SPECIFICATIONS – DETAILED PROVISIONS

SECTION 01 1100: SUMMARY OF WORK

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SECTION 01 1100
SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Project Information.
2. Project Description.
3. Definitions
4. Work by County and Others
5. Warranty
6. Available Information
7. Project Utility Sources

1.02 PROJECT INFORMATION

A. Project Title:

1. **BADLANDS SANITARY LANDFILL FLARE #3 PAD CONSTRUCTION**:

B. Site Address: 31125 Ironwood Ave, Moreno Valley, CA 92555 (located within unincorporated Riverside County).

C. Owner: County of Riverside.

D. Operator: Riverside County Department of Waste Resources.

1.03 PROJECT DESCRIPTION

A. General:

1. The descriptions in this Section are not intended to provide or be construed as a complete summary of the Contract Documents. The following only identifies in broad terms the general nature of the Work to be performed by the Contractor and its Subcontractors.
2. Contractor shall perform and complete all Work in accordance with the requirements set forth in the Contract Documents.
3. This Section should read as if "Provide and Install" were included at the front of sentences, as applicable.
    a. Responsibility for the providing and the installing of every element of the Work is borne by the Contractor, unless otherwise noted.

B. Outline of Work:

The work to be performed by Contractor shall conform to the requirements of the General Provisions, Special Provisions, Detailed Provisions, Drawings, and other related documents, and include the furnishing of all labor, materials, tools, equipment, plant, and services necessary therefore and incidental thereto to complete the Project. The work shall consist of new construction of two concrete pads for the erection of a landfill flare. The major features of the work to be performed shall include, but are not limited to:

1. Prepare and submit documents for the purpose of identifying construction planning, scheduling, and administration activities, including, but not limited to the work plan documents indicated in this Section.
2. Perform field survey, which shall include, but is not limited to: optional survey to verify County-provided survey information, construction layout, staking, datum verification, construction placement, and completed Work verification survey.
3. Provide environmental controls to mitigate against soil erosion and sediment, dust, odor, contaminated surface water runoff, pest, and noise.
4. Mobilize and stage construction equipment.
5. Excavate, over-excavate, stockpile, and/or place engineered fill for foundation preparation.
6. Construct reinforced concrete foundation.
7. Clean-up site and demobilize equipment.

1.04 DEFINITIONS

A. Throughout these Detailed Provisions, certain terms are capitalized. Capitalized terms have the definitions assigned to them in the Detailed Provisions. Definitions of terms will be found throughout these Detailed Provisions. There is no central location for defined terms.

1. "**Addendum**" or "**Addenda**" means alteration or clarification of the plans or specifications provided to bidders by the County prior to bid time, which becomes part of the Contract Documents when the Contract is executed.
2. "**ASTM Specifications**" the latest revised specifications or tentative specifications of the American Society for Testing and Materials.
3. "**Basis of Design**" indicates project is based on specified equipment and equipment from other manufacturers may require, at a minimum, revisions to the Project Drawings and/or Detailed Provisions for surrounding infrastructure.
4. "**Claim**" means a separate demand by the Contractor sent by registered mail or certified mail with return receipt requested for one or more of the following: (a) a time extension, including, without limitation, for relief from damages or penalties for delay assessed by the County under the Contract; (b) payment by the County of money or damages arising from work done by or on behalf of the Contractor and payment for which is not otherwise expressly provided or to which the Contractor is not otherwise entitled; (c) payment of an amount that is disputed by the County; (d) that Contractor's performance is excused, or (d) other relief.

5. "**Change Order**" means a written instrument, signed in accordance with the requirements of the General Provisions, setting forth the agreement of the County and the Contractor on the terms of a Contract Adjustment.
6. "**Change Proposal**" means a document prepared by the Contractor at the request of the County, which proposes changes to the Work and/or changes to the Contract Price and/or Contract Time. County initiates all requests for Change Proposals.
7. "**Contract**" means the Agreement included in the Administrative Provisions covering the Work signed by County and Contractor, which includes all Contract Documents.
8. "**Contract Documents**" The "Contract Documents" for the Project are enumerated in the Agreement.
9. "**Contract Award**" or "**Contract Execution**" occurs when the County Board of Supervisors or their designee signs the Contract, which shall only occur after the Contractor signs the Contract.
10. "**Contract Price**" shall mean either the total aggregate amount of the lump sum, Unit Price, or Unit Prices named in the Agreement awarded by the County, subject to adjustment for variances in quantities and Change Orders or Unilateral Change Orders, or the total of all payments under the Contract at the lump sum, Unit Price, or Unit Prices based on the Engineer's approvals of installed quantities of Work, as the case may be.
11. "**Contractor's Representative**" is the individual who has authority to obligate the Contractor and is identified in the Agreement.
12. "**Contract Time**" means the total number of Working Days stated in the Agreement within which Contractor must complete the Work, as may be modified by a Change Order or Unilateral Change Order.
13. "**Contract Work**" or "**Work**" means all the resources, activities, construction work and other services specified, indicated, shown or reasonably inferable from the Contract Documents including labor, materials, equipment and services to fulfill the Contractor's obligations.
14. "**Contractor**" means the person or persons, entity, including but not limited to, limited liability corporation, co-partnership, or corporation, private or municipal, who have entered into the Agreement with the County, or his or their legal representatives.
15. "**Contractor's Surveyor**" is responsible to perform horizontal and vertical control of the actual construction, based on benchmarks established by County's Surveyor.
16. "**County of Riverside**" or "Riverside County Department of Waste Resources" or "County" or "Owner" may be used interchangeably.
17. "**County's Surveyor**" representing the County shall establish reference benchmarks for construction. County's Surveyor shall also perform surveys to check line, grade, and calculate volumes, as required.

18. "**Critical Path**" is the longest continuous chain of activities for the Work that has the least amount of total float of all chains. In general, a delay on the critical path extends the scheduled completion date of the Work.

19. "**Cubic Yard**" – Unless otherwise specified in these Detailed Provisions, where the term cubic yard appears it shall mean bank(bulk) volume in the case of excavation; and compacted volume yielding the specified relative compaction, moisture content, and hydraulic conductivity, if required, in the case of engineered fill.

20. "**Day**" means calendar day, unless otherwise specified.

21. "**Facilities**" or **"RCDFM"** refers to Riverside County Department of Facilities Management

22. "**Field Directive**" is a document prepared by the County directing the Contractor to proceed promptly with specific work and shall not, in and of itself, constitute a Change Order of entitlement to an adjustment in Contract Time and/or Contract Price.

23. "**Final Acceptance**" of the Work occurs when the Engineer determines that Final Completion of the Work has been achieved, the Board issues a written acceptance of a completed Contract, and, a Notice of Completion has been recorded with the County of Riverside by the County. The date of Final Acceptance is the date the Notice of Completion is recorded by the County of Riverside Recorder.

24. "**Final Completion**" is the stage of performance of the Work when:

    a. All Work required by the Contract Documents has been fully completed in compliance with the Contract Documents and all Applicable Laws including, but not limited to, correction or completion of all punch list items noted upon Final Completion and final cleaning;

    b. Contractor has delivered to County all closeout documentation required by the Contract Documents;

    c. Final inspection and approval by the Inspector of Record and all applicable governmental agencies has occurred and a final certificate of occupancy (or equivalent inspection sign-off by applicable governing agency) has been issued by covering the entire Project site without exception or condition; and

    d. The County accepts the Work as complete and, in its discretion, records a Notice of Completion and Acceptance.

    e. "**Force Majeure**" means any of the following unanticipated events not caused by County or Contractor, which materially and adversely affect Contractor's obligations under the Contract: Acts of God as defined in Public Contract Code §7105, embargo, rebellion, war, terrorism, riot, act of sabotage, civil commotion, discovery of any archeological, paleontological or cultural resources, spill of hazardous substances by a third party not under the control of Contractor at or near the Project site which is required to be reported to the California Environmental Protection Agency, Department of Toxic Substances Control, discovery at, near or on the site of any species listed as "threatened" or "endangered" under the Federal or State Endangered Species Act, fire, flood,

landslide. Force Majeure does not include epidemic, pandemic, virus, infection or other disease.

25. "**Hazardous Material**" means any pollutant, contaminant, toxic or hazardous waste, dangerous substance, potentially dangerous substance, noxious substance, toxic substance, flammable material, explosive material, radioactive material, urea formaldehyde foam insulation, asbestos, PCBs, or any other substances the removal of which is required, or the manufacture, preparation, production, generation, use, maintenance, treatment, storage, transfer, handling, or shipment of which is restricted, prohibited, regulated, or penalized by any and all federal, state, county, or municipal statues or laws and regulations promulgated thereunder, now or at any time hereafter in effect, including, but not limited to, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Hazardous Materials Transportation Act, the Resource Conservation and Recovery Act (RCRA), the Federal Water Pollution Control Act, the Toxic Substances Control Act, the Occupational Safety and Health Act, and the Model Toxics Control Act, or similar state or local statue, as the laws have been amended and supplemented.

26. "**Notice**" means a written document issued by the County or Contractor which is submitted to the other party and delivered by:

    a. Depositing in the U.S. Mail (or other method of commercial express mail), which notice shall be effective on the date of receipt;

    b. Service on the Parties' representative or at the Contractor's home office or field office, which notice shall be effective on the date of service; or,

    c. Facsimile to the Parties' representative or Contractor's home office or field office, which notice shall be effective upon receipt.

27. "**Notice to Proceed**" is a written directive issued by the County authorizing the Contractor to perform some or all of the Work.

28. "**Parties**" refers to the Contractor and County of Riverside.

29. "**Plans**" or "**Project Drawings**" means the official plans, profiles, typical cross sections, general cross sections, working drawings, and supplemental drawings, or exact reproductions thereof, approved by the County, which show the location, character, dimension and details of the Work, and which are to be considered a part of the Contract Documents.

30. "**Project**" means the total construction of the Project identified in the Notice Inviting Bids of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by other contractors and the County's own forces.

31. "**Project Manager**" is the designated representative of the County responsible for the project.

32. "**Request for Change**" means a document, designated as a Request for a Change, prepared by the Contractor requesting either (1) a change in Contract Price; (2) a

change in Contract Time; (3) a change in Contract Work; (4) a payment of money or damages; and/or, (5) any other relief arising out of or relating to this Contract.

33. "**Request for Information**" is a request from the Contractor to the County seeking an interpretation of a clarification of some requirement of the Contract Documents.

34. "**Resident Engineer**" will serve as the Project Manager's on-site representative. All coordination, reporting, and issues related to non-compliance will be directed to the Project Manager through the Resident Engineer. In addition, the Resident Engineer will participate with the Project Manager in all decisions related to design issues which arise during the course of construction.

35. "**Riverside County**" or "**Riverside County Department of Waste Resources**" or "**County**" or "**Owner**" may be used interchangeably and refers to the County of Riverside, organized as a General Law County under the provision of the California Government Code.

36. "**Site**" or "**Project Site**" shall be understood to refer to the location at which construction, equipment or services furnished by the Contractor under the Contract will be performed, completed and/or delivered.

37. "**Standard Drawings**" unless otherwise noted, the Standard Drawings shall be those of the Riverside County Flood Control and Water Conservation District, Riverside County Transportation Department and Standard Plans of the State Department of Transportation (Caltrans).

38. "**Standard Specifications**" is a direct reference to the publication "Standard Specifications for Public Works Construction", latest edition, written and promulgated by the Joint Cooperative Committee of the Southern California Chapter American Public Works Association and Southern California Departments Associated General Contractors of California. This publication is also known as the "Green Book".

39. "**State Standard Specifications**" are the Standard Specifications of the State of California, Department of Transportation, latest edition.

40. "**Subcontractor**" means a person or entity that has a direct contract with the Contractor or with another Subcontractor to perform a portion of the Work, including without limitation, subcontractors, sub-subcontractors, suppliers, equipment operators, manufacturers and vendors, of any and every Tier.

41. "**Supplier(s)**" The term Supplier(s) shall mean any person or firm who is not performing work or supplying labor on Site and is engaged in the business of supplying a manufactured product or resource to the County, Contractor, or Subcontractors. The term Supplier(s) includes materialmen, manufacturers, and fabricators.

42. "**Substantial Completion**" means that stage in the progress of the Work where:

    a. The County has full and unrestricted use and benefit of the Project for the purpose intended;

    b. All the systems and parts of the Contract Work are functional;

c. Utilities are connected and operate normally;

d. Only minor incidental work or correction or repair remains to complete all Contract requirements; and,

e. At the County's option, the Contractor has provided all required permits and certificates.

43. "**Testing/Inspection Provider**" to be hired by the County to perform field and laboratory soil and materials testing and structural inspection services.

1.05 WORK BY COUNTY AND OTHERS

A. County's Testing and Inspection Services:

1. As specified in the Contract Documents, the County shall contract with testing and inspection agencies and/or use in-house inspection/testing services to ensure the Contractor is in compliance with the Contract Documents.

2. The County's testing and inspection agencies provide services for the County exclusively, except as indicated in this Section and in Section 01 4300 – Quality Assurance and Control.

3. Contractor Responsibilities:

a. The Contractor is required to perform, at no additional cost to the County, their own quality control program, including testing, inspection, and special inspections, as necessary to verify compliance with Contract Documents including source quality control testing as specified in Section 01 4300 – Quality Assurance and Control.

1) The Contractor is prohibited from employing the same testing and inspection agency or agencies employed by the County.

b. The Contractor shall be responsible for costs for testing of Work that is subject to corrective action or that was otherwise untested, not observed or other problems attributable to the Contractor's performance of the Work.

c. The Contractor shall pay for additional testing above and beyond that required by the Contract Documents to facilitate the performance of its means and methods.

1.06 WARRANTY

A. The Work shall be warranted in accordance with the General Provisions and Detailed Provisions Section 01 7700 – Closeout Procedures.

B. In addition, certain elements of the Work require extended warranties as defined within the Detailed Provisions sections in Divisions 02 through 03.

1. Sample mandatory extended warranty documents are contained in Detailed Provisions Section 01 7700 – Closeout Procedures.

C. Warranty bond will be required from the Contractor.

1.07 PROJECT UTILITY SOURCES

A. Water Supply:

1. The nearest municipal potable water source is located off-site in the City of Moreno Valley, on Theodore Street. Although Contractor will be allowed to use the County's water source, the County shall have first and priority access to the water in order to ensure landfill operations are not impacted. Costs associated with transporting water from the source to the Project Location shall be the Contractor's responsibility. Costs associated with repairing damages to the County's water source and caused by the Contractor's actions shall be borne by the Contractor. Contractor is responsible for supplying potable water for all other uses.

2. As deemed necessary by the Contractor, the Contractor shall make arrangements for obtaining a dedicated water supply for the Project and provide all labor and equipment to collect, load, transport, apply, and dispose water as necessary for dust control, excavation, grading, and other Project purposes. Water shall be clean and free from objectionable deleterious amounts of acids, alkalis, salts, or organic materials. Payment for complying with this section shall be considered as included in the various items of Work, and no additional compensation shall be allowed.

B. Fire Protection Service:

1. Contractor shall make provisions for fire protection for its operations utilizing portable firefighting equipment.

C. Electrical Power:

1. Contractor shall provide power during construction operations using engine generators certified for use by the California Air Resources Board (CARB).

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION 01 1100

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SPECIFICATIONS – DETAILED PROVISIONS

SECTION 01 3300: SUBMITTAL PROCEDURES

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SECTION 01 3300
SUBMITTAL PROCEDURES

PART 4 GENERAL

4.01 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals. The documenting the progress of construction during performance of the Work, including, but not limited to the following:

1. Contractor's construction schedule.
2. Construction schedule updating reports.

B. Related Contract Document Sections include, but are not limited to:

1. General Provisions.
2. Detailed Provisions Section 01 7700 – Closeout Procedures.

4.02 DEFINITIONS

A. Action Submittals: Written and graphic information that require County's responsive action.

B. Informational Submittals: Written and graphic information that do not require County's responsive action. Submittals may be rejected for not complying with requirements.

4.03 ACTION SUBMITTALS

A. Submittal Schedule: Contractor shall submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by County and additional time for handling and reviewing submittals required by those corrections.

B. Construction Schedule: Within fourteen (14) calendar days after the Contract Award, the Contractor shall submit a construction schedule providing the starting and completion dates of the various stages of the Work. The Contractor shall be prepared to discuss its construction schedule at the Pre-Construction Meeting.

4.04 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. County's Digital Data Files: Electronic copies of digital data files of the Project Drawings will be provided by County for Contractor's use in preparing submittals.

1. Upon request, County will furnish Contractor with digital data drawing files of the Project Drawings for use in preparing Shop Drawings.

b. County makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Project Drawings.

c. Contractor shall execute a data licensing agreement in the form of Agreement acceptable to the County.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. The County reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on County's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow fourteen (14) calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. County will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

3. Resubmittal Review: Allow seven (7) calendar days for review of each resubmittal.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.

2. Include the following information for processing and recording action taken:

a. Project name.

b. Date.

c. Name of County.

d. Name of Contractor.

e. Name of Subcontractor.

f. Name of supplier.

g. Name of manufacturer.

h. Submittal number or other unique identifier, including revision identifier.

1) Submittal number shall use Detailed Provisions Section number followed by a decimal point and then a sequential number (e.g., 013300.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 013300.01.A).

i. Number and title of appropriate Detailed Provisions Section.

j. Drawing number and detail references, as appropriate.

k. Location(s) where product is to be installed, as appropriate.

l. Other necessary identification.

3. Submittal Copies: Unless additional copies are required for final submittal, and unless County observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

4. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. County will return without review, submittals received from sources other than Contractor.

a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

1) Project name.

1) Date.

2) Destination (To:).

3) Source (From:).

4) Name and address of County.

5) Name of Contractor.

6) Name of firm or entity that prepared submittal.

7) Names of subcontractor, manufacturer, and supplier.

8) Category and type of submittal.

9) Submittal purpose and description.

10) Detailed Provisions Section number and title.

11) Detailed Provisions paragraph number or drawing designation and generic name for each of multiple items.

12) Drawing number and detail references, as appropriate.

13) Indication of full or partial submittal.

14) Transmittal number.

15) Submittal and transmittal distribution record.

16) Remarks.

17) Signature of transmitter.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Detailed Provisions Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
    a. File name shall use project identifier and Detailed Provisions Section number followed by a decimal point and then a sequential number (e.g., LC-013300.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LC-013300.01.A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by County.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to County, containing the following information:
    a. Project name.
    b. Date.
    c. Name and address of County.
    d. Name of Contractor.
    e. Name of firm or entity that prepared submittal.
    f. Names of subcontractor, manufacturer, and supplier.
    g. Category and type of submittal.
    h. Submittal purpose and description.
    i. Detailed Provisions Section number and title.
    j. Detailed Provisions paragraph number or drawing designation and generic name for each of multiple items.
    k. Drawing number and detail references, as appropriate.
    l. Location(s) where product is to be installed, as appropriate.
    m. Related physical samples submitted directly.
    n. Indication of full or partial submittal.
    o. Transmittal number.
    p. Submittal and transmittal distribution record.
    q. Remarks.
    r. Other necessary identification.
5. Metadata: Include the following information as keywords in the electronic submittal file metadata:

s. Project name.

t. Number and title of appropriate Detailed Provisions Section.

u. Manufacturer name.

v. Product name.

