

SECTION 01025

ALTERNATES

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.

1.02 DESCRIPTION

- A. Work Included: Provide alternative bid proposals as described in this Section.
- B. Procedures:
1. Provide alternative proposals to be added to or deducted from the amount of the Base Bid if the Owner accepts the corresponding change in scope.
 2. Include within the alternative bid prices all costs, including labor, materials, installations, and fees.
 3. Show the proposed alternative amounts opposite their proper description on the Contractor's Proposal.
- C. Acceptance or Rejection:
1. Acceptance or rejection of Alternate Bids is subject to Owner's discretion. The Owner reserves the right to award any or none of the Alternate Proposal items as the Owner may deem to be in its best interests and without regard to the order in which such items are listed in the Proposal.

***** END OF SECTION *****

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SECTION 01030

POST BID INTERVIEW

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.

1.02 DESCRIPTION

This Section requires the apparent low bidder to attend and participate in a POST BID INTERVIEW with the OWNER and ARCHITECT, prior to award of any contract by the OWNER. The POST BID INTERVIEW will be conducted by the ARCHITECT within fifteen (15) calendar days after the date of bid. The Interview will take place at the Architect's Office.

1.03 PURPOSE

- A. Contractor acknowledgment of a complete and accurate bid.
- B. Contractor submission of a fair and equitable bid.
- C. Fair comparisons of bid.

1.04 REQUIRED ATTENDANCE

- A. A duly authorized representative of the apparent low bidder is required to attend the POST BID INTERVIEW, in person.
- B. The apparent low bidder's authorized representative must have signatory authority on behalf of the apparent low bidder.
- C. Failure to attend the POST BID INTERVIEW will be considered just cause for the Owner to reject the Bid.

1.05 POST BID INTERVIEW PROCEDURE

- A. The ARCHITECT will review the Bidder's Proposal with the attendees.
- B. The ARCHITECT will review the Contract Documents with the attendees, including but not limited to:
 - 1. Insurance
 - 2. Bonding
 - 3. Addenda
 - 4. Pre-Bid Clarifications
 - 5. Bid / Voluntary Alternates
 - 6. Schedule of Values for all Sub-Contractor Work listed according to the Table of Contents for the Project Manual.
 - 7. Value Engineering
 - 8. The Contract Plans
 - 9. The Contract Specification
 - 10. Critical Materials

Contractor's Initial _____

- 11. General Contract Schedule Requirements
- 12. Prevailing Wage Requirements
- 13. Liquidated Damages
- 14. Required Docs for Contract Administration
- 15. Contract Coordination Requirements

1.06 POST BID INTERVIEW DOCUMENTATION

The ARCHITECT will document the POST BID INTERVIEW on the form attached to this Section. Both the Apparent Low Bidder and the OWNER are required to sign the POST BID INTERVIEW Documentation. The POST BID INTERVIEW Documentation is a Contract Document, and all items recorded in the POST BID INTERVIEW Documentation are part of the Contract and shall be enforced accordingly.

PART 2 -- INFORMATION

2.01 BIDDER INFORMATION:

- A. Name: _____
- B. Phone: _____
- C. Fax: _____
- D. Date: _____
- E. Time: _____

2.02 INTRODUCTIONS / SIGN-IN:

- A. Contractor:
 - 1. _____
 - 2. _____
 - 3. _____
- B. Owner:
 - 1. _____
 - 2. _____
 - 3. _____
- C. Architect:
 - 1. _____
 - 2. _____
 - 3. _____

Contractor's Initial _____

PART 3 -- INTERVIEW

3.01 PURPOSE OF INTERVIEW IS TO ASSURE:

- A. Contractor acknowledgment of a complete and accurate bid.
- B. Contractor submission of a fair and equitable bid.
- C. Fair comparisons of bid.

