the results of the required test performed on the joint filler material within the previous 12 months prior to proposed use. The certificate and accompanying test report shall be provided for each lot of joint filler material prior to use on the project.
 3. Silicone Joint Sealant: Premium-grade, high-performance, moisture-cured, single-component, polyurethane-based, non-sag elastomeric sealant. Meets Federal specification TT-S-00230C. Meets ASTM C-920, Type S, Class 25 or 35; Grade NS, Use T or NT, Shore A Hardness (21 day) 35-45. A Certificate of Compliance for the silicone sealant shall be furnished to the Engineer. The Certificate shall also be accompanied with a certified test report of the results of the required tests performed on the sealant material within the previous 12 months prior to proposed use. The Certificate and accompanying test report shall be provided for each lot of silicone joint sealant prior to use on the project.
 - a. Sika Corporation, Sikaflex-1A.
 - b. Tremco, Inc., Dymonic.
 - c. Tremco, Inc., Vulkem 116.

- d. Bostik Construction Products Div., Chem-Calk 900.

- J. Concrete Sealer: For natural concrete only, HLQ-125 as manufactured by SINAK Corp., San Diego, CA (619/231-1771), HLQ-125 as manufactured by SINAK Corp., San Diego, CA (619/231-1771), or equivalent product of another manufacturer in accordance with the "or equal" provision of the Contract Documents, penetrating sealer that interacts with mineral compounds and siliceous materials in portland cement concrete to produce more dense, non-dusting surface.

- K. Related Materials: As follows:
 - 1. Damp-proofing agent shall be an asphalt emulsion, Sonneborn Hydrocide 660, or approved equal.
 - 2. Epoxy adhesives shall be the following products for the applications specified:
 - a. For bonding freshly-mixed, plastic concrete to hardened concrete, Sikadur Hi-Mod Epoxy Adhesive, as manufactured by Sika Chemical Corporation, or approved equal.
 - b. For bonding hardened concrete or masonry to steel, Sikadur Hi-Mod Gel or approved equal.

- L. Curbs / Curb & Gutter & Flatwork Mix Design: At a minimum, concrete for curbs and curbs & gutters and flatwork shall conform to the Standard Specifications for Public Works Construction, Section 201-1.1.2, mix class 520-C-2500.
 - 1. Compressive Strength: minimum of 2,500 psi at 28 days compressive strength.
 - 2. Slump Limit: 4 inches at point of placement.
 - 3. Cement per cu yard (sacks): 5.5 (minimum).
 - 4. Air Content: 4% +/- 1% percent

- M. Swale Mix Design: At a minimum, concrete for swales shall conform to the Standard Specifications for Public Works Construction, Section 201-1.1.2, mix class 560-C-3250:
 - 1. Compressive Strength: minimum of 3,250 psi at 28 days compressive strength.
 - 2. Slump Limit: 4 inches at point of placement.
 - 3. Cement per cu yard (sacks): 6.0 (minimum).
 - 4. Air Content: 4% +/- 1% percent.

- N. Slurry Mix Design:
 - 1. Compressive Strength: 100 psi at min. 28 days compr. strength.
 - 2. Slump Limit: 5 inches at point of placement.
 - 3. Cement per cu yard (sacks): 1.0
 - 4. Aggregate Gradation: "E" per S.S.P.W.C. table 201-1.3.2(A).
 - 5. Air Content: 4% +/- 1% percent.