F. Options: Identify options requiring selection by County.

G. Deviations: Identify deviations from the Contract Documents on submittals.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.

2. Note date and content of revision in label or title block and clearly indicate extent of revision.

3. Resubmit submittals until they receive County's acceptance.

I. Distribution: Furnish copies of final submittals to manufacturers, Subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Retain complete copies of submittals on Project Site. Use only final action submittals that are marked as being accepted by the County.

PART 5 PRODUCTS

5.01 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Action Submittals: Submit one (1) electronic copy and one (1) hard copy of each submittal unless otherwise indicated by the County.

2. Informational Submittals: Submit one (1) electronic copy and one (1) hard copy of each submittal unless otherwise indicated by the County.

3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.

b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Project Schedule: As required in individual Detailed Provisions Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Submit product schedule in the following format:

    a. Four (4) paper copies of product schedule or list unless otherwise indicated. County will return three (3) copies.

C. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Detailed Provisions Section 01 4300 – Quality Assurance and Control.

D. Project Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Detailed Provisions Section 01 7700 – Closeout Procedures.

E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of engineers and owners, and other information specified.

F. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

G. Schedule of Tests Inspections: Comply with requirements specified in Detailed Provisions Section 01 4300 – Quality Assurance and Control.

H. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

I. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

J. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

5.02 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to the County.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit three (3) paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design

professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 6 EXECUTION

6.01 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to County.

B. Project Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Detailed Provisions Section 01 7700 – Closeout Procedures.

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Detailed Provisions Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents. In the case of Shop Drawings, each sheet shall be so dated, signed and certified.

6.02 COUNTY'S ACTION

A. General: County will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: County will review each submittal, make marks to indicate corrections or revisions required, and return it. County will mark each submittal appropriately to indicate action, as follows:

1. "ACCEPTED AS SUBMITTED" or "APPROVED AS NOTED" will require no formal revision and resubmission.
2. "REVISE AND RESUBMIT" or "REJECTED" will require the Contractor to revise said submittal and shall resubmit the required number of copies of said revised submittal to the County.

C. Informational Submittals: County will review each submittal and will not return it, or will return if it does not comply with requirements. County will forward each submittal to appropriate party.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

F. Fabrication of an item shall commence only after the County has reviewed the submittal and returned copies to the Contractor marked either "ACCEPTED AS

SUBMITTED" or "APPROVED AS NOTED". Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis of claims for extra work.

END OF SECTION 01 3300

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SPECIFICATIONS – DETAILED PROVISIONS

SECTION 01 4300: QUALITY ASSURANCE AND CONTROL

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SECTION 01 4300
QUALITY ASSURANCE AND CONTROL

PART 7 GENERAL

7.01 SUMMARY

A. Section includes the following:

1. Administrative and procedural requirements for quality assurance and quality control.

2. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

   a. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and –control procedures that facilitate compliance with the Contract Document requirements.

   b. Requirements for Contractor to provide quality-assurance and –control services required by County or authorities having jurisdiction are not limited by provisions of this Section.

   c. Specific test and inspection requirements are not specified in this Section.

7.02 REFERENCES

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

1. ASTM E329 – Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

7.03 DEFINITIONS

A. Quality-Assurance Services – Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services – Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include Ceontract enforcement activities performed by County.

C. Preconstruction Testing or Conformance Testing – Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

D. Product Testing – Tests and inspections that are performed by an Nationally Recognized Testing Laboratory (NRTL), an NVLAP (National Institute of Science and Technology (NIST) National Voluntary Laboratory Accreditation Program), or a testing agency qualified to conduct product testing and acceptable to authorities

having jurisdiction, to establish product performance and compliance with specified requirements.

E. Source Quality-Control Testing – Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

F. Field Quality-Control Testing – Tests and inspections that are performed on-site for installation of the Work and for completed Work.

G. Testing Agency – An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. Installer/Applicator/Erector – Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

I. Experienced – Unless noted otherwise, when used with an entity or individual, "experienced" means having successfully completed a minimum of five (5) previous projects similar in nature, size, and extent to the Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

7.04 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. In case of conflict between the Contract Documents, the following order of governing documents shall be followed (with first listed document controlling):

1. Permits ~~from other authorities having jurisdiction as may be required by law~~issued by jurisdictional regulatory agencies.

~~1.~~2. Change Orders, Construction Change Directives and/or Supplemental Agreements, or Addenda to any of the Contract Documents; whichever occurs last.

3. Construction Agreement.

4. Detailed Provisions.

~~2.~~5. Special Provisions.

6. Administrative Provisions.

~~3. Detailed Provisions~~

~~4.~~7. General Provisions.

~~5.~~8. Project Drawings ~~(specific details supersede general plan)~~and Specifications

~~6.~~9. Standard Drawings

~~7.~~10. Reference~~State Standard~~ Specifications

The Special Provisions, Detailed Provisions, Drawings, and Standards are intended to be complimentary so that any W~~w~~ork exhibited in the Drawings, but not mentioned in the Special and/or Detailed Provisions, or vice versa, shall be executed to the true intent thereof and the same as if both exhibited in Drawings and set forth in the Special Provisions. The Contractor shall consult with the County to obtain interpretations of the Contract Documents. The Contractor shall also assist in resolutions of questions and transmit written interpretations to concerned parties.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to the County for a decision before proceeding.

7.05 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. At the minimum, include the following:

1. Date of issue.
2. Project title.
3. Name, address, e-mail, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Detailed Provisions Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and re-inspecting.

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. At the minimum, include the following:

1. Name, address, e-mail, and telephone number of representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.

3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Detailed Provisions Sections.

C. Permits, Licenses, and Certificates: For County's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgements, correspondence, records and similar documents, established for compliance with standards and regulations bearing performance of the Work.

7.06 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Detailed Provisions Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for the Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for the Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for the Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where the Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for the Project.

F. Specialists: Certain Detailed Provisions Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, and NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is

acceptable to authorities.

1. NRTL: A Nationally Recognized Testing Laboratory according to 29 CFR 1910.7
2. NVLAP: A testing agency accredited according to National Institute of Science and Technology (NIST) National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that similar in material, design, and extent to those indicated for the Project.

I. Preconstruction Testing and Conformance Testing: Where testing agency is indicated to perform preconstruction/conformance testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:
   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
   d. When testing is complete, remove test specimens, assemblies, and mockups, and laboratory mockups; do not reuse products.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to County, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected W~~w~~ork complies with or deviates from the Contract Documents.

7.07 QUALITY CONTROL

A. County Responsibilities: Where quality-control services are indicated in individual Detailed Provisions Sections as County's responsibility, County may engage a qualified testing agency to perform these services. It is the Contractor's responsibility to schedule the testing provided by such agencies.

1. Costs associated with retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with Contract Documents due to the Contractor's actions, shall be charged to the Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to County are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
   a. Contractor shall not employ same entity engaged by County, unless agreed to in writing by the County.

2. Notify County of Riverside at least forty-eight (48) hours in advance of time when Work that requires testing or inspection will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with County and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify County and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.

5. Preliminary design mix proposed for use for material mixes that require control by testing agency.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and –control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

7.08 SPECIAL INSPECTIONS AND TESTS

A. Special Inspections and Tests: Conducted by a qualified special inspector as required by California Building Code (CBC), as indicated in individual Detailed Provisions Sections and indicated in the Project Drawings, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.

2. Notifying County and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.

3. Submitting a certified written report of each test, inspection, and similar quality-control service to County, Contractor, and to authorities having jurisdiction.

4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.

5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.

6. Retesting and re-inspecting corrected work.

PART 8 PRODUCTS – NOT USED

PART 9 EXECUTION

9.01 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. At a minimum, include the following:

1. Date of test or inspection was conducted.

2. Description of the Work tested or inspected.

3. Date of test or inspection results were transmitted to County.

4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project Location. Post changes and revisions as they occur. Provide access to test and inspection log for County’s reference during normal working hours.

9.02 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Detailed Provisions Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

9.03 REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK

A. If any Work is concealed or performed without the requisite inspection notice, then the Work shall be subject to such tests or exposure as may be necessary to prove to the Engineer that the materials used and the Work performed are in conformity with the Plans and Specifications, or said materials or Work may be removed and installed or performed again at the discretion of the Engineer. All labor, equipment, and materials necessary for exposing, testing or complete removal, and installation or replacement shall be furnished by the Contractor at its own expense. The Contractor shall replace, at its own expense, any materials or Work damaged by exposure or testing.

B. Cost of rework inspection incurred by the County will be deducted from the Contract Price via Change Order. Rework inspection cost is as follows:

1. Contractor's failure to complete the Work within the Contract Time, including any previously authorized extensions thereof.

2. Extra inspections required for Contractor's correction of defective Work.

3. Overtime costs for acceleration of Work done for Contractor's convenience.

4. All associated costs including travel.

C. All Work which has been rejected shall be remedied or removed and replaced by the Contractor in an acceptable manner; and no compensation will be allowed for such removal or replacement. Any Work done beyond the lines and grades as described by the Contract Documents, or any Extra Work done without proper written authority, will be considered as unauthorized and will not be paid for. Work so done may be ordered removed at the Contractor's expense. Upon failure on the part of the Contractor to comply, the County shall have authority to cause defective or unauthorized Work to be remedied, or removed and replaced, and to deduct the costs for this Work from any monies due or to become due the Contractor.

END OF SECTION 01 4300

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SPECIFICATIONS – DETAILED PROVISIONS

SECTION 01 7700: CLOSEOUT PROCEDURES

CONTENTS

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SECTION 01 7700
CLOSEOUT PROCEDURES

PART 10 GENERAL

10.01 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to:

1. Substantial Completion procedures
2. Final Completion/Final Acceptance procedures.
3. Project Record Documents
4. Warranties.
5. Repair Work.
6. Final Cleaning.

B. Related Sections:

1. General Provisions.
2. Detailed Provisions Section 01 7823 – Operation and Maintenance Manuals.

10.02 DEFINITIONS

A. Project Record Documents: Various documents that define the constructed facility that are kept current by neat, legible hand annotation of all deviations from what is shown or required by the Contractor during the course of construction to accurately document the "as-built" facility, including, but not limited to:

1. Project Drawings.
2. Contract Documents (Administrative Provisions, General Provision, Special Provisions, and Detailed Provisions).
3. Addenda.
4. Change Orders.
5. Request for Information (RFI).
6. Completed Work Verification Survey: electronic copy and one (1) full-size hard copy.
7. Field Directives.
8. Correspondence.
9. Submittals.

10.03 SUBSTANTIAL COMPLETION

A. Contractor shall notify the County in writing that the Work is Substantially Complete.

1. The County shall promptly inspect the Work and, if the County does not agree that the Work is Substantially Complete, the County will prepare a Punch List (list of items to be completed or corrected).

    a. The County reserves the right to add to, modify, or change the Substantial Completion Punch List as circumstances dictate.

    b. Failure by the County to include any items on such list does not alter the responsibility of the Contractor to complete or correct the Work in accordance with the Contract.

2. With the Contractor's Substantially Complete request, the Contractor shall provide the following:

    a. Obtain and submit releases enabling County's full and unencumbered use of the Work, including access to utilities and other administrative approvals.

    b. Make final changeover of locks, keys, gates, and other access restriction measures consistent with removal of the Contractor's personnel form the area of Work.

    c. Deliver tools, spare parts, extra stock of materials, and similar physical items to the County in accordance with the requirements of the Contract Documents.

B. At the Contractor's request, the County may identify those Punch List items that must be completed or corrected in order for the Contractor to achieve Substantial Completion.

1. When the County determines that those Punch List items have been completed or corrected by the Contractor, the County shall make a determination that the Work is Substantially Complete.

2. A Certificate of Substantial Completion will be issued by the County, which shall establish the date of Substantial Completion.

3. The Certificate of Substantial Completion shall state the responsibilities of the County and the Contractor for security, maintenance, heat, utilities, damage to the Work, insurance, and the time to complete remaining Punch List Work before Liquated Damages begin to accrue for the Contractor's failure to achieve Final Completion/Final Acceptance in a timely manner.

4. The County shall assess Liquated Damages for the Contractor's failure to complete or correct the required Punch List items for Substantial Completion within the Contract Time.

10.04 PUNCH LIST PROCEDURES

A. The County shall prepare the Punch List (list of incomplete items of Work including discrepancies found in the Completed Work Verification Survey) when notified by the Contractor that the Work is Substantially Complete.

B. The Contractor shall correct all Punch List items and re-issue the County Punch List, with their initials and date complete, along with a written statement that the entire Project is physically complete and ready to receive the Certificate of Substantial Completion.

C. Prior to issuance of the Certificate of Substantial Completion, the County shall perform all necessary inspections to verify that all Punch List items of Work are complete.

10.05 FINAL INSPECTION AND FINAL PUNCH LIST

A. All remaining Punch List items that were not corrected prior to Substantial Completion shall be successfully completed by the Contractor prior to the Contractor's request for Final Acceptance. When the Contractor considers that all Contract Work is ready for final inspection and Final Acceptance, the Contractor shall give written notice to the County.

B. County shall promptly perform a final inspection of the Work and, if necessary, prepare a Final Punch List (a list of items to be completed or corrected by the Contractor prior to the County granting Final Acceptance).

C. Final Punch List items may include, but are not limited to: Copies of warranties and guarantees required by the Contract; permit approvals and Certificates of Occupancy/Use; Operation and Maintenance Manuals, Project Record Documents; Right of Way, Easements and Property Releases, and any other documents called for elsewhere in the Contract Documents.

D. The Contractor shall complete or correct the items identified in the Final Punch List within the time period as required in the Certificate of Substantial Completion. Should the Contractor fail to complete or correct all remaining Final Punch List items within the required time, the County may assess Liquated Damages against the Contractor for failure to achieve Final Acceptance in a timely manner.

E. After the Contractor completes all items identified in the Final Punch List(s), the Contractor shall notify the County in writing that the Final Punch List items have been successfully completed. After verification by the County that such completion was satisfactory, the Contractor shall submit a Final Application for Payment.

10.06 REQUIREMENTS FOR FINAL APPLICATION FOR PAYMENT

A. In addition to any other requirement identified in the Contract Documents, the Final Application for Payment shall include the following documents:

1. Affidavit of Wages Paid for Contractor and all Subcontractors in accordance with state law;

2. Contractor's release of Claims against the County from all parties who are entitled to Claims against the subject Project, property or improvement pursuant to the provisions of law;

3. Contractor certification that all Subcontractors and suppliers have been paid and there are no outstanding liens;

4. Right of Way, Easements and Property Releases;
5. Final, Project Record Documents ten (10) Working Days following issuance of the Certificate of Substantial Completion.
    a. One (1) complete full size set of finalized Project Record Drawings on bond.
    b. One (1) complete set of finalized Project Record Specifications.
    c. One (1) complete set of Contract documents, including approved Field Work Directives and Change Orders.
    d. One (1) complete set of Contractor's correspondence, including but not limited to RFIs, memorandums, and e-mails.
6. Final Application for Payment;
7. Completed permits and/or Certificates of Occupancy/use ten (10) Working Days following issuance of the Certificate of Substantial Completion; and
8. Complete the following:
    a. Complete Final Cleaning and Project Location cleanup.
    b. Complete all remaining obligations as set forth within this Section.

10.07 FINAL COMPLETION/FINAL ACCEPTANCE

A. Final Completion/Final Acceptance shall be achieved when all the obligations of the Contract have been successfully performed by the Contractor in accordance with the Contract and accepted by the County.

B. Neither Final Acceptance, nor Final Payment, shall release Contractor or its Sureties from any obligations under this Contract or the Performance and Payment Bonds, or constitute a waiver of any Claims by the County arising from or related to Contractor's performance or failure to perform the Work and to meet all contractual obligations in accordance with the Contract, including but not limited to:

1. Unsettled liens, security interests or encumbrances;
2. Damaged, non-conforming, or defective Work discovered by the County;
3. Terms of any warranties or guarantees required by the Contract; and
4. Payments made in error.

C. Except for any Claims properly submitted in accordance with the General Provisions, acceptance of Payment on the Final Application for Payment by the Contractor shall, on behalf of itself and its Subcontractors or Sureties, forever and unconditionally release and discharge the County, its officers, agents, employees, from:

1. Any and all disputes or Claims, including but not limited to Claims for damages, fines, interest, taxes, attorney fees, or costs, demands, rights, actions or causes of actions, known or unknown, arising out of or in any way related to the parties' performance under the Contract and/or Project; and

2. Any and all known and/or unknown liabilities, obligations, demands, actions, suits, debts, charges, causes of action, requests for money and/or payment under the Contract, outstanding invoices, or Claims directly or indirectly arising out of or related to the Contract and/or Project.

10.08 PROJECT RECORD DOCUMENTS

A. Provide to the County one (1) complete set of the Project Record Documents in accordance with the requirements of this Section.

B. Store Project Record Documents separate from documents used for construction.

C. Contractor shall red-line the Project Record Documents on a weekly basis concurrent with construction progress. The Contractor shall supply a red-line of the Project Record Documents that shall document all additions and modifications to the original Contract Documents as follows:

1. Specifications: Legibly mark and record at each Section description of actual Products installed, including the following:

   a. Manufacturer's name and product model and number.

   b. Product substitutions or alternates utilized.

   c. Changes made by Addenda.

2. Project Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

   a. Measured horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.

   b. Measure locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

   c. Field changes of dimension and detail.

   d. Details not on original Contract Documents.

   e. Mark the Project Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.

3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

D. Project Record Documents Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up Project Record Documents and prepare a full set of corrected digital data files of the Project Record Documents in PDF format as follows:

1. Format: Scan Project Record Documents and assemble submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

2. Incorporate changes and additional information previously marked on red-line copies of the Project Record Documents. Delete, redraw, and add details and notations where applicable.
3. County will furnish Contractor with PDF of Contract Documents for use in recording information.

10.09 SCHEDULE OF CONTRACT CLOSEOUT PROCEDURES

A. The following Closeout Procedures Checklist gives the order and responsibility for the requirements of the Final Contract Closeout. This list may not include all items required by the General Provisions and Detailed Provisions.

B. Contract Closeout Documents Checklist: Complete the items indicated, and submit this Checklist when directed by the County.

Checklist Item No.	Responsibility	Procedure	Date
1	Contractor	Notify County in writing that the Work is Substantially Complete	
2	County	Inspect the Work, prepare Punch List and identify items requiring completion/correction for Substantial Completion.	
3	Contractor	Complete/correct punch list items required for Substantial Completion.	
4	County	Verify Substantial Completion Punch List items have been completed/corrected and issue Certificate of Substantial Completion.	
5	Contractor	Notify County in writing that the Work is ready for Final Acceptance: Prepare Final Application for Payment that includes the following: a. Affidavit of Wages Paid for Contractor and all Subcontractors. b. Contractor release of Claims. c. Release of Liens Certificate from all Subcontractors. d. Project Record Documents. e. Operation and Maintenance Manuals. f. Warranties. g. Permits and Certificates of Occupancy/Use.	
6	County	Perform Final Inspection and if necessary issue Final Punch List.	
7	Contractor	Complete/correct Final Punch List items.	
8	County	Verify completion/correction of Final Punch List items. Prepare Notice of Completion and Final Payment for County Board of Supervisors Approval.	
9	County	County Board of Supervisor approves Notice of Completion and Final Payment. Notice of Completion is recorded.	
10	County	Release of all retention funds shall be within thirty-five (35) days after the recordation of the Notice of Completion.	

10.10 SUBMITTALS

A. Warranties:

1. Organize warranty documents into an orderly sequence based on the Detailed Provision Sections:

   a. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2 by 11 inch paper.

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

   c. Identify each binder on the front and spine with the typed title "WARRANTIES," Project name, and name of Contractor.

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

2. Provide additional copies of each warranty to include in Operation and Maintenance Manuals.

B. Final, Project Record Documents:

1. One (1) complete set of finalized Project Record Specifications.

2. One (1) complete set of Contract Documents, including approved Field Work Directives and Change Orders.

3. One (1) complete set of Contractor's correspondence, including but not limited to: RFIs, memorandums, and e-mails.

4. Project Record Documents Digital Data Files:

   a. Format: Scan Project Record Documents and assemble submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Affidavit of Wages Paid for Contractor and all Subcontractors in accordance with state law.

D. Contractor's release of Claims against the County from all parties who are entitled to Claims against the subject Project, property or improvement pursuant to the provisions of law.

E. Contractor certification that all Subcontractors and suppliers have been paid and there are no outstanding liens;

F. Final Application for Payment;

PART 11 PRODUCTS

11.01 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 12 EXECUTION

12.01 REPAIR OF THE WORK

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

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

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

12.02 FINAL CLEANING

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

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial/industrial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project:

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

b. Sweep paved areas broom clean. Remove spills, stains, and other foreign deposits.

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

d. Remove tools, construction equipment, machinery, and surplus material from Project Location.

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

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

g. Sweep concrete floors broom clean in unoccupied spaces.

h. Remove labels that are not permanent.

12.03 PROJECT RECORD DOCUMENTS – RECORDING AND MAINTENANCE

A. Recording: Maintain one (1) copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until the end of the Project.

B. Maintenance of Project Record Documents and Samples: Store record documents and Samples at the Project Location apart from the documents used for construction. Do not use Project Record Documents for construction purposes. Maintain record documents in organized, clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for County's reference during normal working hours.

C. Filing and Archiving Requirements:

1. Boxes shall have attached lids.
2. All file folders shall be standard letter size, 8-1/2 x 11 inches.
3. Three ring binders are not acceptable for archiving. Chicago Screws are acceptable for "binding" specifications and correspondence in chronological order.
4. Hanging folders and/or rubber bands are not acceptable. Accordion folders or manila folders are acceptable.
5. Do not return file folders labeled with subject matter(s) that were not used in the Contract.
6. If Contractor did not use County's file code index, a copy of the Contractor's file code index shall be included with the files.
7. Do not separate transmittal cover sheets from the deliverable.
8. Do not include duplicates unless mandated in Contract Documents.

END OF SECTION 01 7700

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SPECIFICATIONS – DETAILED PROVISIONS

SECTION 02 2300: EARTHWORK

CONTENTS

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SECTION 02 2300
EARTHWORK

PART 13 GENERAL

13.01 SUMMARY

A. Work includes:

1. Regardless of the nature or type of the materials encountered, includes excavating and grading for site grades, building preparation, and disposing of all excavated material. These activities may be performed in completing finished grade, and in completing related Work where shown on the Project Drawings or as designated by the County.
2. Finish grading shall consist of scarifying and establishing finish grade to conform to Project Drawings.
3. Removal of unsuitable materials.
4. Over-excavation and recompaction of suitable materials.
5. Subgrade preparation and engineered fill placement.
6. Dust alleviation and control.
7. Erosion control measures to prevent run-off of sediment and other unsuitable materials.
8. Location of Work: All areas within limits of grading and all areas outside limits of grading which are disturbed in the course of the Work.

B. Related Detailed Provisions Sections include, but are not limited to:

1. Division 01 – General Requirements.

13.02 QUALITY ASSURANCE

A. Referenced Standards:

1. American Association of State Highway and Transportation Officials (AASHTO):
   a. AASHTO T90 – Determining the Plastic Limit and Plasticity of Index Soils.
   b. AASHTO T180 – Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop.
2. American Society for Testing and Materials (ASTM):
   a. ASTM C33/C33M – Standard Specification for Concrete Aggregates.
   b. ASTM D75/D75M – Standard Practice for Sampling Aggregates.
   c. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).
   d. ASTM D1556/D1556M – Standard Test Method for Density and Unit Weight

of Soil in Place by the Sand-Cone Method.

e. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

f. ASTM D2167 – Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

g. ASTM D2216 – Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

h. ASTM D2419 – Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregates

i. ASTM D2487 – Classification of Soils for Engineering Purposes (Unified Soil Classification System).

j. ASTM D2488 – Standard Practice for Description and Identification of Soils

k. ASTM D3786/D3786M – Standard Test Method for Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method.

l. ASTM D4253 – Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

m. ASTM D4254 – Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

n. ASTM D4632/D4632M – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

o. ASTM D4643 – Standard Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Heating

p. ASTM D6938 – Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

3. California Code of Regulations (CCR): Title 8 – Construction Safety Orders.

4. California Department of Industrial Relations – Division of Occupational Safety and Health (Cal-OSHA).

5. State of California; Business, Transportation and Housing Agency; Department of Transportation (Caltrans):

   a. Caltrans Standard Specifications – Division III: Earthwork and Landscape

B. Testing and Inspection Service:

1. County will procure Testing/Inspection Provider services, for quality assurance testing during earthwork operations.

13.03 DEFINITIONS

A. Backfill: Refill of an excavation, previously removed.

B. Earth Excavation: Earth excavation includes excavation of pavement and other obstructions visible on the ground surface, underground structures, utilities and other items to be demolished and removed; together with earth and other materials encountered that are not classified as rock or unauthorized excavation.

C. Fill: Placement of material in an excavation or on prepared subgrade to final grade.

D. Finish Grade: The establishment of grades to a plus or minus 0.05' of final grades as indicated on Project Drawings.

E. Finished Grade Elevations: Indicated on Project Drawings.

F. Grading Intent: Spot elevations (grades) and contours are indicated based on the best available data. Drawings are referenced to provide additional site grading data. The intent is to maintain constant slopes between spot elevations. If a spot elevation is determined to be in error, or the difference in elevation between points change, contact the County immediately for field adjustments of spot elevations.

G. Optimum Moisture Content (OMC) – The moisture content of the soil at the maximum dry density as determined by ASTM D1557.

H. Relative Compaction: Ratio, expressed as a percentage of the in-place dry-density as compacted to a laboratory maximum dry-density of representative sample of the same material determined by ASTM D1557.

I. Rough Grade: The establishment of grades to one-tenth ($^1/_{10}$) of a foot plus or minus tolerance of grades required to accomplish the Work described on Project Drawings or applicable Detailed Provisions Sections.

J. Standard Specifications: Refers to the Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation (Caltrans), latest edition. In case of conflict between the Standard Specifications and these Specifications, the strictest specifications shall govern. Provisions for measurement and payment specified within the Standard Specifications shall be disregarded and the provisions of these Contract Documents shall govern.

K. Structural Fill: Any fill placed under structures and any backfill placed adjacent to buried walls.

L. Sub-base: Compacted layer of approved material used between the subgrade and the pavement.

M. Subgrade: Previously undisturbed material prepared and compacted to required density and elevation to support a structure, pavement system, or to receive additional specified materials.

N. Subgrade Elevations: 4-inches below finish grade elevations indicated on Project Drawings, unless otherwise indicated.

O. Unauthorized Excavation: Includes removal and disposal of material beyond subgrade elevations, and dimensions indicated without prior approval of the County.

P. Unsuitable Material: Shall consist of materials determined by the County and/or Testing/Inspection Provider to be:

1. Soft, loose, unstable or yielding, or
2. Previously placed uncontrolled fill, or
3. Designated material to be overexcavated per geotechnical report requirements, or
4. Unable to be compacted to specified density using ordinary methods at optimum moisture content, or
5. Contains visible or excessive deleterious material as determined by the County or Testing/Inspection Provider, or
6. Too wet to be properly compacted and circumstances prevent processing suitable in-place drying prior to being used as backfill, or
7. Otherwise unsuitable for planned use.

Such material shall be removed to the limits directed by the County and the resulting excavation backfilled with engineered fill material.

13.04 SUBMITTALS

A. Submittal Procedures: See Detailed Provisions Section 01 3300 – Submittal Procedures for requirements for the mechanics and administration of the submittal process.

B. Approval Submittals:

1. Product technical data including:
    a. Acknowledgement that products submitted meet requirements of standards referenced.
    b. Manufacturer's installation instructions.
2. Excavation Plan:
    a. In accordance with Section 5.1.5 – Accident Prevention of the General Provisions, Contractor shall submit to the County a detailed plan showing the design of shoring, bracing, sloping of the sides of trenches, or other provisions to be made for the protection of personnel during earthwork operations.
    b. County acceptance of the Excavation Plan does not release the Contractor of liability in the event of an accident or injury, nor does it place any liability on the County or any County employees.
3. Testing laboratory reports verifying that imported material conforms to the specified gradations or characteristics.

C. Quality Assurance Submittals:

1. Submit sieve analysis reports on all imported granular materials.
2. Submit field quality control test results.

13.05 SAFETY PRECAUTIONS

A. Observe safety precautions in all phases of the Work. Included shall be trench shoring, bracing, lighting, and barricades as dictated by reason and by Safety Orders of the Division of Industrial Safety, State of California (Cal-OSHA).

B. Acquire an exemption letter or trenching permit from Cal-OSHA and comply with Labor Code Section 6705, Excavation Plans for Worker Protection. Submit a copy of the exemption letter or trenching permit with excavation drawings to the County prior to excavation work.

13.06 DELIVERY, STORAGE, AND HANDLING

A. Stockpile satisfactory excavated materials in a location approved by the County, until required for backfill or fill. Place, grade, shape, and stabilize stockpiles for proper drainage and erosion control.

13.07 PROJECT CONDITIONS

A. Avoid overloading or surcharge a sufficient distance back from edge of excavation to prevent slides or caving.

1. Maintain and trim excavated materials in such manner to be as little inconvenience as possible to public and adjoining property owners.

B. Protect and maintain benchmarks, monuments or other established points and reference points and if disturbed or destroyed, replace items to full satisfaction of the County and no additional cost to the County.

C. The Contractor's attention is directed to the possible existence of pipe, conduit and other underground improvements which may or may not be shown on the Project Drawings. Preserve and protect any such improvements whether shown on the Project Drawings or not. Expose such improvements in advance of the underground construction to allow for changes in alignment as necessary. Where it is necessary to remove and replace or to relocate such improvements in order to prosecute Work, they shall be removed, maintained, and permanently replaced by the Contractor at their expense. Relocation of said improvements shall not be performed without written permission of the County or the owner of the utility. Unless otherwise noted, existing underground utilities shall be protected in place.

D. Excavation made with power driven equipment is not permitted within five (5) feet of any know utility or subsurface construction. For Work immediately adjacent to or for excavation exposing a utility or other buried obstruction, use hand or light equipment excavation. Start 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 or other existing Work as affected by the contract excavation until approval for backfill is granted by the County. The Contractor shall report damage of utility lines or subsurface construction immediately to the County and make repairs at no additional cost to the County.

E. Protect excavations by shoring, bracing, sheeting, underpinning, or other methods as required, to prevent cave-ins or loose dirt from entering excavations. Barricade open

excavations and post warning lights at Work adjacent to public streets and walks.

F. Protect existing streams, ditches and storm drain inlets using proper erosion control methodology.

G. Do not use explosives unless approved otherwise in writing by the County.

H. Provide dust alleviation and control measures continuously during the course of the Work to the satisfaction of the County.

13.08 EXISTING CONDITIONS

A. A topographic survey of the property has been included in the Project Drawings, it is for reference only. Upon beginning the earthwork, the Contractor represents that they have inspected the project areas and are satisfied as to actual grades and levels and the true conditions under which the Work is to be performed.

13.09 SOILS TESTING

A. A Testing/Inspection Provider will be procured by the County for testing and inspection as required by the Contract Documents.

B. All materials, work, methods and equipment shall be subject to inspection at the Project Location and import sources. Material or workmanship not complying with the Contract Documents will not be accepted. The Contractor shall give the Testing/Inspection Provider reasonable notice when ready for inspection and shall supply samples for inspection without extra charge.

C. Cost of Testing:

1. With the exceptions of retest due to material or Contractor workmanship, the County will assume the cost for all tests and inspections specified to be performed by the Testing/Inspection Provider. Additional costs of retesting incurred by the County shall be deducted from the Contract Final Payment.

D. Tests performed by the Testing/Inspection Provider may include, but are not limited to:

1. Determine the density of soil in place by the sand cone method, ASTM D1556 or by nuclear methods, ASTM D6938.
2. Determine laboratory moisture-density relations of soils by ASTM D1557.
3. Determine the relative density of cohesion-less soils by ASTM D4253 and D4254.
4. Sample backfill materials in accordance with ASTM D75.
5. Conduct in-place moisture-density tests for backfilling to assure that all work complies with this Detailed Provisions Section.

E. Make excavation for compaction tests at the locations and to the depths designated by the Testing/Inspection Provider. Backfill and re-compact the excavation at completion of testing. When test indicate that the compaction is less than the specified relative compaction, rework and retest those areas until the specified

relative compaction has been obtained.

13.10 MAINTENANCE

A. Protect newly graded areas from traffic, erosion, and settlement. Repair and reestablish damaged or eroded slopes, elevations, or grades and restore surface construction prior to acceptance.

B. Repair settlement at excavated areas for a period of one (1) year following Final Acceptance at no additional cost to the County. Remove surface (pavement, or other finish), add backfill material, compact, and replace surface treatment; restore appearance, quality, and conditions of surface and finish to match adjacent work, and eliminate evidence of restoration.

PART 14 PRODUCTS

14.01 WATER

A. Water used in compaction shall have a maximum chloride concentration of 500 mg/l, a maximum sulfate concentration of 500 mg/l, and shall have a pH of 7.0 to 9.0. Water shall be free of acid, alkali, or organic materials.

PART 15 EXECUTION

15.01 EXAMINATION

A. Verify existing grades and conditions are as indicated on the Project Drawings. Designate and identify datum elevation and project engineering reference points. Set required lines, levels, and elevations.

B. Verify earthwork volume of soil to be filled.

C. Notify County if indicated conditions on Project Drawings conflict with actual conditions. Non-notification of discrepancies between actual field conditions and the conditions shown on the Project Drawings, in writing, shall indicate Contractor's acceptance of such field conditions. Adjustments/modifications to the construction to accommodate the inconsistencies (without notification) shall be at no additional cost to the County.

15.02 PROTECTION

A. Protection of the jobsite during the performance of earthwork shall be the responsibility of the Contractor.

B. Protect the jobsite from flooding, ponding, or inundation during site clearing, excavation, placement of fill and grading. Make temporary provisions during the rainy season to adequately direct surface drainage away from and off the jobsite. Dispose of water in a manner to prevent damage to adjacent property and in accordance with regulatory agency requirements.

C. Use plastic sheeting to prevent unprotected slopes from becoming saturated. Install checkdams, desilting basins, riprap, sand bags, or other devices or methods necessary to control erosion.

D. Following periods of rainfall, the County will visually assess rain related damage. At the request of the County, the Contractor shall make excavations in order to evaluate the extent of rain related damage.

E. Rain related damage will be considered to include, but may not be limited to, erosion, silting, saturation, swelling, structural distress and other adverse conditions identified by the County.

F. Where soil has been adversely affected by rain-related damage, it shall be overexcavated and replaced with compacted fill or other remedial grading as directed by the County. Repairs shall be performed at Contractor's expense.

G. Protect existing surface and subsurface features on-site and adjacent to jobsite as follows:

1. Provide barricades, coverings, or other type of protection necessary to prevent damage to existing items indicated to remain in place.

2. Protect and maintain benchmarks, monuments or other established reference points and property corners.

    a. If disturbed or destroyed, Contractor shall replace at their own expense to full satisfaction of the County and controlling agency.

3. Verify location of utilities:

    a. Omissions or inclusion of utility items does not constitute nonexistence of definite location.

    b. Secure and examine local utility records.

    c. Take necessary precautions to protect existing utilities from damage due to any construction activity.

    d. Remove abandoned utility service lines from areas of excavation. Cap, plug, or seal abandoned lines and identify termination points at grade level with markers.

    e. Perform excavation work near utilities by hand and provide necessary shoring, sheeting, and supports as the Work progresses.

    f. Repair damages to utility items at Contractor's expense.

    g. In case of damage, notify County at once so required protective measures may be taken.

4. Maintain free of damage, existing concrete, structures, and pavement to the greatest extent possible.

    a. Any item known or unknown or not properly located that is damaged shall be repaired to original condition.

    b. All repairs to be made at Contractor's expense.

5. Provide full access to areas required for landfill operations and other points as designated by the County to prevent serious interruption of travel.
6. Maintain stockpiles and excavations in such a manner to prevent inconvenience or damage to structures on-site.
7. Avoid surcharge or excavation procedures which can result in heaving, caving, or slides.

15.03 PREPARATION

A. The Contractor shall provide all construction staking and layout of all Work to be performed under the direction of a Professional Land Surveyor registered in the State of California.
   1. Stake all units, structures, piping, roads, parking areas and walks and establish their elevations.
   2. Perform other layout work required.
   3. Replace benchmarks, monuments, and/or property corner markers to original location if disturbed or destroyed.

B. Unless otherwise stated, equipment used in the excavation, transport, processing, installation and compaction of all materials used in construction of the earthwork shall be standards of practice grading machinery of known specifications suitable for performing Work in a timely, proper, and efficient manner.

15.04 EXCAVATION

A. Earth excavation shall include the satisfactory removal and disposal of all materials encountered, regardless of the nature of the materials, the condition of the materials at the time they are excavated, or the manner in which they were excavated.