PART 3 - EXECUTION

3.1 PREPARATION OF SURFACES FOR CONCRETING

- A. General: Earth surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.
8. Subgrade Preparation:
1. It is recommended that the native soil below proposed crushed base material under hardscape areas, be over excavated to the recommended minimum depth of 12" (inches) below the base layer, brought to near optimum moisture content and rolled with heavy compaction equipment. Soil should be re-compacted to at least 90% of the maximum dry density obtainable by ASTM D1557 method of compaction.
 2. The exposed bottom surface soils, below over-excavation, shall be scarified to the recommended minimum depth of 8" (inches), brought to near optimum moisture content and rolled with heavy compaction equipment. Exposed soil should be compacted to at least 90% of the maximum dry density obtainable by ASTM D1557 method of compaction. Potentially expansive fine-grained silts and clays, if present, should be removed to a depth of approximately 12 inches and replaced with on-site low-expansion sandy soil.
- C. The compacted surface shall be firm, hard and unyielding. The term "firm, hard and unyielding" as used in S. S.P.W.C. Section 301-1.3 shall mean that when the heaviest construction and hauling equipment used on the project drives over the subgrade, no permanent deformation shall occur either before or during pavement construction. On areas where the underlying material appears to be wet or soft, or where it deflects under wheel loads, the Contractor shall employ excavation and work techniques which do not worsen the subgrade condition.
- D. The above subgrade preparation recommendations are based on the assumption that soils encountered during field exploration are representative of soils throughout the site. However, there can be unforeseen and unanticipated variations in soils between points of subsurface exploration. For this reason, the actual scarification or over-excavation depths will have to be determined on the basis of in-grading observations and testing performed by representatives of the project geotechnical consultant.
- E. A California Licensed Surveyor (LS) must provide grade stakes and elevations for the Geotechnical Engineer to verify that the over-excavation depths, shown on the construction drawings for concrete pavement structural sections, have been achieved prior to re-compaction.
- F. Joints in Concrete: Concrete surfaces upon or against which concrete is to be placed, where the placement of the old concrete has been stopped or interrupted so that, as determined by the Engineer, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bond. Except where the Drawings call for joint surfaces to be coated, the joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by sandblasting followed by thorough washing. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.
- G. Embedded Items: No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and Accepted by the Inspector at least 24 hours before placement of concrete. All surfaces of forms and embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.
- H. All inserts or other embedded items shall conform to the requirements herein.

- I. All reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms where shown or by shop drawings and shall be acceptable to the Inspector before any concrete is placed. Accuracy of placement is the responsibility of the Contractor.
- J. Where concrete is to be cast against old concrete, (greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by sand-blasting, exposing the aggregate. In concrete shear-walls, suspended slabs and roof slabs, the interface surface at construction joints shall be roughened to a full amplitude of one quarter inch. The hardened surface shall be cleaned of all latent foreign material and washed clean, prior to the application of an epoxy bonding agent.
- K. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the work. No concrete shall be deposited underwater nor shall the Contractor allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, will be subject to the review of the Engineer.
- L. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2-inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.
- M. Openings for pipes, inserts for pipe hangers and brackets, and the setting of anchors shall, where practicable, be provided for during the placing of concrete.
- N. Anchor bolts shall be accurately set, and shall be maintained in position by templates while being embedded in concrete.
- O. Cleaning: The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

3.2 HANDLING, TRANSPORTING, AND PLACING

- A. General: Placing of concrete shall conform to the applicable requirements of ACI 301 and the requirements of this Section.
- B. The total elapsed time between the addition of water at the batch plant and the completion of the discharge of the P.C.C. from the mixer shall not exceed 90 minutes. All P.C.C. remaining in the mixer after said 90-minute time limit shall be rejected and removed from the project site.
- C. Non-Conforming Work or Materials: Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced by and at the expense of the Contractor.
- D. Whenever batch trucks or other paving equipment cause rutting of the subgrade or subbase in concrete placement areas, inspectors shall immediately stop construction. Construction shall not be allowed to resume until distorted subgrade or subbase is repaired. Contractors and inspectors should locate by proof rolling, any questionable unstable areas in advance to avoid distortion under equipment. Wet, unstable areas must be dried out or replaced before starting placement of asphalt. Locating wet or soft areas in advance can be accomplished by testing finished subgrade or subbase with a loaded truck. Construction of concrete pavement should not proceed unless testing gives a

reasonable indication that distortions will not occur during construction of overlying pavement. When repair, aeration, and recompaction are required to correct damage from Contractor's operation, all necessary repair will be done at Contractor's expense. However, if the Engineer determines that additional depth of aeration and recompaction are needed, that should be paid by change order.