B. This Work may include ripping, breaking, and dozing of materials using standard earthmoving equipment up to and including CAT D-9 with single ripper type equipment. Based on a previous subsurface soil investigation, the material within limits of excavation has been determined to be rippable. In the event non-rippable material is encountered, the Contractor shall immediately notify the County. Prior to the removal of non-rippable material, Contractor and the County shall mutually decide upon the most acceptable method of removal for this material. This Work shall be considered as Extra Work and shall be paid for as such. This item shall also include keeping excavation areas neat and orderly and completing the excavation to the satisfaction of the County.

C. All excavated materials incorporated as part of compacted engineered fill must be inspected and approved to be suitable by the County and/or Testing/Inspection Provider.

D. Excavation shall be performed to the lines and grades indicated. During excavation, material suitable for fill materials shall be stockpiled in an orderly manner within the designated project limits at a minimum distance from the banks of excavation area

equal to one-half the depth of the excavation, but in no instance closer than five (5) feet. The Contractor shall stockpile excavated soil as Directed by the County and as shown on the Project Drawings. The County shall utilize and/or dispose of soil that is stockpiled by the Contractor.

E. Do not operate excavation equipment within five (5) feet of structures or utilities. Excavate with hand tools in these areas or light equipment as approved by the County.

F. Excavate unsuitable materials extending below required elevations to depth as directed by the County and/or Testing/Inspection Provider. Over-excavation shall include the removal of all unsuitable materials that exists directly beneath a structure or within a zone outside and below the structure defined by a line sloping at one horizontal to one vertical (1H:1V) from the outside edge of the footing. Refill the over-excavated areas with compacted engineered fill material. Structure over-excavation requirements are as follows:

1. On-site soils within the footprint of the structure and below the bottom level of the footings shall be over-excavated so that the entire foundation (footings, grade beams, and floor slab) will be underlain by a minimum three (3) feet of compacted Structural Backfill material. Deeper removal may be necessary in localized areas where porous, compressible material is encountered or as determined by the County and/or Testing/Inspection Provider.

2. Prior to placement of Structural Backfill, the bottom of removal shall be observed and confirmed to be competent by the Testing/Inspection Provider.

Costs associated with over-excavation of structure foundation area per the geotechnical report requirements shall be included in the Contractor's cost proposal. Any additional excavation beyond geotechnical report requirements shall be compensated based on the Contractor's unit cost provided in the Schedule of Values as approved by the County.

G. Excavate to the depths and widths needed to accomplish the construction. Allow for forms, working space, structural backfill and grading. Unless unsuitable materials are encountered, do not carry excavation deeper than the elevations shown.

H. The subgrade shall be scarified a minimum of 10 inches, moisture conditioned and uniformly compacted to 90% of the maximum dry density. The moisture content of the subgrade soil shall be moisture conditioned to a range of 0% to 3% of the OMC.

I. If necessary to achieve the planned subgrade elevation, the stockpiled excavated soils shall be utilized as fill material. The soil shall be moisture condition, placed in thin lifts and uniformly compacted to 90% of the maximum dry density. The moisture content of the fill soil shall be moisture conditioned to a range of 0% to 3% of the OMC.

J. Take every precaution to prevent water from entering, softening, and undercutting excavated areas, including but not limited to: pits, footings, and trenches.

K. All excavations shall be barricaded in conformance with Cal-OSHA standards.

L. Sheeting and shoring for the Work and for the safety of personnel shall be in

compliance with Cal-OSHA regulations. Shoring is required for all trench portions greater than 4-feet in depth. Trenches greater than 20-feet in depth require protection systems designed by Professional Structural Engineer licensed in California.

M. Notify the County immediately upon discovery of unsuitable materials or unforeseen site conditions. Excavation shall include the complete removal of the unsuitable materials and its legal disposal thereof.

15.05 DUST ALLEVIATION AND CONTROL

A. The Contractor shall be responsible for and shall provide pollution and dust abatement and control measures continuously during the course of the Work.

15.06 FIELD QUALITY CONTROL

A. The County shall procure the services of a Testing/Inspection Provider to conduct in-place moisture-density tests for fill materials to assure that all Work complies with this Detailed Provisions Section.

B. Moisture density relations, to be established by the soils testing agency and is required for all materials to receive compaction. This test shall be conducted when the material changes, based on visual observation of the soils, and/or based on in-place density test results of the compacted fill.

C. Extent of compaction testing will be as necessary to assure compliance with Specifications.

D. Contractor shall provide a minimum forty-eight (48) hour advance notice to County when ready for compaction or subgrade testing and inspection.

E. Should any compaction density test or subgrade inspection fail to meet specification requirements, perform corrective work as necessary at no additional cost to the County.

F. Contractor shall be responsible for all costs associated with corrective work and retesting resulting from failing compaction density tests.

G. Testing:

1. Testing/Inspection Provider shall perform the following minimum laboratory testing and field testing of fill materials at the frequency specified in the following table:

TEST	TEST DESIGNATION	TEST FREQUENCY	Project Minimum Value
Field Testing			
In-place moisture/ density (nuclear)	ASTM D6938	Every 100 CY of soil subgrade material (engineered fill and/or existing in-	90% of Maximum Dry Density and from 0% to 3% above OMC

		place soil)	
Visual Soil Classification	ASTM D2488	Continuous	
Laboratory Testing			
Moisture Density Relationship	ASTM D1557	One per material type	

2. If compaction fails to meet the requirements of this Specification, the Contractor shall remove and replace fill material or subgrade at proper density or shall bring the density up to specified level by other means acceptable to the County. Subsequent testing required to confirm that the reconstructed material has been brought up to specified density shall be paid for by the Contractor.
3. Contractor shall assure County and Testing/Inspection Provider staff have immediate access for testing of all soils related work.
4. Ensure excavations are safe for testing personnel.

END OF SECTION 02 2300

SPECIFICATIONS – DETAILED PROVISIONS

SECTION 03 0505: CONCRETE TESTING

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SECTION 03 0505
CONCRETE TESTING

PART 16 GENERAL

16.01 SUMMARY

A. Description:

1. This Work consists of testing concrete and grout where required by the Contract Documents or where designated by the County.

B. Related Detailed Provisions Sections include, but are not limited to:

1. Section 01 4300 – Quality Assurance and Control
2. Section 03 2100 – Concrete Reinforcement
3. Section 03 3100 – Cast-in-Place Structural Concrete
4. Section 03 3131 – Concrete Mixing, Placing, Jointing, and Curing

16.02 RESPONSIBILITY AND PAYMENT

A. County may hire a Testing/Inspection Provider to perform the following testing and inspection services and provide test results to the County and Contractor.

1. Testing and inspection of concrete, grout, and concrete reinforcement produced for incorporation into the Work during the construction of the Project for compliance with the Contract Documents.
2. Additional testing or retesting of materials occasioned by their failure, re-test or inspection, to meet requirements of the Contract Documents.
3. Strength testing on concrete required by the County or Special Inspector when the water-cement ratio exceeds the water-cement ratio of the typical test cylinders.
4. In-place testing of concrete as may be required by County when strength of structure is considered potentially deficient.
5. Other testing services needed or required by Contractor such as field curing of test specimens and testing of additional specimens for determining when forms, form shoring or reshoring may be removed.
6. County will pay for services defined in Paragraph 1.02A.1.
7. See Detailed Provisions Section 01 4300 – Quality Assurance and Control.

B. Contactor shall hire a qualified testing agency to perform the following testing and provide test results to the County.

1. Testing of materials and mixes proposed by the Contractor for compliance with the Contract Documents and retesting in the event of changes.
2. Additional testing and inspection required because of changes in materials or proportions requested by Contractor.

3. Contractor shall pay for services defined in Paragraphs 1.02B.1. and 1.02B.2.
4. Contractor shall reimburse County for testing services defined in Paragraphs 1.02A.2., 1.02A.3., 1.02A.4., and 1.02A.5.
5. See Detailed Provisions Section 01 4300 – Quality Assurance and Control.

C. Duties and Authorities of Testing/Inspection Provider:

1. Any Testing/Inspection Provider or agencies and their representatives retained by Contractor or County for any reason are not authorized to revoke, alter, relax, enlarge, or release any requirement of Contract Documents, nor to reject, approve or accept any portion of the Work.
2. Testing/Inspection Provider shall inform the Contractor and County regarding acceptability of or deficiencies in the Work including materials furnished and Work performed by Contractor that fails to fulfill requirements of the Contract Documents.
3. Testing/Inspection Provider shall submit test reports and inspection reports to the County and Contractor immediately after they are performed.
    a. All test reports shall include exact location in the Work at which batch represented by a test was placed.
    b. Reports of strength tests shall include detailed information on storage and curing of specimens prior to testing.
4. County retains the responsibility for ultimate rejection or approval of any portion of the Work.

16.03 QUALITY ASSURANCE

A. Referenced Standards:

1. American Association of State Highway and Transportation Officials (AASHTO):
    a. AASHTO T260 – Standard Method of Test for Sampling and Testing for Chloride Ion in Concrete and Concrete Raw Materials.
2. American Concrete Institute (ACI):
    a. ACI 318 – Building Code Requirements for Structural Concrete.
3. American Society for Testing and Materials (ASTM):
    a. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
    a. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
    b. ASTM C42 – Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
    c. ASTM C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars

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

e. ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete.

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

g. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.

h. ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by Volumetric Method.

i. ASTM C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

j. ASTM C311 – Standard Test Method for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland Cement Concrete.

k. ASTM C596 – Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement.

l. ASTM C827 – Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.

m. ASTM C939 – Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete.

n. ASTM C1077 – Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

o. ASTM C1090 – Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic-Cement Grout.

p. ASTM C1218 – Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.

q. ASTM C1260 – Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).

r. ASTM E329 – Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

4. National Bureau of Standards (NBS):

b. Cement and Concrete Reference Laboratory (CCRL).

B. Qualifications:

1. Contractor's testing agency:

c. Meeting requirements of ASTM E329.

a. Provide evidence of recent inspection by CCRL of NBS, and correction of deficiencies noted.

16.04 DEFINITIONS

A. Testing/Inspection Provider: A professional testing/inspection firm or service hired by the County to perform testing, inspection or analysis services as directed, and as provided in the Contract Documents.

16.05 SUBMITTALS

A. Approval Submittals:

1. Product technical data, including, but not limited to:

a. Concrete materials and concrete mix designs proposed for use.

1) Include results of all testing performed to qualify materials and to establish mix designs.

2) Place no concrete until approval of mix designs has been received in writing.

3) Submittal for each concrete mix design to include:

(a) Sieve analysis and source of fine and coarse aggregates.
(b) Test for aggregate organic impurities.
(c) Proportioning of all materials.
(d) Type of cement with mill certificate for the cement.
(e) Brand, quantity and class of fly ash proposed for use along with other submittal data as required for fly ash by Detailed Provisions Section 03 3100 – Cast-In-Place Structural Concrete.
(f) Slump.
(g) Brand, type and quantity of air entrainment and any other proposed admixtures.
(h) Shrinkage test results in accordance with ASTM C157.
(i) Total chloride ion content per cubic yard of concrete determined in accordance with AASHTO T260.
(j) 28-day compression test results and any other data required by Detailed Provisions Section 03 3100 – Cast-In-Place Structural Concrete to establish concrete mix design.

B. Quality Assurance Submittals: Testing agency qualifications.

PART 17 PRODUCTS – (NOT APPLICABLE TO THIS SECTION)

PART 18 EXECUTION

18.01 TESTING SERVICES TO BE PERFORMED BY COUNTY

A. The following concrete testing may be performed by the County's Testing/Inspection Provider:

1. Concrete strength testing:

a. Secure concrete samples in accordance with ASTM C172.

2) Obtain each sample from a different batch of concrete on a random basis, avoiding selection of test batch other than by a number selected at random before commencement of concrete placement.

a. For each strength test, mold and cure five (5) cylinders from each sample in accordance with ASTM C31. Samples shall be formed in 6" x 12" long non-absorbent cylindrical molds.

3) Record any deviations from requirements on test report.

1) Cylinder size: Per ASTM C31.

b. Field cure one cylinder for the seven (7) day test.

4) Laboratory cure the remaining cylinders.

c. Test cylinders in accordance with ASTM C39.

5) Test one (1) cylinder at seven (7) days.

6) Test one (1) cylinder at fourteen (14) days.

7) Test two (2) cylinders at twenty-eight (28) days.

1) Hold remaining cylinder in reserve.

d. Strength test result:

8) Average of strengths of two (2) cylinders from the same sample tested at twenty-eight (28) days.

1) If one (1) cylinder in a test manifests evidence of improper sampling, molding, handling, curing, or testing, discard and test reserve cylinder; average strength of remaining cylinders shall be considered strength test result.

2) Should all cylinders in a test show any of above defects, discard entire test.

e. Frequency of tests:

9) Concrete sand cement grout: One (1) strength test for each four (4) hour period of grout placement or fraction thereof.

1) Precast concrete, concrete topping, concrete fill and lean concrete: One (1) strength test for each ten cubic yards (10 CY) or fraction thereof placed in any one (1) day.

2) All other concrete:

(a) One (1) strength test consisting to be taken not less than once a day, nor less than once for each sixty cubic yards (60 CY) or fraction thereof placed in any one (1) day.

(b) If total volume of concrete on the Project is such that frequency of testing required in above paragraph will provide less than five (5) strength tests for each concrete mix, tests shall then be made from at least five (5) randomly selected batches or from each batch if fewer than five (5) batches are provided.

2. Slump testing:

    a. Determine slump of concrete sample for each strength test.

        10) Determine slump in accordance with ASTM C143.

    a. If consistency of concrete appears to vary, the County shall be authorized to require a slump test for each concrete truck.

        11) This practice shall continue until the County deems it no longer necessary.

3. Air content testing (at County's option): Determine air content of concrete sample for each strength test in accordance with either ASTM C231 or ASTM C173.

4. Fly ash testing (at County's option) in compliance with ASTM C311 with a minimum of one (1) sample weighing four pounds (4 lbs.) taken from each two hundred (200) tons of fly ash supplied for the Project.

5. Temperature testing (if required): One (1) test hourly when air temperature is 40 Deg F and below and when 80 Deg F and above and one (1) test for each composite sample per ASTM C1064.

6. In-place concrete testing (if required).

18.02 SAMPLING ASSISTANCE AND NOTIFICATION FOR COUNTY

A. To facilitate testing and inspection, perform the following:

    1. Furnish any necessary labor to assist Testing/Inspection Provider in obtaining and handling samples on-site.

    2. Provide and maintain for sole use of Testing/Inspection Provider adequate facilities for safe storage and proper curing of test specimens on-site for first 24 hours as required by ASTM C31.

B. Notify County sufficiently in advance of operations (minimum of 48 hours) to allow completion of quality tests for assignment of personnel and for scheduled completion of quality tests.

18.03 ACCEPTANCE

A. Completed concrete work which meets applicable requirements will be accepted without qualification.

B. Completed concrete work which fails to meet one or more requirements, but which has been repaired to bring it into compliance will be accepted without qualification.

C. Completed concrete work which fails to meet one or more requirements and which cannot be brought into compliance may be accepted or rejected as provided in these Contract Documents.

    1. In this event, modifications may be required to assure that concrete work complies with requirements.

    2. Modifications, as directed by County, to be made at no additional cost to County.

D. Dimensional Tolerances:

1. Formed surfaces resulting in concrete outlines smaller than permitted by tolerances shall be considered potentially deficient in strength and subject to modifications required by the County.
2. Formed surfaces resulting in concrete outlines larger than permitted by tolerances may be rejected and excess material subject to removal.
    a. If removal of excess material is permitted, accomplish in such a manner as to maintain strength of section and to meet all other applicable requirements of function and appearance.
3. Concrete members cast in the wrong location may be rejected if strength, appearance or function of structure is adversely affected or misplaced items interfere with other construction.
4. Inaccurately formed concrete surfaces exceeding limits of tolerances and which are exposed to view, may be rejected.
    a. Repair or remove and replace if required.
5. Finished slabs exceeding tolerances may be required to be repaired provided that strength or appearance is not adversely affected.
    a. High spots may be removed with a grinder, low spots filled with a patching compound, or other remedial measures performed as permitted or required.

E. Appearance:

1. Concrete surfaces exposed to view with defects which, in opinion of County, adversely affect appearance as required by specified finish shall be repaired by approved methods.
2. Concrete not exposed to view is not subject to rejection for defective appearance unless, in the opinion of the County, the defects impair the strength or function of the member.

F. High Water-Cement Ratio:

1. Concrete with water in excess of the specified maximum water-cement ratio will be considered potentially deficient in durability.
2. Remove and replace concrete with high water-cement ratio or make other corrections as directed by County.

G. Strength of Structure:

1. Strength of structure in place will be considered potentially deficient if it fails to comply with any requirements which control strength of structure, including but not limited to the following:
    a. Low concrete strength:
        12) Test results for standard molded and cured test cylinders to be evaluated separately for each mix design.

(a) Such evaluation shall be valid only if tests have been conducted in accordance with specified quality standards.

(b) For evaluation of potential strength and uniformity, each mix design shall be represented by at least three (3) strength tests.

(c) A strength test shall be the average of two (2) cylinders from the same sample tested at twenty-eight (28) days.

1) Acceptance:

(a) Strength level of each specified compressive strength shall be considered satisfactory if both of the following requirements are met:

i. Average of all sets of three (3) consecutive strength tests equal or exceed the required specified twenty-eight (28) day compressive strength.

ii. If an individual strength tests falls below sixty percent (60%) or the required minimum twenty-eight (28) day strength, the concrete shall be immediately rejected and shall be removed and replaced at no additional cost to the County.

b. Reinforcing steel size, configuration, quantity, strength, position, or arrangement at variance with requirements in Detailed Provisions Section 03 2100 – Concrete Reinforcement or requirements of the Project Drawings or approved Shop Drawings.

c. Concrete which differs from required dimensions or location in such a manner as to reduce strength.

d. Curing time and procedure not meeting requirements of this Detailed Provisions Section.

e. Inadequate protection of concrete from extremes of temperature during early stages of hardening and strength development.

f. Mechanical injury, construction fires, accidents or premature removal of formwork likely to result in deficient strength.

g. Concrete defects such as voids, honeycomb, cold joints, spalling, cracking, etc., likely to result in deficient strength or durability.

2. Structural analysis and/or additional testing may be required when strength of structure is considered potentially deficient.

3. In-place testing of concrete may be required when strength of concrete in place is considered potentially deficient.

a. Testing by impact hammer, sonoscope, or other nondestructive device may be permitted by the County to determine relative strengths at various locations in structure or for selecting areas to be cored.

13) Such tests shall not be used as a basis for acceptance or rejection.

a. Core tests:

14) Where required, test cores will be obtained in accordance with ASTM C42.

(b) If concrete in structure will be dry under service conditions, air dry cores (temperature 60 to 80 Deg F, relative humidity less than sixty percent (60%)) for seven (7) days before test then test dry.

(c) If concrete in structure will be wet or subjected to high moisture atmosphere under service conditions, test cores after immersion in water for at least forty (40) hours and test wet.

(d) Testing wet or dry to be determined by County.

1) Three (3) representative cores may be taken from each member or area of concrete in place that is considered potentially deficient.

(e) Location of cores shall be determined by the County so as least to impair strength of structure.

(f) If, before testing, one (1) or more of cores shows evidence of having been damaged subsequent to or during removal from structure, damaged core shall be replaced.

2) Concrete in area represented by a core test will be considered adequate if average strength of three (3) cores is equal to at least eighty-five percent (85%) of specified strength and no single core is less than seventy-five percent (75%) of specified strength.

3) Fill core holes with nonshrink grout and finish to match surrounding surface when exposed in a finished area.

4. If core tests are inconclusive or impractical to obtain or if structural analysis does not confirm safety of structure, load tests may be required and their results evaluated in accordance with ACI 318, Chapter 20.

5. Correct or replace concrete work judged inadequate by structural analysis or by results of core tests or load tests with additional construction, as directed by County, at Contractor's expense.

6. Contractor to pay all costs incurred in providing additional testing and/or structural analysis required.

7. Should test samples fail strength testing, the County may require changes in proportions or materials, or both, to apply to the remainder of the Work. Furthermore, the County may require additional curing on those portions of the structure represented by the test samples which fall below the specified values. The cost of such additional curing shall be at no additional cost to the County. In the event that such additional curing does not give the strength required, as evidenced by core and/or load tests, the County may require strengthening or replacement of those portions of the structure which fail to develop the required strength. Coring and testing and/or load tests and any strengthening or concrete replacement required because of strengths or test samples are below specified values, shall be at no additional cost to the County. In such cases of failure to meet strength requirements the Contractor and County shall confer to determine what adjustment, if any, can be made in compliance with Sections titled "Strength" and "Failure to Meet Strength Requirements" of ASTM C94. The "purchaser" referred to in ASTM C94 is the Contractor.

END OF SECTION 03 0505

SPECIFICATIONS – DETAILED PROVISIONS

SECTION 03 1113: FORMWORK – STRUCTURAL CAST-IN-PLACE CONCRETE

CONTENTS

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SECTION 03 1113
FORMWORK – STRUCTURAL CAST-IN-PLACE CONCRETE

PART 19 GENERAL

19.01 SUMMARY

A. Section includes: Formwork requirements for concrete construction.

1. This work includes but is not limited to:

a. Structural foundations/footings.

b. Structural slabs, girders, beams, and columns.

B. Related Detailed Provisions Sections include, but are not limited to:

1. Section 03 2100 – Concrete Reinforcement
2. Section 03 0505 – Concrete Testing
3. Section 03 3100 – Cast-In-Place Structural Concrete
4. Section 03 3131 – Concrete Mixing, Placing, Jointing, and Curing
5. Section 03 3132 – Concrete Finishing and Repair of Surface Defects

19.02 QUALITY ASSURANCE

A. Referenced Standards:

1. American Concrete Institute (ACI):

a. ACI 116R –Cement and Concrete Terminology.

b. ACI 301 – Specifications for Structural Concrete.

c. ACI 347 – Guide to Formwork for Concrete.

2. California Building Code (CBC):

d. 2016 CBC, referred to herein as Building Code.

3. APA – Engineered Wood Association (APA)

B. Qualifications:

1. Formwork, shoring and reshoring to be designed by a Professional Structural Engineer currently registered in California and having a minimum of three (3) years experience in this type of design work.

a. Above qualification applies to slabs and beams not cast on the ground, wall and column pours over 15 feet high.

C. Miscellaneous:

1. Design and engineering of formwork, shoring and reshoring as well as its construction is the responsibility of the Contractor.

2. Design requirements:
    a. Design formwork for loads, lateral pressures and allowable stresses outlined in ACI 347 and for design considerations, wind loads, allowable stresses and other applicable requirements of the CBC.
        1) Where conflicts occur between the above two (2) standards, the more stringent requirements shall govern.
    b. Design formwork to limit maximum deflection of form facing materials reflected in concrete surfaces exposed to view to 1/240 of span between structural members.
    c. Conform to all requirements of CBC 2016.

19.03 SUBMITTALS

A. Submittal Procedures: See Detailed Provisions Section 01 3300 – Submittal Procedures for requirements for the mechanics and administration of the submittal process.

B. Approval Submittals:
    1. Product technical data, including, but not limited to:
        a. Acknowledgement that products submitted meet requirements of standards referenced.
        b. Manufacturer's installation instructions.
        c. Manufacturer and type of proposed form materials.
        d. Manufacturer and type of proposed form ties.
        e. Manufacturer and type of proposed form coating and release agent materials.
        f. Manufacturer and type of void forms including compressive strength.
    2. Samples:
        a. A 12-inch square of each form finish.

PART 20 PRODUCTS

20.01 ACCEPTABLE MANUFACTURERS

A. Void Forms:
    1. SureVoid Products, Inc.; www.surevoid.com
    2. Deslauriers, Inc.; www.deslinc.com
    3. Or approved equal.

B. Stay-In-Place Forms:
    1. AMICO a part of Gibraltar Industries Company; www.amicoglobal.com/

2. Nuform Building Technologies Inc.; www.nuformdirect.com
3. Or approved equal.

C. Tubular Fiber Forms:

1. Sonoco Products Company, plastic lined; www.sonotube.com
2. Or approved equal.

20.02 MATERIALS

A. Forms for Surfaces Not Exposed to View:

1. Wood or metal sufficiently tight to prevent leakage.
2. Do not use aluminum forms.

20.03 ACCESSORIES

A. Form Ties:

1. Commercially fabricated for use in form construction.
   a. Do not use wire ties.
2. Constructed so that ends or end fasteners can be removed without causing spalling at surfaces of the concrete.
3. ¾-inch minimum to 1-inch maximum diameter cones on both ends.
4. Embedded portion of ties to be not less than 1½-inch from face of concrete after ends have been removed.
5. Provide ties with built-in waterstops in all walls that will be in contact with liquid.
6. Through-wall ties that are designed to be entirely removed are not allowed in all walls that will be in contact with liquid.

B. Form Coating:

1. Non-grain and non-staining types of form coating that will not leave residual matter on the face of the concrete or adversely affect proper bonding of any subsequent paint or other surface applications.
   a. Form coating containing mineral oils or other non-drying materials will not be permitted for any concrete work.
   b. For project pursuing sustainable design, provide a concrete form release agent with a volatile organic compound (VOC) content less than one hundred (100) grams per liter.

PART 21 EXECUTION

21.01 PREPARATION

A. Form Surface Treatment:

1. Before placing of either reinforcing steel or concrete, cover surfaces of forms with an approved coating material that will effectively prevent absorption of moisture and prevent bond with concrete, will not stain concrete or prevent bonding of future finishes.
    a. A field applied form release agent or sealer of approved type or a factory applied non-absorptive liner may be used.
2. Do not allow excess form coating material to stand in puddles in forms nor in contact with hardened concrete against which fresh concrete is to be placed.

B. Clean surfaces of forms, reinforcing steel and other embedded materials of any accumulated mortar or grout from previous concreting and of all other foreign material before concrete is placed.

21.02 ERECTION

A. Install products in accordance with manufacturer's instructions. Construct substantial forms to the shapes, lines, grades and elevations necessary to complete Work.

B. Tolerances:
1. Variation from plumb:
    a. In lines and surfaces of columns, piers, walls, and in risers.
        15) Maximum in any ten (10) feet of height: ¼-inch.
        1) Maximum for entire height: ½-inch.
    b. For exposed corner columns, control-joint grooves, and other exposed to view lines:
        16) Maximum in any twenty (20) feet length: ¼-inch.
        2) Maximum for entire length: ½-inch.
2. Variation from level or from grades specified:
    a. In exposed lintels, sills, parapets, horizontal grooves, and other exposed to view lines:
        17) Maximum in any bay or in twenty (20) feet of length: ¼-inch.
        1) Maximum for entire length: ½-inch.
3. Variation in cross sectional dimensions of columns and beams and in thickness of slabs and walls: Maximum of -¼-inch, +½-inch.
4. Footings and foundations:
    a. Variations in concrete dimensions in plan: -½-inch, +2-inch.
    b. Misplacement or eccentricity:
        18) Two percent (2%) of footing width in direction of misplacement but not more than 2-inches.
    c. Thickness:

19) Decrease in specified thickness: five percent (5%).

1) Increase in specified thickness: No limit except that which may interfere with other construction.

5. Establish and maintain in an undisturbed condition and until Final Completion and Acceptance of the Project, sufficient control points and benchmarks to be used for reference purposes to check tolerances.

6. Regardless of tolerances listed allow no portion of structure to extend beyond legal boundary of the Project.

7. To maintain specified tolerances, camber formwork to compensate for anticipated deflections in formwork prior to hardening of concrete.

C. Make forms sufficiently tight to prevent loss of mortar from concrete. Forms shall be tied, clamped and braced to prevent spreading, shifting or settling.

D. Place ¾-inch chamfer strips in exposed to view corners of forms to produce ¾-inch wide beveled edges.

E. At construction joints, overlap contact surface of form sheathing for flush surfaces exposed to view over hardened concrete in previous placement by at least 1-inch.

1. Hold forms against hardened concrete to prevent offsets or loss of mortar at construction joint and to maintain a true surface.

2. Where possible, locate juncture of built-in-place wood or metal forms at architectural lines, control joints or at construction joints.

F. Provide runways for moving equipment with struts or legs, supported directly on formwork or structural member without resting on reinforcing steel.

21.03 REMOVAL OF FORMS

A. Do not remove forms before the concrete has attained a strength of at least seventy percent (70%) of its specified design strength for beams and slabs and at least thirty percent (30%) of its specified design strength for walls and vertical surfaces, nor before reaching the following number of day-degrees of curing (whichever is the longer):

Forms for	Degree Days
Foundation footings and slabs-on-grade	100

Degree-days are defined as the total number of 24-hour periods multiplied by the weighted average daily air temperature at the surface of the concrete (e.g. two (2) days at an average 50 Deg F = 100 degree-days).

B. When required for concrete curing in hot weather, required for repair of surface defects or when finishing is required at an early age, remove forms as soon as concrete has hardened sufficiently to resist damage from removal operations or lack of support.

C. In cold weather, when temperature of concrete exceeds ambient air temperature by 20

Deg F. at the end of the protection period, loosen forms and leave in place for at least 24-hours to allow concrete to cool gradually to ambient air temperature.

END OF SECTION 03 1113

SPECIFICATIONS – DETAILED PROVISIONS

SECTION 03 2100: CONCRETE REINFORCEMENT

CONTENTS

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SECTION 03 2100
CONCRETE REINFORCEMENT

PART 22 GENERAL

22.01 SUMMARY

A. Section includes: Reinforcing bar requirements for concrete construction. Furnish and install reinforcing for all concrete, including dowels, bars, chairs, spacers, stirrups, ties, bolsters, etc., necessary for supporting and fastening reinforcement in place as shown on the Project Drawings and specified herein.

1. This Work includes but is not limited to:

   a. Structural foundations/footings.

   b. Structural slabs, girders, beams, and columns.

B. Related Detailed Provisions Sections include, but are not limited to:

1. Section 03 0505 – Concrete Testing
2. Section 03 1113 – Formwork – Structural Cast-In-Place Concrete
3. Section 03 3100 – Cast-In-Place Structural Concrete
4. Section 03 3131 – Concrete Mixing, Placing, Jointing, and Curing

22.02 QUALITY ASSURANCE

A. Referenced Standards:

1. American Concrete Institute (ACI):

   a. ACI 66 – ACI Detailing Manual.

   b. ACI 301 – Specifications for Structural Concrete for Buildings

   c. ACI 315 – Details and Detailing of Concrete Reinforcing

   d. ACI 318 - Building Code Requirements for Structural Concrete.

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

   a. ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

   b. ASTM A706 – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

   c. ASTM A775 – Standard Specification for Epoxy-Coated Steel Reinforcing Bars.

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

3. American Welding Society (AWS);

e. AWS D1.4 – Structural Welding Code – Reinforcing Steel.

4. California Building Code (CBC)
5. Concrete Reinforcing Steel Institute (CRSI):
   a. Manual of Standard Practice.
6. Federal Specifications (FS)

B. Qualifications:

1. Welding operators, processes and procedures to be qualified in accordance with AWS D1.4.
   a. Welders whose work fails to pass inspection shall be re-qualified before performing welding.
2. Welding operators to have been qualified during the previous twelve (12) months prior to commencement of welding.

22.03 SUBMITTALS

A. Submittal Procedures: See Detailed Provisions Section 01 3300 – Submittal Procedures for requirements for the mechanics and administration of the submittal process.

B. Approval Submittals:

1. Product technical data, including, but not limited to:
   a. Acknowledgement that products submitted meet requirements of standards referenced.
   b. Manufacturer's installation instructions.
   c. Mill certificates for all reinforcing indicating chemical and physical analysis. Tensile and bend tests shall be performed by the mill in accordance with ASTM A615.
   d. Manufacturer and type of proprietary rebar mechanical splices.
   e. Manufacturer and type of rebar adhesive anchor including installation instructions.
2. Qualifications of welding operators, welding processes and procedures.
3. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement. Drawings shall be prepared in accordance with ACI 315.
   a. Shop Drawings shall not be prepared by reproducing the plans and details indicated on the Project Drawings, but shall consist of completely redrawn plans and details as necessary to indicate complete fabrication and installation of all reinforcing steel.

b. Sufficient rebar details to permit installation of reinforcing. Areas of high congestion, including member joints and embedded locations shall be fully detailed to verify clearances and assembly parameters and coordination with other trades.

c. Rebar details in accordance with ACI SP 66.

d. No reinforcing steel shall be fabricated without approved Shop Drawings.

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

f. Shop Drawings shall be in sufficient detail to permit installation of reinforcing without reference to Project Drawings.

22.04 DELIVERY, STORAGE AND HANDLING

A. Support and store all reinforcing above ground.

B. Ship to jobsite in bundles with attached plastic or metal tags with permanent mark numbers which match the Shop Drawing mark numbers and indicate bar size/length.

C. Deliver and store welding electrodes in accordance with AWS D1.4.

D. Handling of Epoxy-Coated Rebar:

1. Use padded or nonmetallic slings and padded straps to protect coated reinforcement from damage.
2. Handle bundled bars to prevent sagging that could damage the coating.
3. Do not drop or drag rebar.
4. Store on wooden cribbing.
5. Coated rebar subject to rejection by County if rebar coating has been damaged.

PART 23 PRODUCTS

23.01 ACCEPTABLE MANUFACTURERS

A. Reinforcing steel bar and welded wire fabric:

1. Manufacturer regularly engaged in the production of steel bar and welded wire fabric reinforcement.

B. Rebar adhesive anchors:

1. HIT-HY 200 System by Hilti Fastening Systems, Inc.; www.us.hilti.com
2. HIT-RE 500 V3 System by Hilti Fastening Systems, Inc.; www.us.hilti.com
3. SET-XP Adhesive Anchor System by Simpson Strong-Tie Company, Inc.; www.strongtie.com
4. Or approved equal.

C. Rebar mechanical splices:

1. Lenton Rebar Splicing by ERICO, Inc.; www.erico.com/lenton.asp
2. Bar-Grip Systems by Barsplice Products, Inc.; www.barsplice.com
3. Or approved equal.

23.02 MATERIALS

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

B. Reinforcing Bars to be Welded:

1. ASTM A706, Grade 60.
2. ASTM A615, with supplemental reports as required.

C. Welded Wire Reinforcement: ASTM A1064.

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

E. Stirrups and Ties: ASTM A615, Grade 60.

F. Epoxy-Coated Rebar: ASTM A775 and ASTM A615, grade 60, meeting Annex A1 for epoxy coating.

G. Epoxy-Coated Rebar Patching Material:

1. Compatible with the coating material.
2. Inert in concrete.
3. Meet requirements of Annex A1 or ASTM A775.
4. Obtained from the manufacturer of the epoxy resin that was used to originally coat the rebar.

H. Proprietary Rebar Mechanical Splices: To develop in tension and compression a minimum of one hundred and twenty-five percent (125%) of the yield strength of the rebar being spliced. Must be approved by the County and be in compliance with latest ICC-ES evaluation reports and ACI 318.

I. Welding Electrodes: Low hydrogen, E70 or E90 meeting requirements of AWS D1.4.

J. Rebar Adhesive Anchors:

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

23.03 ACCESSORIES

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

1. Unless noted otherwise, CRSI Class 2 wire supports.
2. Plastic-coated tips in contact with forms.
3. Plastic coating meeting requirements of CRSI Manual of Standard Practice.

B. Tie Wires: FS-QQ-W-461, annealed steel, black, 16 gauge minimum.

C. Protective plastic caps at mechanical splices.

23.04 FABRICATION AND SOURCE QUALITY CONTROL

A. Shop fabricate reinforcement to meet requirements of Project Drawings. Fabricate reinforcement in accordance with the requirements of ACI 315 where specific details are not shown or where Project Drawings and Detailed Provisions are not more demanding.

B. Tolerances:

1. Sheared lengths: +1-inch.
2. Overall dimensions of stirrups, ties, and spirals: +½-inch.
3. All other bends: +0-inch, -½-inch.

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

D. Steel reinforcement shall not be bent or straightened in a manner that will degrade the material. Bars with kinks or bends not shown on the Shop Drawings shall not be used. Heating of bars for bending will not be permitted.

E. Ship rebar to jobsite with attached plastic or metal tags.

1. Place on each tag the mark number of the rebar corresponding to the mark number indicated on the Shop Drawings.
2. Mark numbers on tags to be so placed that the numbers cannot be removed.
3. Mark bar size and length on tags.
4. For epoxy-coated rebar, use only plastic tags secured to rebar by nylon or plastic ties.

F. Make completed reinforcement available for inspection at manufacturer's shop prior to packaging for shipment. Notify County at least seven (7) Calendar Days before inspection is allowed.

G. Fabricator shall perform one tensile and one bend test for each 2½ tons of steel or fraction thereof in accordance with ASTM A615. Contractor shall be responsible for costs associated with fabricator testing.

H. When fabricator is approved by authority having jurisdiction, submit Certificate of Compliance indicating Work performed at manufacturer's facility conforms to the Contract Documents.

PART 24 EXECUTION

24.01 INSTALLATION

A. All reinforcement shall be accurately set in place, lapped, spliced, spaced, rigidly and

securely held in place and tied with specified wire at all splices and crossing points. All wire tie ends shall point away from the form. Carefully locate all dowel steel to align with wall and column steel.

B. Tolerances:

1. Rebar placement:

a. Clear distance to formed surfaces: + ¼-inch.

b. Minimum spacing between bars: - ¼-inch.

c. Top bars in slabs and beams:

1) Members 8-inch deep or less: +¼-inch.

2) Members between 8-inch and 2-feet deep: -¼-inch, +½-inch.