- E. All pull boxes, meter boxes, valve covers and manholes shall be adjusted to proposed finish grade prior to placement of the P.C.C.
- F. Dowel Placement:
 - 1. Dowel bars shall be centered on the joint within a tolerance of +2 inches in the longitudinal direction directly over the contact joint or sawcut for the transverse weakened plane joints, as shown on the plans. Prior to placement of dowel bars, the Contractor shall submit to the Engineer a written procedure to identify the transverse weakened plane joint locations relative to the middle of the dowel bars and the procedure for consolidating concrete around the dowel bars.
 - 2. Dowel bars shall be placed at longitudinal joints as shown on the plans. Dowel bars shall be placed as shown on the plans by using mechanical insertion. When dowel bars are placed by mechanical insertion, the concrete over the dowel bars shall be reworked and refinished so that there is no evidence on the surface of the completed pavement that there has been any insertion performed. When drill and bonding of dowel bars is performed at contact joints, a grout retention ring shall be used.
- G. Concrete shall not be placed until the forms and reinforcement have been inspected, all preparations for the placement have been completed, and the preparations have been checked by the project inspector, all subject to the observation of the engineer or architect.
- H. Casting New Concrete Against Old: An approved epoxy adhesive bonding agent shall be applied to the old surfaces according to the manufacturer's written recommendations. This provision shall not apply to joints where waterstop is installed.
- I. Conveyor Belts and Chutes: All ends of chutes, hopper gates, and all other points of concrete discharge throughout the CONTRACTOR'S conveying, hoisting and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the INSPECTOR. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the specified consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered. Sufficient illumination shall be provided in the interior of all forms so that the concrete at the places of deposit is visible from the deck or runway.
- J. Placement in Slabs: Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the pour. As the work progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.
- K. Temperature of Concrete: The temperature of concrete when it is being placed shall be not more than 90 degrees F nor less than 40 degrees F in moderate weather, and not less than 50 degrees F in weather during which the mean daily temperature drops below 40 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the CONTRACTOR shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F. The CONTRACTOR shall be entitled to no additional compensation

on account of the foregoing requirements.

- L. Cold Weather Placement: Earth foundations shall be free from frost or ice when concrete is placed upon or against them. Fly ash concrete shall not be placed when the air temperature falls below 50 degrees F.
- M. A transverse construction joint shall be constructed, including dowel bars, at the end of each day's work or where concrete placement is interrupted for more than 30 minutes, to coincide with the next contraction joint location. If sufficient concrete has not been mixed to form a slab to match the next contraction joint, when an interruption occurs, the excess concrete shall be removed and disposed of back to the last preceding joint. The cost of removing and disposing of excess concrete shall be at the Contractor's expense. Excess material shall become the property of the Contractor and shall be disposed of. A metal or wooden bulkhead (header) shall be used to form the joint. The bulkhead shall be designed to accommodate the installation of dowel bars.
- N. Float Finish: Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surfaces to true planes within a tolerance of 1/4 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. The finished surface shall be free from humps, sags, blemishes or other irregularities Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture.
- O. Broom Finish Type:
 - 1. Surfaces Sloped Less than 6%: Provide a medium salt (medium broom) finish by drawing a soft bristle broom across concrete surface, perpendicular to line of traffic, to provide a uniform fine line texture.
 - 2. Surfaces Sloped greater than 6%: Provide a slip resistant (heavy broom finish) by striating surface 1/16 inch to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
- P. Joints:
 - 1. Joints: Joints in concrete curb, gutter, and walk shall be designated as expansion joints and control joints. Joints for concrete flatwork shall be provided every five feet or less. Expansion joints for swales, curbs / curb & gutter shall be placed at no greater than 15 feet on center or as indicated on construction drawings
 - a. Expansion Joints: Provide 1/2" wide premolded joint filler, material meeting Section 2.011 herein. Construct expansion joints per detail 3 on sheet C2.01
 - 1) Provide expansion joints, with elastomeric sealer, between concrete walk and curb, concrete walk and buildings, & concrete walk and retaining walls and at locations noted on the construction documents
 - b. Control Joints:
 - 1) In site concrete provide control joint per detail 3 on sheet C2.01.
 - 2) Where integral curb and gutter is adjacent to site concrete pavement, the joint shall be aligned with the pavement joints where practical
- Q. Protection: In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control film. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.