3) Members more than 2-feet deep: -¼-inch, +1-inch.

d. Crosswise of members: Spaced evenly within +1-inch.

e. Lengthwise of members: +2-inch.

2. Minimum clear distances between rebar:

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

b. Columns: Distance equal to 1½ times the rebar diameter or 1½-inch, whichever is greater.

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

C. Minimum concrete protective covering for reinforcement, unless otherwise shown on the Project Drawings:

1. Concrete against and permanently exposed to earth: 3-inch.

2. Concrete exposed to earth or weather:

a. No. 6 bars and larger: 2-inch.

b. No. 5, W31 or D31 wire, and smaller: 1½-inch.

3. Concrete not exposed to weather or in contact with earth:

a. Slabs, walls and joists (No. 11 rebar and smaller): ¾–inch.

b. Slabs, walls and joists (No. 11 rebar and larger): 1½-inch.

c. Beams and columns: 1½-inch.

4. Slabs-on-grade:

a. Top reinforcement: 2-inches.

b. Bottom reinforcement: 3-inches.

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

1. For rebar: Class B splice meeting the requirements of Paragraph 12.15 of ACI 318.
2. For welded wire reinforcement:
    a. Splice lap length measured between outermost cross wires of each fabric sheet shall not be less than one (1) spacing of cross wires plus 2-inches, nor less than 1.5 x development length nor less than 6-inches.
    b. Development length shall be as required for the yield strength of the welded wire reinforcement in accordance with Paragraph 12.8 of ACI 318.
3. Provide splices of reinforcing not specifically indicated or specified subject to approval by the County.
    a. Mechanical proprietary splice connectors may only be used when approved by the County and shall be in compliance with current ICC-ES evaluation reports.

E. Welding:
1. Welding is not permitted unless specifically detailed on Drawings or approved by the County prior to welding reinforcement.
2. Perform welding of rebar in accordance with requirements of AWS D1.4.
3. Welding shall not be done within two bar diameters of any bent portion of a bar which has been bent cold.
4. Welding of crossing bars is not permitted.
5. Have each welder place an approved identifying mark near each completed weld.

F. Placing Rebar:
1. Assure that reinforcement at time concrete is placed is free of mud, oil or other materials that may affect or reduce bond.
2. Reinforcement with rust, mill scale or a combination of both will be accepted as being satisfactory without cleaning or brushing provided dimensions and weights including heights of deformations on a cleaned sample is not less than required by applicable ASTM Specification that governs for the rebar supplied.
3. Rebar support:
    a. Uncoated rebar:
        20) Support rebar and fasten together to prevent displacement by construction loads or placing of concrete.
            (a) Locate and support reinforcement with bar supports to maintain minimum concrete cover.
            (b) Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
        1) On ground, provide supporting concrete blocks or metal bar supports with bottom plate.
            (a) Do not use concrete blocks to support slab-on-grade reinforcing.
        2) Over formwork, provide plastic-coated metal chairs, runners, bolsters,

spacers, hangers and other rebar support.

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

b. Coated rebar:

21) Support coated rebar and fasten together to prevent displacement.

3) Use plastic or nylon ties to hold rebar rigidly in place.

4) Support rebar by use of plastic or plastic-coated chairs, runners, bolsters, spacers, hangers and rebar supports as required.

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

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

a. Place spacer rebar at 3-feet maximum centers to maintain the required 1-inch clear distance between layers.

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

a. If perimeter edge is formed by earth or stay-in-place forms, extend reinforcement to within 3-inches of the edge.

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

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

a. Do not bend reinforcing by means of heat.

9. Do not tack weld reinforcement.

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

a. Drill hole in concrete with diameter and depth as indicated on Shop and/or Project Drawings and per manufacturer's instructions.

b. Clean holes per manufacturer's recommendations.

c. Place adhesive in drilled hole.

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

24.02 FIELD QUALITY CONTROL

A. County and/or Testing/Inspection Provider retained by the County shall perform field inspection in accordance with CBC requirements. When required, County shall procure services of a Special Inspector to inspect reinforcing placement per CBC Section 1704.

B. All reinforcing steel whose properties are not identifiable by mill test reports shall be tested in accordance with ASTM A615. One series of tests for each missing report, costs to be borne by the Contractor.

C. Reinforcement Congestion and Interferences:

1. Notify County whenever the specified clearances between rebar cannot be met.
2. Do not place any concrete until the County approves a solution to rebar congestion problem.
3. Rebar may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items.
4. If rebar are moved more than one (1) bar diameter, obtain County approval of resulting arrangement of rebar.
5. No cutting of rebar shall be done without written approval from the County.

D. Inspection of Epoxy-Coated Rebar:

1. Coated rebar will be inspected on the jobsite for handling defects, coating abrasion, coating thickness and continuity of coating.
2. County may defer final inspection of rebar coating integrity and repairs until the rebar have been erected and all handling is completed.
3. Repair coated areas as directed by the County.
    a. Do not place concrete until all repairs to coatings have been completed.

E. Patching of Epoxy-Coated Rebar:

1. Patching and repair to be performed in accordance with the instructions of patching material manufacturer.
2. Patching material to provide a minimum film thickness of 5 mils over the bare area.
    a. Thickness of area adjacent to patched area not to exceed 15 mils.
3. Areas to be patched to be clean and free of surface contaminants.
    a. Treat areas in accordance with patching material manufacturer’s instructions before oxidation occurs.
4. Total surface area covered by patching material not to exceed two percent (2%) of total surface area of the rebar.
5. Rebar welds and adjacent bare rebar areas to also be patched after welding is completed.

F. Welding:

1. County’s Testing/Inspection Provider shall:
    a. Review and approve Contractor proposed welding procedures and processes for conformance with AWS D1.4.
    b. Qualify welders in accordance with AWS D1.4.

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

d. The tensile strength of each test shall be not less than one hundred and twenty-five percent (125%) of the required yield strength of the rebar tested.

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

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

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

2. With the exception of re-tests associated with Contractor's workmanship, costs associated with welding qualification, observation, and testing shall be borne by the County. Contractor shall reimburse the County for all costs associated with re-testing.

END OF SECTION 03 2100

SPECIFICATIONS – DETAILED PROVISIONS

SECTION 03 3100: CAST-IN-PLACE STRUCTURAL CONCRETE

CONTENTS

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SECTION 03 3100
CAST-IN-PLACE STRUCTURAL CONCRETE

PART 25 GENERAL

25.01 SUMMARY

A. Section includes:

1. Furnish concrete materials in the proportions and strengths necessary to complete the Work specified.
2. This Work includes but is not limited to:
   a. Structural foundations/footings.
   b. Structural slabs, girders, beams, and columns.

B. Related Detailed Provisions Sections include, but are not limited to:

1. Section 03 0505 – Concrete Testing
2. Section 03 2100 – Concrete Reinforcement
3. Section 03 3131 – Concrete Mixing, Placing, Jointing, and Curing
4. Section 3 3132 – Concrete Finishing and Repair of Surface Defects

25.02 QUALITY ASSURANCE

A. Referenced Standards:

1. American Concrete Institute (ACI):
   a. ACI 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
   b. ACI 212.3R – Chemical Admixtures for Concrete.
   c. ACI 232.2R – Use of Fly Ash in Concrete.
   d. ACI 301 – Specification for Structural Concrete.
   e. ACI 304R – Guide for Measuring, Mixing, Transporting and Placing Concrete.
   f. ACI 305R – Hot Weather Concreting.
   g. ACI 306R – Cold Weather Concreting.
   h. ACI 318 - Building Code Requirements for Structural Concrete.
   i. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures.
   j. ACI CT-XX – Concrete Terminology.
2. American Society for Testing and Materials (ASTM):
   a. ASTM C33 – Standard Specification for Concrete Aggregates.

b. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

c. ASTM C94 – Standard Specification for Ready-Mixed Concrete.

d. ASTM C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars

e. ASTM C150 – Standard Specification for Portland Cement.

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

g. ASTM C192 – Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.

h. ASTM C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

i. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.

j. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.

k. ASTM C595 – Standard Specification for Blended Hydraulic Cements.

l. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

m. ASTM C685 – Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.

n. ASTM C827 – Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.

o. ASTM C939 – Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete.

p. ASTM C1017 – Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

q. ASTM C1064 – Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.

r. ASTM C1090 – Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic-Cement Grout.

s. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

3. National Bureau of Standards (NBS):

   a. NBS Handbook No. 44

4. National Ready Mixed Concrete Association (NRMCA)

   a. Quality Control Manual, Section 3 – Certification of Ready Mixed Concrete Production Facilities.

5. Truck Mixer Manufacturers Bureau (TMMB)

    a. TMMB 100 – Truck Mixer, Agitator and Front Discharge Concrete Carrier Standards.

25.03 DEFINITIONS

A. Words and terms used in these Detailed Provisions are defined in ACI CT-XX.

25.04 SUBMITTALS

A. Submittal Procedures: See Detailed Provisions Section 01 3300 – Submittal Procedures for requirements for the mechanics and administration of the submittal process.

B. Approval Submittals:

1. Product technical data, including, but not limited to:

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

    b. Manufacturer's instructions.

    c. Concrete mix designs as required by Detailed Provisions Section 03 0505 – Concrete Testing.

    d. Manufacturer and type of proposed admixtures.

    e. Manufacturer and type of proposed non-shrink grout and grout cure/seal compound.

C. Quality Assurance Submittals:

1. Certifications:

    a. Certification of standard deviation data for each proposed concrete mix based on statistical records. Provide the following for each strength data point used in the calculation of the standard deviation for determination of the minimum required average strength:

        1) Date of sampling and name of testing laboratory.

        2) Name of concrete batch plant.

        3) Water cementitious ratio.

        4) Slump of batch.

        5) Air content of batch.

        6) 28-day compression test results.

        7) If available, temperature and unit weight of batch.

        Provide data from projects not more strictly controlled than outlined in these Detailed Provisions. Provide summary sheet showing all pertinent data and the computation of the standard deviation.

b. Certification that the fly ash meets the quality requirements of ASTM C618, and fly ash supplier's certified test reports for each shipment of fly ash delivered to concrete supplier.

c. Certification that the class of coarse aggregate meets the requirements of ASTM C33 for type and location of concrete construction.

d. Certification of aggregate gradation.

2. Test reports:

a. Cement mill reports for all cement to be supplied.

3. Delivery Tickets:

a. Furnish a delivery ticket for ready mixed concrete to the County as each truck arrives. Provide a printed record of the weight of cement and each aggregate as batched individually on each ticket. Use the type of indicator that returns for zero punch or returns to zero after a batch is discharged. Indicate for each batch the weight of fine and coarse aggregate, cement, fly ash, and water, moisture content of fine and coarse aggregate at time of batching, and types, brand and quantity of each admixture, the quantity of concrete delivered, the time any water is added and the amount, and the numerical sequence of the delivery. Show the time of day batched and time of discharge from the truck. Indicate the number of revolutions of transit mix truck.

25.05 DELIVERY, STORAGE AND HANDLING

A. Delivery, Storage, and Handling shall be made in accordance with the following:

1. Store cement and pozzolan in weathertight buildings, bins, or silos which will exclude moisture and contaminants.

2. Arrange aggregate stockpiles and use in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of like aggregates.

3. Allow natural sand to drain until it has reached a relatively uniform moisture content before use.

4. Store admixtures in such a manner as to avoid contamination, evaporation, or damage.

a. For those used in form of suspensions or non-stable solutions, provide agitating equipment to assure thorough distribution of ingredients.

b. Protect liquid admixtures from freezing and temperature changes which would adversely affect their characteristics and performance.

PART 26 PRODUCTS

26.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the manufacturers listed in the

applicable Sections below are acceptable.

B. Submit request for substitution in accordance with Detailed Provisions Section 01 6000 – Product Requirements.

26.02 MATERIALS

A. General:

1. The County and Testing/Inspection Provider shall have access to and have the right to inspect all batch plants, cement mills and supply facilities providing products under these Detailed Provisions. Batch plants shall have current certificates that all scales have been tested and are certified within the tolerances as set forth in the National Bureau of Standards Handbook No. 44.

B. Portland Cement:

1. ASTM C150, Type II, Low Alkali.
2. Cement type used shall correspond to that upon which selection of concrete proportions was based in the mix design.

C. Fly Ash:

1. ASTM C618, Class F, including the requirements of Section 2.8 but with the Loss of Ignition (LOI) limited to three percent (3%) maximum and the optional physical requirements of Table 3.
2. Non-staining.
3. Suited to provide hardened concrete of uniform light gray color.
4. Maximum loss on ignition: three percent (3%).
5. Compatible with other concrete ingredients and having no deleterious effects on the hardened concrete.
6. Cement and fly ash type used shall correspond to that upon which selection of concrete proportions was based in the mix design.

D. Admixtures:

1. Air entraining: ASTM C260.
2. Water reducing, retarding, and accelerating: Conform to ASTM C494, Types A through E, and provisions of ACI 212.3R. Follow manufacturer's instructions.
3. High range water reducers (superplasticizers): Conform to ASTM C494, Types F or G.
4. Admixtures to be chloride free.
    a. Do not use calcium chloride or admixtures containing calcium chloride.
5. Do not use admixtures causing retarded or accelerated setting of concrete without written approval from the County.

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

E. Water:

1. ASTM C94 and potable.
2. Clean and free from deleterious substances.
3. Free of oils, acids, and organic matter.

F. Aggregates for Normal Weight Concrete:

1. ASTM C33, graded.
2. All concrete aggregates shall be obtained from sources acceptable to the County, shall be non-reactive, sound, uniformly graded and free of deleterious material.
3. Fine and coarse aggregates to be regarded as separate ingredients.
4. Coarse aggregate shall consist of gravel, crushed gravel or crushed stone made up of clean, hard, durable particles free from coatings, organic matter or other foreign substances. Thin or elongated pieces having a length greater than four (4) times the average thickness shall not exceed fifteen percent (15%) by weight.
5. Fine aggregates for concrete or mortar shall consist of clean, natural sand or combination of natural and manufactured sands that are hard and durable. Fine aggregates shall be free of materials with deleterious reactivity to alkali in cement.
6. Coarse aggregate sieve analysis:
    a. For lean concrete, concrete topping, and integral wearing course: ASTM C33, size number 7 (maximum ½-inch).
    b. For foundations: ASTM C33, 1-inch nominal maximum.
    c. For slabs on grade, walls, and all other concrete: ASTM C33, ¾-inch nominal maximum.

G. Maximum total chloride ion content for concrete mix including all ingredients measured as a weight percent of cement:

1. Prestressed concrete: 0.06.
2. All other concrete: 0.10.

H. Sand Cement Grout:

1. Approximately three (3) parts sand, one (1) part Portland cement, 6 +/- 1 percent entrained air and water to produce a slump which allows grout to completely fill required areas and surround adjacent reinforcing.
    a. Provide sand in accordance with requirements for fine aggregate for concrete.
2. Minimum 28-day compressive strength: 3,000 psi.

I. Non-shrink Grout:

1. Non-shrink, non-metallic, non-corrosive, and non-staining conforming to ASTM C1107.
2. Premixed with only water to be added in accordance with manufacturer's instructions at jobsite.
3. Shrinkage: 0% at 28 days when tested in accordance with ASTM C827 and ASTM C1090.
4. Expansion: 0.4% maximum at 28 days when tested in accordance with ASTM C157.
5. Minimum 28-day compressive strength: 5,000 psi when tested in accordance with ASTM C109.
6. Add the minimum amount of water necessary to produce the desired flow not exceeding a flow of twenty (20) seconds per ASTM C939.
7. Acceptable manufacturers:
    a. Euclid Chemical Company "NS Grout"; www.euclidchemical.com
    b. L&M Construction Chemicals a part of LATICRETE International, Inc., "Crystex"; www.lmcc.com
    c. Master Builders Solutions by BASF "MasterFlow, 713"; www.master-builders-solutions.basf.us
    d. Sauereisen Cements "F-100 Level Fill Grout"; www.sauereisen.com
    e. Sika Corporation "Sika Grout 212"; www.usa.sika.com
    f. U.S. Grout, LLC. "Five Star Grout"; www.usgrout.com
    g. Or approved equal.

J. Epoxy Grout:
1. Three-component epoxy resin system:
    a. Two (2) liquid epoxy components.
    b. One (1) inert aggregate filler component.
2. Adhesive acceptable manufacturers:
    a. Euclid Chemical Company "E3-FLOWABLE"; www.euclidchemical.com
    b. Master Builders Solutions by BASF "MasterFlow 648"; www.master-builders-solutions.basf.us
    c. Sika Corporation "Sikadur-32 Hi-Mod"; www.usa.sika.com
    d. U.S. Grout, LLC. "Five Star Epoxy Grout"; www.usgrout.com
    e. Or approved equal.
3. Aggregate acceptable manufacturers:
    a. Euclid Chemical Company "Euclid aggregate"; www.euclidchemical.com

b. Master Builders Solutions by BASF “MasterFlow 648”; www.master-builders-solutions.basf.us

c. Sika Corporation “Sika aggregate”; www.usa.sika.com

d. U.S. Grout, LLC. “U.S. Grout aggregate”; www.usgrout.com

e. Or approved equal.

4. Aggregate manufacturer shall be the same as the adhesive manufacturer.

5. The aggregate shall be compatible with the adhesive.

6. Each component furnished in separate package for mixing at jobsite.

26.03 MIXES

A. General: Mixing of concrete shall be done in accordance with:

1. Provide concrete capable of being placed without aggregate segregation and, when cured, of developing all properties specified.

2. Ready-mixed concrete shall conform to ASTM C94.

3. All concrete to be normal weight concrete, weighing approximately 145 to 150 lbs. per cu. ft. at 28 days after placement.

B. Minimum 28-Day Compressive Strengths: As indicated on Project Drawings.

C. Air Entrainment:

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

a. 1½-inch maximum aggregate size: 4½ to 6½ percent total air content.

b. 1-inch maximum aggregate size: 5 to 7 percent total air content.

c. ¾-inch maximum aggregate size: 5 to 7 percent total air content.

d. ½-inch maximum aggregate size: 5½ to 8 percent total air content.

e. Interior slabs and mats with power trowel finish: Maximum 3 percent total air content.

D. Proportioning:

1. General:

a. Proportion ingredients to produce a mixture which will work readily into corners and angles of forms and around reinforcement by methods of placement and consolidation employed without permitting materials to segregate or excessive free water to collect on surface.

b. Proportion ingredients to produce proper placability, durability, strength, maximum specified allowable shrinkage and other required properties.

2. Minimum Compressive Strength: As indicated on Project Drawings.

3. Maximum Water-Cementitious Materials Ratio: 0.45.

4. Maximum concrete shrinkage shall comply with ASTM C157 for testing indicated.
5. Fly ash:
    a. For cast-in-place concrete only.
    b. If fly ash is used, the water to fly ash plus cement ratio not to exceed the maximum water cement ratio specified in this Detailed Provisions Section.
6. Water reducing, retarding, and accelerating admixtures:
    a. Use in accordance with manufacturer's instructions.
    b. Do not use unless required by these Detailed Provisions or approved for use by the County.
7. High range water reducers (superplasticizers):
    a. Use in accordance with manufacturer's instructions.
    b. Do not use unless required by these Detailed Provisions or approved for use by the County.
8. Trial Batch and Laboratory Tests:
    a. Before placing any concrete, the Contractor shall submit certified trial batch results of each class of concrete having a 28-day strength of 4,000 psi or higher, based on the preliminary concrete mixes submitted by the Contractor. All concrete shall conform to the requirements of this Section, whether the aggregate proportions are from the Contractor's preliminary mix design, or whether the proportions have been adjusted during the trial batch process. The trial batch shall be prepared using aggregates, cement and admixture proposed for the project. The cost for the trial batch tests shall be borne by the Contractor.
    b. The determination of compressive strength will be made by testing 6-inch diameter by 12-inch high cylinders; mage, cured and tested in accordance with ASTM C192 and ASTM C39. Three (3) compression test cylinders will be tested at 7-days and three (3) at 28 days. The average compressive strength for the three (3) cylinders tested at 28-days for any give trial batch shall not be less than one hundred and twenty-five percent (125%) of the specified compressive strength.
    c. A standard sieve analysis of the combined aggregate for each trial batch shall be performed according to the requirements for ASTM C136. Values shall be given for percent passing each sieve.
    d. In lieu of trial batches, field test records for concrete made with similar ingredients may be used in accordance with ACI 301.
        22) Use of proposed concrete mix proportions based on field test records subject to approval by County based on information contained in field test records and demonstrated ability to provide the required average strength and meet allowable shrinkage requirements.
            1) Test records shall represent materials, proportions and conditions similar to those specified.

26.04 SOURCE QUALITY CONTROL

A. To assure stockpiles are not contaminated or materials are segregated, perform any test for determining conformance to requirements for cleanness and grading on samples secured from aggregates at point of batching.

PART 27 EXECUTION

27.01 FIELD QUALITY CONTROL

A. Perform concrete tests per this Section and Detailed Provisions Section 03 0505 – Concrete Testing.

B. Perform strength test on any concrete to which water has been added at the jobsite.

END OF SECTION 03 3100

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SPECIFICATIONS – DETAILED PROVISIONS

SECTION 03 3131: CONCRETE MIXING, PLACING, JOINTING, AND CURING

CONTENTS

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SECTION 03 3131
CONCRETE MIXING, PLACING, JOINTING, AND CURING

PART 28 GENERAL

28.01 SUMMARY

A. Section Includes: Mixing, placing, jointing, and curing of concrete construction.

1. This Work includes but is not limited to:

a. Structural foundations/footings.

b. Structural slabs, girders, beams, and columns.

B. Related Detailed Provisions Sections include, but are not limited to:

1. Section 03 0505 – Concrete Testing
2. Section 03 2100 – Concrete Reinforcement
3. Section 03 3100 – Cast-In-Place Structural Concrete
4. Section 03 3132 – Concrete Finishing and Repair of Surface Defects

28.02 QUALITY ASSURANCE

A. Referenced Standards:

1. American Concrete Institute (ACI):

a. ACI 301 – Specification for Structural Concrete.

b. ACI 302.1R – Guide for Concrete Floor and Slab Construction.

c. ACI 304R – Guide for Measuring, Mixing, Transporting and Placing Concrete.

d. ACI 305R – Hot Weather Concreting.

e. ACI 306R – Cold Weather Concreting.

f. ACI 308R – Guide to Curing Concrete.

g. ACI 309R – Guide for Consolidation of Concrete.

h. ACI CT-XX – Concrete Terminology.

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

a. ASTM C94 – Standard Specification for Ready-Mixed Concrete.

b. ASTM C156 – Standard Test Method for Water Loss (from a Mortar Specimen) Through Liquid Membrane-Forming Curing Compounds for Concrete.

c. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete.

d. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

e. ASTM D994 – Standard Specification for Preformed Expansion Joint Filler for

Concrete (Bituminous Type).

f. ASTM D1056 – Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.

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

3. National Bureau of Standards (NBS):

a. NBS Handbook No. 44

4. Truck Mixer Manufacturers Bureau (TMMB)

a. TMMB 100 – Truck Mixer, Agitator and Front Discharge Concrete Carrier Standards.

5. National Ready Mixed Concrete Association (NRMCA):

a. Checklist for Certification of Ready Mixed Concrete Production Facilities.

6. NSF International (NSF)

B. Qualifications:

1. Ready Mixed Concrete Batch Plant: Certified by NRMCA.

28.03 DEFINITIONS

A. Words and terms used in these Detailed Provisions are defined in ACI CT-XX.

28.04 SUBMITTALS

A. Submittal Procedures: See Detailed Provisions Section 01 3300 – Submittal Procedures for requirements for the mechanics and administration of the submittal process.

B. Approval Submittals:

1. Shop Drawings:

a. Complete drawings with details and dimensions showing proposed location of all construction joints and joint keyways. Drawings shall be scaled, minimum $^1/_8$ –inch = 1 foot.

2. Product technical data, including, but not limited to:

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

b. Manufacturer's installation instructions.

1) Procedure for adding high-range water reducer at the jobsite.

c. Manufacturer and types:

23) Joint fillers.

2) Curing agents.

3) Construction joint bonding adhesive.

3. Cold Weather Plan.

4. Hot Weather Plan.

C. Quality Assurance Submittals:

1. Certifications:

a. Ready mix concrete plant certification.

D. Closeout Submittals: Copies of concrete delivery tickets.

28.05 DELIVERY, STORAGE AND HANDLING

A. Delivery:

1. Concrete:

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

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

c. Provide a printed record of the weight of cement and each aggregate as batched individually on each ticket. Use the type of indicator that returns for zero punch or returns to zero after a batch is discharged. Indicate for each batch the weight of fine and coarse aggregate, cement, fly ash, and water, moisture content of fine and coarse aggregate at time of batching, and types, brand and quantity of each admixture, the quantity of concrete delivered, the time any water is added and the amount, and the numerical sequence of the delivery. Show the time of day batched and time of discharge from the truck. Indicate the number of revolutions of transit mix truck.

PART 29 PRODUCTS

29.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable Sections below are acceptable. Placement shall be in accordance with manufacturer's written instructions.

B. Submit request for substitution in accordance with Detailed Provisions Section 01 6000 – Product Requirements.

29.02 COMPONENTS

A. Curing Materials:

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

2. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf,

weighing approximately 9 oz./sq. yd. when dry.

3. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet. The loss of moisture, when determined in accordance with the requirements of ASTM C156, shall not exceed 0.055 grams per square centimeter of surface.
4. Polyethylene sheet for use as concrete curing blanket shall be white and shall have a normal thickness of 6 mils.
5. Water: Potable.
6. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating. The curing compound shall contain a fugitive dye so that areas of application will be readily distinguishable. Compound shall contain no wax, paraffin, or oil. Curing compound shall be non-yellowing and have a unit moisture loss no greater than 0.039 gm/ square centimeter at 72 hours as measured by ASTM C156. Curing compound shall not prevent bonding of floor finishes and comply with Federal, State, and local VOC limits.
    a. Acceptable manufacturers:
        1) Euclid Chemical Company; www.euclidchemical.com
        1) W.R. Meadows, Inc.; www.wrmeadows.com
        2) Or approved equal.

PART 30 EXECUTION

30.01 PREPARATION

A. General:
1. Complete formwork.
    a. See Detailed Provisions Section 03 1113 – Formwork – Structural Cast-In-Place Concrete.
2. Remove earth, water, ice, and other foreign materials form areas that will receive concrete.
3. Secure reinforcement in place.
    a. See Detailed Provisions Section 03 2100 – Concrete Reinforcement.
4. Position expansion joint material, anchors and other embedded items. Pipe, conduit, dowels, sleeves and other ferrous items required to be embedded in concrete construction shall be adequately positioned and supported prior to placement of concrete. There shall be a minimum of 2-inches clearance between embedded items and any of the concrete reinforcement. Securing embeddments in position by wiring or welding them to the reinforcement will not be permitted. Embedded items shall be clean and free of rust, mud, dirt, grease, oil, ice, or other contaminants which would reduce or prevent bonding with concrete. Close open ends of piping, conduits, and sleeves embedded in concrete with caps or plugs prior to placing

concrete. 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.

5. Obtain approval of reinforcement erection and placement prior to placing concrete.
6. Do not place concrete during rain, sleet, or snow, unless adequate protection is provided and County approval is obtained.
    b. Plan size of crews with due regard for effects of concrete temperature and atmospheric conditions on rate of hardening of concrete as required to obtain good surfaces and avoid unplanned cold joints.
    c. Do not allow rainwater to increase mixing water nor to damage surface finish.
7. Prepare all construction joints for proper bond per Paragraph 3.04.C of this Detailed Provisions Section.
8. 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 diverted out of the forms and clear of the Work. No concrete shall be deposited under water or allowed to rise on any concrete until the concrete has attained its initial set. Pumping or other necessary dewatering operations for removing groundwater, if required, shall be the responsibility of the Contractor and will be subject to review by the County.
9. Remove hardened concrete and foreign materials form inner surfaces of conveying equipment and formwork.
10. Provide slabs and beams of minimum indicated required depth when sloping structural foundation base slabs and elevated slabs to drains.
    a. For floor slabs on grade, slope top of subgrade to provide slab of required uniform thickness.

B. Preparation of Subgrade for Slabs on Ground:
1. Subgrade drained and of adequate and uniform load-bearing nature.
2. Obtain approval of subgrade compaction density prior to placing slabs on ground.
3. Maintain subgrade at a temperature above 32 Deg F before concrete placing begins for a sufficient amount of time to remove frost.
4. Moisten subgrade to eliminate absorption.
    a. Keep subgrade moist at time of concreting.
    b. Allow no free-standing water on subgrade or soft or muddy spots when concrete is placed.
5. Furnish, place, protect, and repair sheet vapor retarder according to ASTM E1643 and manufacturer's written instructions.
    a. Lap joints 6-inches and seal with manufacturer's recommended tape.

C. Edge Forms and Screeds:

1. Set accurately to produce designated elevations and contours of finished surface.
2. Sufficiently strong to support vibrating screeds or roller pipe screeds, if required.
3. Use strike off templates, or approved vibrating type screeds, to align concrete surfaces to contours of screed strips.

30.02 CONCRETE MIXING

A. General:

1. Provide all concrete from a central plant conforming to Checklist for Certification of Ready Mixed Concrete Production Facilities of the NRMCA.
2. Comply with ACI 318, ASTM C94, and TMMB 100 for all central plant and rolling stock equipment and methods.
3. Measure, batch, mix, and transport in accordance with ASTM C94 and furnish batch ticket information.
    a. When air temperature is between 85 and 90 Deg F, reduce mixing and delivery time from 1½ hours to seventy-five (75) minutes; when air temperature is above 90 Deg F, reduce mixing and delivery time to sixty (60) minutes.
4. Mixing equipment shall be subject to the County's approval. Mixers shall be of the stationary plant or truck mixer type. Adequate equipment and facilities shall be provided for accurate measurement and control of all materials and for readily changing the proportions of the material. The mixing equipment shall be maintained in good working order and shall be capable of combining the aggregates, cement and water within the specified time into a thoroughly mixed and uniform mass and of discharging the mixture without segregation. Cement and aggregate shall be proportioned by weight.
5. Select equipment of size and design to provide continuous flow of concrete at the delivery end. Use metal of metal-lined non-aluminum discharge chutes with slopes not exceeding one (1) vertical to two (2) horizontal and not less than one (1) vertical to three (3) horizontal. Chutes more than 20-foot long and chutes not meeting slope requirements may be used if concrete is discharged into a hopper before distribution.
6. The batch plant shall be capable of controlling and delivering of all material to within one percent (1%) by weight of the individual material. If bulk cement is used, it shall be weighed on a separate visible scale which will accurately register the scale load at any stage of the weighing operation from zero to full capacity.
7. Cement shall not come in contact with aggregate or with water until the materials are in the mixer ready for complete mixing with all mixing water. The procedure of mixing cement with sand or with sand and coarse aggregate for delivery to the jobsite for final mixing and an addition of mixing water will not be permitted. Re-tempering of concrete will not be permitted. The entire batch shall be discharged before recharging. The volume of the mixed material per batch shall not exceed the manufacturers rated capacity of the mixer.

8. Each mixer shall be equipped with a device for accurately measuring and indicating the quantity of water entering the concrete, and the operating mechanism shall be such that leakage will not occur when the valves are closed. Each mixer shall be equipped with a device for automatically measuring, indicating and controlling the time required for mixing. This device shall be interlocked to prevent the discharge of concrete from the mixer before the expiration of the mixing period.
9. Transit-mixed concrete shall be mixed and delivered in accordance with ASTM C94. After the drum is once started, it shall be revolved continuously until it has completely discharged its batch. Water shall not be admitted to the mix until the drum has started revolving. The right is reserved to increase the required minimum number of revolutions allowed, if necessary, to obtain satisfactory mixing, and the Contractor will not be entitled to additional compensation because of such an increase or decrease.
10. Mixed concrete shall be delivered to the site of the Work and discharge shall be completed within one (1) hour after the addition of the cement to the aggregates. In hot weather or under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 85 Deg F or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed forty-five (45) minutes. The use of non-agitating equipment for transporting concrete will not be permitted.
11. Truck mixers shall be equipped with counters so that the number of revolutions of the drum may be readily verified. The counter shall be resettable type and shall be actuated at the time of starting mixers at mixing speeds. Concrete shall be mixed in a truck mixer for not less than seventy (70) revolutions of the drum or blades at the rate of rotation designated by the manufacturer of the equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.
12. Truck mixers and their operation shall be such that the concrete throughout the mixed batch as discharged is within acceptable limits of uniformity with respect to consistency, mix, and grading. If slump tests taken at approximately the ¼ and ¾ points of the load during discharge give slumps differing by more than one (1) inch when the specified slump is more than three (3) inches, the mixer shall not be used on the work unless the causing condition is corrected and satisfactory performance is verified by additional slump test. All mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit, and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.

B. Control of Admixtures:
1. Charge admixtures into mixer as solutions.
   a. Measure by means of an approved mechanical dispensing device.
   b. Liquid considered a part of mixing water.

c. Admixtures that cannot be added in solution may be weighed or measured by volume if so recommended by manufacturer.

2. Add separately, when two or more admixtures are used in concrete, to avoid possible interaction that might interfere with efficiency of either admixture, or adversely affect concrete.

3. Complete addition of retarding admixtures within one (1) minute after addition of water to cement has been completed, or prior to beginning of last three quarters of required mixing, whichever occurs first.

C. Tempering and Control of Mixing Water:

1. Mix concrete only in quantities for immediate use.

2. Discard concrete which has set.

3. Discharge concrete from ready mix trucks within time limit and drum revolutions stated in ASTM C94.

4. Addition of water at the jobsite:

a. See Detailed Provisions Section 03 3100 – Cast-In-Place Structural Concrete for specified water cement ratio and slump.

b. Do not exceed maximum specified water cement ratio or slump.

c. Incorporate water by additional mixing equal to at least half of total mixing required.

d. Perform strength test on any concrete to which water has been added at the jobsite.

2) See Detailed Provisions Section 03 0505 – Concrete Testing.

30.03 PLACING OF CONCRETE

A. General:

1. Comply with ACI 301, 304R, 304.2R and 318.

2. 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 County at least four (4) hours before placement of concrete. All reinforcement, anchor bolts, sleeves, inserts and similar items shall be set and secured in the forms where shown on Drawings and shall be acceptable to the County before any concrete is placed.

3. Deposit concrete:

a. Continuously to avoid cold joints.

b. In horizontal layers not to exceed 24-inches in depth.

c. Uniformly distributed during the placing process and in no case after depositing shall any portion be displaced in the forms more than 2-feet in horizontal direction.

4. Place concrete at such a rate that concrete, which is being integrated with fresh concrete, is still workable.
5. Do not deposit concrete which has partially hardened or has been contaminated by foreign materials.
6. Spreaders:
    a. Temporary: Remove as soon as concrete placing renders their function unnecessary.
    b. Embedded:
        3) Obtain County approval.
        1) Materials: Concrete or metal.
        2) Ends of metal spreaders coated with plastic coating 2-inches from each end.
7. Deposit concrete as nearly as practicable in its final position to avoid segregation.
    a. Maximum free fall: 4 feet.
    b. Free fall exceeding 4 feet: Place concrete by means of hopper, elephant trunk or tremie pipe extending down to within 4 feet of surface placed upon.
8. Perform the following operations before bleeding water has an opportunity to collect on surface:
    a. Spread.
    b. Consolidate.
    c. Straightedge.
    d. Darby or bull float.

B. Admixtures:
1. All admixtures to be introduced at the batch plant in accordance with manufacturer's recommendations.

C. Cold Weather Concrete Placement:
1. For this Detailed Provision Section, "cold weather" is defined as a period when for more than three (3) successive days, the average daily outdoor temperature drops below 40 Deg F. Calculate average daily temperature as the average of the highest and the lowest temperature during the period from midnight to midnight.
2. Batch, deliver, place, cure and protect concrete during cold weather in compliance with the recommendations of ACI 306R and the additional requirements of this Section.
3. Review the cold weather concreting plan at the preconstruction meeting. Include the methods and procedures for use during cold weather including the production, transportation, placement, protection, curing and temperature monitoring of the concrete and the procedures to be implemented upon abrupt changes in weather conditions or equipment failures.

4. Do not place concrete or substrates that are below 32 Deg F or contain frozen material.
5. Maintain all materials, forms, reinforcement, subgrade and any other items which concrete will come in contact with free of frost, ice or snow at time of concrete placement.
6. The minimum temperature of concrete immediately after placement and during the protection periods shall be:

Minimum Concrete Temperature for Sections with Dimension Less than 12-inches (Deg F)	Minimum Concrete Temperature for Sections with Dimension 12-inches to 36-inches (Deg F)
55	50

The temperature of the concrete in place and during the protection period shall not exceed these values by more than 20 Deg F. Prevent overheating and non-uniform heating of the concrete.

7. Protect concrete during periods of cold weather to provide continuous warm, moist curing (with supplementary heat when required by weather conditions) for a total of at least 350 degree-days of curing.
    a. Degree-days are defined as the total number of twenty-four (24) hour periods multiplied by the weighted average daily air temperature at the surface of the concrete (e.g. 7 days at an average 50 Deg F = 350 degree-days).
    b. To calculate the weighted average daily air temperature, sum hourly measurements of the air temperature in the shade at the surface of the concrete taking any measurement less than 50 Deg F as 0 Deg F. Divide the sum thus calculated by 24 to obtain the weighted average temperature for that day.
8. Do not use salt, manure or other chemicals for protection.
9. At the end of the protection period, allow the concrete to cool gradually to the ambient temperature. If water curing has been used, do not expose concrete to temperatures below those listed in this Section until at least twenty-four (24) hours after water curing has been terminated and air dry concrete for at least three (3) days prior to first exposure to freezing temperatures.
10. Heat subgrade, forms, and reinforcement so the temperature of the subgrade, forms, and reinforcement will be between 45 and 70 Deg F, when temperature of surrounding air is 40 Deg F or below at time concrete is placed.
    a. Remove all frost from subgrade, forms and reinforcement before concrete is placed.
11. Do not place slabs on ground if temperature is below 40 Deg F or if temperature surrounding the slab will be below 40 Deg F before structure is enclosed and heated.