3.3 LIGHT STANDARD BASES, FLAGPOLE BASES, POST BASES AND SIMILAR SITE STRUCTURES

- A. Forms: Suitable material and type, size, shape, quality and strength to insure construction as designed, true to line and sufficiently rigid to resist deflection during placing of concrete. Clean forms of all dirt, mortar and foreign matter before use.
- B. Reinforcement: Place accurately and hold in position, using metal chairs, spacers, metal hangers, supporting wires and other devices of sufficient strength to resist crushing under full load. Clean reinforcing steel of mortar, oil, dirt, loose mill scale loose or thick rust and coatings.
- C. Coordinate installation of conduits, cast in place items and other inserts.
- D. Finish: Grind or sack as required as determined by the Architect to produce a smooth, straight, plumb and acceptable finish without burrs or form marks. For horizontal surfaces: provide float finish.
- E. Curing: Cure surfaces utilizing one of the following methods:
 - 1. Spraying: Spray water over slab areas and maintain wet for 7 days.
 - 2. Spread polyethylene film over 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 7 days.
 - 3. Apply liquid curing compound at rate of 200 square feet per gallon, using power sprayer equipped with agitator. Do not apply liquid curing compound to surfaces scheduled to receive paving units or finish of any kind.

3.4 TAMPING AND VIBRATING

- A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. Vibrators shall be high speed power vibrators (8000 to 10,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required.
- B. Care shall be used in placing concrete around waterstops. The concrete shall be carefully worked by rodding and vibrating to make sure that all air and rock pockets have been eliminated. Where flat-strip type waterstops are placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that all air and rock pockets have been eliminated. Concrete surrounding the waterstops shall be given additional vibration, over and above that used for adjacent concrete placement to assure complete embedment of the waterstops in the concrete.
- C. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the results herein specified within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.5 CURING

- A. Comply with 2013 California Building Code, Title 24, Part 2, Volume 2, Section 1905A.11.
 - 1. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least seven days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.
- B. Curing Methods: Perform curing of concrete by curing as herein specified.
 - 1. Provide moisture-curing by the following methods:
 - a. Keep concrete surface continuously wet by covering with water.
 - b. Continuous water-fog spray.
 - c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4 inch lap over adjacent absorptive covers.
 - 2. Provide curing and sealing compound to exposed exterior slabs, walks, and curbs, as follows:
 - a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Re-coat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - b. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid, floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to Architect.
- C. Concrete slabs and paving shall be properly cured and protected against damage and defacement of nature during construction operations. If weather is hot or surface has dried out, spray surface with fine mist of water starting not later than two hours after final troweling. Surface of finish shall be kept continuously wet for at least ten days. Wetting is considered emergency work and shall be performed on weekends and holidays if necessary.
- D. Concrete Sealer Application: Apply specified concrete sealer in continuous operation in accordance with manufacturer's instructions and recommendations.
 - 1. Prior to starting application, protect adjoining Work, including sealant bond surfaces, from spillage or blow-over of concrete sealer.
 - a. Cover adjoining and nearby surfaces of aluminum and glass where there is the possibility of the concrete sealer being deposited on surfaces.
 - b. Cover live plants and grass.
 - c. Immediately clean concrete sealer from adjoining surfaces, complying with manufacturer's cleaning recommendations.
 - 2. Apply concrete sealer under temperature conditions according to manufacturer's instructions.
 - 3. Apply concrete sealer in light, even coats using garden sprayer, airless sprayer

or paint brush.

4. Apply concrete sealer at rate to suit porosity of portland cement concrete but not less than no more than coverage rates recommended by manufacturer for effective sealing of surface.
- E. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the CONTRACTOR'S expense. Exclude traffic from concrete paving for at least 7 days after placement.
- F. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.