12. During periods not defined as cold weather, but when freezing temperatures are expected or occur, protect concrete surfaces from freezing for the first seventy-two (72) hours.

D. Hot Weather Concrete Placement:

1. For this Detailed Provision Section, “hot weather” is defined as any combination of high air temperatures, low relative humidity and wind velocity which produces a rate of evaporation as estimated in ACI 305R, approaching or exceeding 0.2 pounds per square foot per hour (lb/sq ft/hr).
2. Batch, deliver, place, cure and protect concrete during hot weather in compliance with the recommendations of ACI 305R and the additional requirements of this Section.
    a. Temperature of concrete being placed shall not exceed 90 Deg F. Maintain a uniform concrete mix temperature below this level. The temperature of the concrete shall not cause loss of sump, flash set or cold joints.
    b. Promptly deliver concrete to the site and promptly place the concrete upon its arrival at the site, not exceeding the maximum time interval specified in Paragraph 3.02.A.10. Provide vibration immediately after placement.
    c. The County may direct the Contractor to immediately cover concrete with sheet curing material.
3. Review the hot weather concreting plan at the preconstruction meeting. Include the methods and procedures for use during hot weather including production, placement, and curing.
4. Cool ingredients before mixing, or add flake ice or well crushed ice of a size that will melt completely during mixing for all or part of mixing water if high temperature, low slump, flash set, cold joints, or shrinkage cracks are encountered.
5. Temperature of concrete when placed:
    a. Not to exceed 90 Deg F.
    b. Not so high to cause:
        1) Shrinkage cracks.
        1) Difficulty in placement due to loss of slump.
        2) Flash set.
6. Temperature of forms and reinforcing when placing concrete:
    a. Not to exceed 90 Deg F.
    b. May be reduced by spraying with water to cool below 90 Deg F.
        1) Leave no standing water to contact concrete being placed.

E. Consolidating:

1. Consolidate in accordance with ACI 309R except as modified herein.

2. Consolidate by vibration so that concrete is thoroughly worked around reinforcement, embedded items and into corners of forms.
    a. Eliminate:
        1) Air or stone pockets.
    1) Honeycombing or pitting.
    2) Planes of weakness.
3. Internal vibrators:
    a. Minimum frequency of 8,000 vibrations per minute.
    b. Insert and withdraw at points approximately 18-inches apart.
        2) Allow sufficient duration at each insertion to consolidate concrete but not to cause segregation.
    c. Use in:
        3) Beams and girders of framed slabs.
        1) Columns and walls.
    d. Size of vibrators shall be in accordance with ACI 309R, Table 5.1.5.
4. Obtain consolidation of slabs with internal vibrators, vibrating screeds, roller pipe screeds, or other approved means.
5. Do not use vibrators to transport concrete within forms.
6. Provide spare vibrators on jobsite during all concrete placing operations.
7. Bring a full surface of mortar against form by vibration supplemented if necessary by spading to work coarse aggregate back from formed surface, where concrete is to have an as-cast finish.
8. Use suitable form vibrators located just below top surface of concrete, where internal vibrators cannot be used in areas of congested reinforcing.
9. Prevent construction equipment, construction operations, and personnel from introducing vibrations into freshly placed concrete after the concrete has been placed and consolidated.

F. Handle concrete from mixer to place of final deposit by methods which will prevent segregation of loss of ingredients and in a manner which will assure that required quality of concrete is maintained.
1. Use truck mixers, agitators, and non-agitating units in accordance with ASTM C94.
2. Horizontal belt conveyors:
    a. Mount at a slope which will not cause segregation or loss of ingredients.
    b. Protect concrete against undue drying or rise in temperature.
    c. Use an arrangement at discharge end to prevent segregation.
    d. Do not allow mortar to adhere to return length of belt.

e. Discharge conveyor runs into equipment specially designed for spreading concrete.

3. Metal or metal line chutes:

   a. Slope not exceeding 1 vertical to 2 horizontal (1V:2H) and not less than 1 vertical to 3 horizontal (1V:3H).

   b. Chutes more than 20 feet long and chutes not meeting slope requirements may be used provided they discharge into a hopper before distribution.

   c. Provide end of each chute with a device to prevent segregation.

4. Pumping or pneumatic conveying equipment:

   a. Designed for concrete application and having adequate pumping capacity.

   b. Control pneumatic placement so segregation is avoided in discharged concrete.

   c. Loss of slump in pumping or pneumatic conveying equipment shall not exceed 1½-inch.

   d. Do not convey concrete through pipe made of aluminum or aluminum alloy.

   e. Provide pumping equipment without Y sections.

30.04 FINISHING

A. See Detailed Provisions Section 03 3132 – Concrete Finishing and Repair of Surface Defects.

B. Coordinate mixing and placing with finishing.

30.05 CURING AND PROTECTION

A. Protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury immediately after placement, and maintain with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement, hardening, and compressive strength gain.

   1. Comply with ACI 306R for cold-weather protection during curing.

   2. Comply with 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. In accordance with ACI 308.1, apply one of the following curing procedures immediately after completion of placement and finishing, for concrete surfaces not in contact with forms.

   1. Moisture Curing: Keep surfaces continuously moist for not less than seven (7) 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 (7) days. Immediately repair any holes or tears during curing period using cover material and waterproof tape. Application of waterproof sheet materials, conforming to ASTM C171.

3. Curing Compound: Application of a curing compound conforming to ASTM C309.

   a. Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's recommendations immediately after any water sheen which may develop after finishing has disappeared from concrete surface.

   b. Recoat areas subjected to heavy rainfall within three (3) hours after initial application. Maintain continuity of coating and repair damage during curing period.

   c. Do not use on any surface against which additional concrete or other material is to be bonded unless it is proven that curing compound will not prevent bond.

   d. Where a vertical surface is cured with a curing compound, the vertical surface shall be covered with a minimum of two (2) coats of the curing compound.

      4) Apply the first coat of curing compound to a vertical surface immediately after form removal.

      1) The vertical concrete surface at the time of receiving the first coat shall be damp with no free water on the surface.

      2) Allow the preceding coat to completely dry prior to applying the next coat.

      3) A vertical surface: Any surface steeper than 1 vertical to 4 horizontal (1V:4H).

D. Curing Concrete in Contact with Forms:

1. Minimize moisture loss from and temperature gain of concrete placed in forms exposed to heating by sun by keeping forms wet and cool until they can be safely removed.

2. After form removal, cure concrete until end of time prescribed.

   a. Use one (1) of methods listed above.

3. Forms left in place shall not be used as a method of curing in hot weather.

4. In hot weather, remove forms from vertical surfaces as soon as concrete has gained sufficient strength so that the formwork is no longer required to support the concrete.

E. Continue curing for at least seven (7) days for all concrete except high early strength concrete for which period shall be at least three (3) days.

1. If one of curing procedures indicated above is used initially, it may be replaced by one of other procedures indicated any time after concrete is one (1) day old, provided concrete is not permitted to become surface dry during transition.

F. Cold Weather:

1. Follow recommendations of ACI 306R.
2. Maintain temperature of concrete between 50 and 70 Deg F for required curing period, when outdoor temperature is 40 Deg F, or less.
3. Use heating, covering, insulating, or housing of the concrete work to maintain required temperature without injury due to concentration of heat.
4. Do not use combustion heaters unless precautions are taken to prevent exposure of concrete to exhaust gases which contain carbon dioxide.
5. Interior slabs in areas intended to be heated shall be adequately protected so that frost does not develop in the supporting subgrade.

G. Hot Weather:

1. Follow recommendations of ACI 301.
2. Make provision for cooling forms, reinforcement and concrete, windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering with a light colored material.
3. Provide protective measures as quickly as concrete hardening and finishing operations will allow.

H. Rate of Temperature Change:

1. Keep changes in temperature of air immediately adjacent to concrete as uniform as possible, during and immediately following curing period.
2. Do not exceed a temperature change of 5 Deg F in any one (1) hour or 50 Deg F in any twenty-four (24) hour period.

I. Protection from Mechanical Injury:

1. Protect concrete from damaging mechanical disturbances, such as load stresses, heavy shock, and excessive vibration.
2. Protect finished concrete surfaces from damage by construction equipment, materials, or methods, and by rain or running water.
3. Do not load self-supporting structures in such a way as to overstress concrete.

30.06 CLEAN UP

A. Upon completion of all concrete work and before Substantial Completion, the Contractor shall remove all tools, surplus materials, apparatus, debris, etc., from the site and the site shall be left in a clean, neat, and acceptable condition to the County.

B. Hardened concrete material accumulated in the designated washout area for the Project can be recycled by the Contractor, using a “no charge” account, at the Badlands Landfill.

30.07 FIELD QUALITY CONTROL

A. Tests in accordance with Detailed Provisions Section 03 0505 – Concrete Testing.

1. Perform a strength test on all concrete to which water or superplasticizer, above the amount stated in the approved concrete mix design, has been added.
    a. Perform sampling after water or superplasticizer has been added and additional mixing has been performed.

B. All cracks wider than $^{1}/_{64}$-inch in new concrete appearing within six (6) months of concrete placement shall be repaired using epoxy adhesive injection by the Contractor at no cost to the County.

END OF SECTION 03 3131

SPECIFICATIONS – DETAILED PROVISIONS

SECTION 03 3132: CONCRETE FINISHING AND REPAIR OF SURFACE DEFECTS

CONTENTS

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SECTION 03 3132
CONCRETE FINISHING AND REPAIR OF SURFACE DEFECTS

PART 31 GENERAL

31.01 SUMMARY

A. Section Includes: This Work consists of providing concrete surface finishes and repairing surface finishes of all defects.

1. This Work includes but is not limited to:

a. Structural Foundations/Footings.

b. Structural Slabs, girders, beams, and columns.

B. Related Detailed Provisions Sections include, but are not limited to:

1. Section 03 1113 – Formwork – Structural Cast-In-Place Concrete
2. Section 03 3100 – Cast-In-Place Structural Concrete
3. Section 03 3131 – Concrete Mixing, Placing, Jointing and Curing

31.02 QUALITY ASSURANCE

A. Referenced Standards:

1. American Concrete Institute (ACI):

a. ACI 301 – Specification for Structural Concrete.

b. ACI CT-XX – Concrete Terminology.

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

a. ASTM C150 – Standard Specification for Portland Cement.

b. ASTM D4258 – Standard Practice for Surface Cleaning Concrete for Coating.

c. ASTM D4259 – Standard Specification for Abrading Concrete.

3. The Society for Protective Coatings/NACE International (SSPC/NACE):

a. SSPC/NACE No. 6 – Surface Preparation of Concrete

31.03 DEFINITIONS

A. Vertical Surface Defects:

1. Any void in the face of the concrete deeper than $^1/_8$-inch, such as:

a. Tie holes.

b. Air pockets (bug holes).

c. Honeycombs.

d. Rock holes.

2. Scabbing:
    a. Scabbing is defect in which parts of the form face, including release agent, adhere to concrete.
3. Foreign material embedded in face of concrete.
4. Fins $^{1}/_{16}$-inch or more in height.

B. Installer or Applicator:
1. Installer or applicator is the person actually installing or applying the product in the field at the Project Location.
2. Installer or applicator are synonymous.

C. Other words and terms used in this Detailed Provisions Section are defined in ACI CT-XX.

31.04 SUBMITTALS

A. Submittal Procedures: See Detailed Provisions Section 01 3300 – Submittal Procedures for requirements for the mechanics and administration of the submittal process.

B. Approval Submittals:
1. Product technical data, including, but not limited to:
    a. Acknowledgement that products submitted meet requirements of standards referenced.
    b. Manufacturer's installation instructions.

C. Quality Assurance Submittals:
1. Certifications:
    a. Certification of aggregate gradation.
    b. Certification that products being used will not interfere with bonding of future floor or wall finishes.

31.05 DELIVERY, STORAGE AND HANDLING

A. Comply with manufacturer's recommendations and requirements for materials used.

B. Materials shall be delivered to the jobsite in sealed, undamaged containers. Each container shall be clearly marked with manufacturer's label showing type of material, color and lot number.

PART 32 PRODUCTS

32.01 ACCEPTABLE MANUFACTURERS

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

acceptable:

1. Bonding agents:
    a. Euclid Chemical Company; www.euclidchemical.com
    b. L&M Construction Chemicals a part of LATICRETE, Inc.; www.lmcc.com
    c. Master Builders Solutions by BASF; www.master-builders-solutions.basf.us
    d. Or approved equal.

B. Submit request for substitution in accordance with Detailed Provisions Section 01 6000 – Product Requirements.

32.02 MATERIALS

A. Bonding Agent:
    1. For use only on concrete surfaces not receiving liquid water repellent coating:
        a. High solids acrylic latex base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.
    2. For use only on concrete surface receiving liquid water repellent:
        a. Non-acrylic base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.

B. Cement:
    1. ASTM C150, Type II Portland.

C. Aggregate:
    1. Sand: Maximum size #30 mesh sieve.
    2. For exposed aggregate finish surfaces: Same as surrounding floor and/or wall.

D. Water: Potable.

E. Non-Shrink Grout: See Detailed Provisions Section 03 3100 – Cast-In-Place Structural Concrete and Detailed Provisions Section 03 3131 – Concrete Mixing, Placing, Jointing, and Curing.

32.03 MIXES

A. Bonding Grout: One (1) part cement to one (1) part aggregate.

B. Patching Mortar:
    1. One (1) part cement to two and one-half (2½) parts aggregate by damp loose volume.
        a. Substitute white Portland cement for a part of gray Portland cement to produce color matching surrounding concrete.

PART 33 EXECUTION

33.01 PREPARATION

A. For methods of curing, see Detailed Provisions Section 03 3131 – Concrete Mixing, Placing, Jointing, and Curing.

B. Preparation of Bonding Grout Mixture:

1. Mix cement and aggregate.
2. Mix bonding agent and water together in separate container in accordance with manufacturer's instructions.
3. Add bonding agent/water mixture to cement/aggregate mixture.
4. Mix to consistency of thick cream.
5. Bonding agent itself may be used as bonding grout if approved by manufacturer and County.

C. Preparation of Patching Mortar Mixture:

1. Mix cement and aggregate.
2. Mix bonding agent and water together in separate container in accordance with manufacturer's instructions.
3. Add only enough bonding agent/water mixture to cement/aggregate mixture to allow handling and placing.
4. Let stand with frequent manipulation with a trowel, until mix has reached stiffest consistency to allow placement.

D. Clean surfaces in accordance with ASTM D4258 to remove dust, dirt, form oil, grease, or other contaminants prior to abrasive blasting, chipping, grinding or wire brushing.

1. Abrasive blast surfaces in accordance with ASTM D4259 and SSPC/NACE No. 6 to completely open defects down to sound concrete and remove laitance.
    a. If additional chipping or wire brushing is necessary, make edges perpendicular to surface or slightly undercut.
    b. No featheredges will be permitted.
2. Rinse surface with clean water and allow surface water to evaporate prior to repairing surface defects.

E. Repairing Surface Defects:

1. Fill and repair using patching mortar mix specified in Paragraph 2.03.
    a. Use non-shrink grout to fill tie-holes as outlined in this Detailed Provisions Section.
2. If required by bonding agent manufacturer, etch surfaces with a muriatic acid solution followed by a thorough rinse with clean water.
    a. Test concrete to determine pH level and continue flushing with clean water until

surface pH is within acceptable limits.

3. Dampen area to be patched and an area at least 6-inches wide surrounding it prior to application of bonding grout.
4. Brush bonding grout into the surface after the surface water has evaporated.
5. Allow bonding grout to set for period of time required by bonding agent manufacturer before applying premixed patching mortar.
6. Fill tie-holes with non-shrink nonmetallic grout.
    a. Where exposed to view and scheduled to receive concrete Finish #2 or #5, hold grout below surface of concrete and fill with patching mortar to match surrounding concrete.
7. Fill all other defects with patching mortar.
    a. Match color of surrounding floor and/or wall.
    b. Do not use acrylic bonding agent in patching mortar for filling defects in surfaces to be treated with liquid water repellent.
8. Consolidate grout or mortar in place and strike off so as to leave patch slightly higher than surrounding surface.
9. Leave undisturbed for at least sixty (60) minutes before finishing level with surrounding surface.
    a. Do not use metal tools in finishing a patch in a formed wall which will be exposed or coated with other materials.
10. Keep areas damp in accordance with grout manufacturer or bonding agent manufacturer's directions.

33.02 INSTALLATION AND APPLICATION

A. Do not repair surface defects or apply wall or floor finishes when temperature is or is expected to be below 50 Deg F.
    1. If necessary, enclose and heat area to between 50 and 70 Deg F during repair of surface defects and curing of patching material.
        a. Use only clean fuel, indirect fired heating apparatus.

B. Concrete Finishes for Horizontal Slab Surfaces:
    1. General:
        a. Tamp concrete to force coarse aggregate down from surface.
        b. Screed with straightedge, eliminate high and low places, bring surface to required finish elevations; slope uniformly to drains.
        c. Dusting of surface with dry cement or sand during finishing processes not permitted.
    2. Broom of belt finish: Broom concrete surface with a steel or fiber broom to produce

corrugations between 1⁄16 and 1⁄8 in. deep. Broom perpendicular to nearest edge of slab surface. Broom all areas of a panel in the same direction. Use the same type and manufacture of broom for all slabs to provide a consistent appearance.

33.03 FIELD QUALITY CONTROL

A. Horizontal slab finishes will be accepted provided:

1. Applicable specification requirements are satisfied.
2. Water does not pond in areas sloped to drain.
3. Gap between a 10-foot straightedge placed anywhere and the finished surface does not exceed:
   a. Class A tolerance: $^1/_8$-inch.
   b. Class B tolerance: ¼-inch.
   c. Class C tolerance: ½-inch.
4. Accumulated deviation from intended true plane of finished surface does not exceed ½-inch.
5. Accuracy of floor finish does not adversely affect installation and operation of movable equipment, floor supported items, or items fitted to floor (doors, tracks, etc.).

B. Unacceptable finishes shall be replaced or, if approved in writing by County, may be corrected provided strength and appearance are not adversely affected.

1. High spots to be removed by grinding and/or low spots filled with a patching compound or other remedial measures to match adjacent surfaces.

END OF SECTION 03 3132

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