3.6 PUMPING OF CONCRETE

- A. General: If the pumped concrete does not produce satisfactory end results, the CONTRACTOR shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.
- B. Pumping Equipment: The pumping equipment must have 2 cylinders and be designed to operate with one cylinder only in case the other one is not functioning. In lieu of this requirement, the CONTRACTOR may have a standby pump on the site during pumping.
- C. The minimum diameter of the hose (conduits) shall be 4-inches.
- D. Pumping equipment and hoses (conduits) that are not functioning properly, shall be replaced.
- E. Aluminum conduits for conveying the concrete will not be permitted.
- F. Proportioning: Minimum compressive strength, cement content, and maximum size of aggregates shall be as specified herein.
- G. Gradation of coarse aggregates shall conform to ASTM C 33 and shall be as close to the middle range as possible.
- H. Gradation of fine aggregate shall conform to ASTM C 33, with 15 to 30 percent passing the number 50 screen and 5 to 10 percent passing the number 100 screen. The fineness modulus of sand used shall not be over 3.00.
1. Water and slump requirements shall conform to the requirements of this Section.
- J. Cement and admixtures shall conform to the requirements of this Section.
- K. Field Control: Concrete samples for slump per ASTM C 143 and test cylinders per ASTM C 31 and C 39.

3.7 TREATMENT OF SURFACE DEFECTS

- A. As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be

smoothed will not be permitted. No repairs shall be made until after inspection by the ENGINEER. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall have them repaired as specified herein. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced.

1. All repairs and replacements herein specified shall be promptly executed by the CONTRACTOR at its own expense.

- B. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2-inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, and not less than 1/32-inch depth of the surface film from all hard portions, by means of an efficient sandblast. After cutting and sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar so that while the repair material is being applied, the surfaces under repair will remain moist, but not so wet as to overcome the suction upon which a good bond depends. The material used for repair purposes shall consist of a mixture of one sack of cement to 3 cubic feet of sand. For exposed walls, the cement shall contain such a proportion of Atlas white portland cement as is required to make the color of the patch match the color of the surrounding concrete.

- C. Holes left by tie-rod cones shall be reamed so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with non-shrink grout. Holes left by form-tying devices having a rectangular cross-section, and other imperfections having a depth greater than their least surface dimension, shall not be reamed but shall be repaired in an approved manner with non-shrink grout.

- D. All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of this Section, as applicable, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

- E. Prior to filling any structure with water, all cracks that may have developed shall be repaired to the satisfaction of the ENGINEER. This repair method shall be done on the water bearing face of members. Prior to backfilling, faces of members in contact with fill, which are not covered with a waterproofing membrane, shall also have cracks repaired as specified herein.

- F. The finished surface shall be free from humps, sags, blemishes or other irregularities.

3.8 FIELD QUALITY CONTROL

- A. Correction of Mix Design for Failed Concrete Tests: If the compressive cylinder strength test for in place PCC yields test results below the specified 28-day PCC compressive strength and the Engineer determines a corrective change is necessary, the Contractor shall, at its own expense, make corrective changes in the mix proportions. The Engineer shall approve the changes in the mix proportions or PCC placement procedures, before any additional PCC is placed on the job.

- B. Flood Tests: Before final acceptance, and after concrete has thoroughly cured, all concrete pavement, including swales and curb & gutter, shall be water tested to ensure proper drainage as directed by the Inspector. The Contractor shall provide water for this purpose. The flooding shall be done by water tank truck. Concrete work where water ponds and does not run off in a reasonable amount of time (1-hour), shall be removed to the nearest score or joint line and replaced to provide proper drainage. Full compensation for complying with this requirement shall be considered as included in the Contract Unit Price for cement concrete pavement.

3.9 OFF-SITE CONCRETE WORK

- A. Concrete driveway aprons, street sidewalks, curbs and gutters, etc., indicated to be constructed outside of property lines shall conform to the standards and specifications of the public agency having jurisdiction and shall be subject to inspection by its representative. The CONTRACTOR shall obtain and pay for necessary permits and inspection fees. The Owner shall reimburse the Contractor for said permits and all necessary inspection fees.

3.10 CARE AND REPAIR OF CONCRETE

- A. General: The CONTRACTOR shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the CONTRACTOR'S expense.
- B. The contractor shall barricade and protect placed Portland Cement Concrete from all damage, marks, mars and/or graffiti. Any Portland Cement Concrete damaged, defaced, discolored or defective shall be replaced at the contractor's expense.

END OF SECTION