3.02 CONTRACTUAL REQUIREMENTS:

A. Can you meet all specified bonding requirements?	Yes	No
B. Can you meet all specified insurance requirements?	Yes	No
C. Acknowledge that you are required to comply with the prevailing wage Requirements?	Yes	No
D. Are you prepared to bind every subcontractor, supplier, and vendor, to the terms of the contract as far such terms are applicable to each subcontractors work?	Yes	No
E. Acknowledge inclusion in the bid of all Addenda?	N/A	Yes No
F. Acknowledged Receipt of Pre-Bid Clarifications (RFI) Submitted?	N/A	Yes No
G. Acknowledge inclusion in the Bid of all Allowances? 1. 2. 3. 4.	N/A	Yes No
H. Acknowledge inclusion in the Bid of all Alternates? 1. 2. 3. 4.	N/A	Yes No
I. Acknowledge that you are required to comply with the SWPPP.	Yes	No
J. Acknowledge that you are required to comply with the PM-10	Yes	No

Contractor's Initial _____

3.03 SCOPE OF WORK:

<p>A. Are the plans and specifications clear and understandable?</p>	<p>Yes No</p>
<p>B. Are there any items that need to be identified or require clarification?</p> <p>If yes, please identify item.</p> <p>1.</p> <p>2.</p> <p>3.</p> <p>4.</p> <p>5.</p> <p>6.</p>	<p>Yes No</p>
<p>C. Is (are) the cost(s) for the above items (as applicable) included in your proposal items?</p>	<p>Yes No</p>
<p>D. Review bid alternatives (if applicable)</p> <p>1.</p> <p>2.</p> <p>3.</p>	<p>N/A Yes No</p>
<p>E. Are you proposing any substitutions?</p> <p>If yes, please identify item.</p> <p>1.</p> <p>2.</p> <p>3.</p> <p>4.</p> <p>5.</p> <p>6.</p> <p>7.</p> <p>8.</p> <p>9.</p>	<p>N/A Yes No</p>

Contractor's Initial _____

3.04 Are you proposing any VALUE ENGINEERING? (describe)

- 1. Add / Deduct _____
- 2. Add / Deduct _____
- 3. Add / Deduct _____
- 4. Add / Deduct _____
- 5. Add / Deduct _____
- 6. Add / Deduct _____
- 7. Add / Deduct _____
- 8. Add / Deduct _____
- 9. Add / Deduct _____
- 10. Add / Deduct _____
- 11. Add / Deduct _____
- 12. Add / Deduct _____
- 13. Add / Deduct _____

VALUE ENGINEERING TOTAL \$ _____

BASE BID \$ _____

PROPOSED REVISED TOTAL \$ _____

Contractor's Initial _____

SCHEDULE:

- A. Do you acknowledge the construction duration stipulated in the Contract? Yes No
- B. Will you provide Cost and Manpower loading for your construction schedule activities to within the required seven (7) calendar days, per the Contract?
(Section 01320 – Project Construction Schedule) Yes No
- C. It is understood the Project schedule is critical. Can you accelerate any and all schedule activities if the requirement occurs? Yes No

D. If not, what must change and why?

E. Identify critical materials, deliveries and dependencies (long lead), including Owner Furnished items that could affect the completion of your work.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

- F. You have reviewed the "Time for Completion" set forth in the Agreement, and you further understand the City MAY assess liquidated damages if you fail to complete this Project within same. You further understand any delays caused by you or your subcontractors WILL require your company to accelerate the Work upon written direction by the City, in order to complete this Project on time, as stipulated in the Agreement. Yes No
- G. You agree that failure to meet the completion date is just cause for the CITY to assess and retain Liquidated Damages in accordance with the Contract Documents. Yes No

Contractor's Initial _____

3.05 CONTRACTOR COMMENTS / SUGGESTIONS:

- A. _____
- B. _____
- C. _____
- D. _____
- E. _____
- F. _____
- G. _____
- H. _____

3.06 AGREEMENT:

- A. Contractor agrees that the information contained herein is part of your contractual obligations. Your signature acknowledges your agreement to perform all work discussed herein, and that costs for all work are included in your proposal. The foregoing information is true and accurate, and I am authorized to sign as an officer of the company I am representing.

Company Name: _____

Signature: _____

Name: _____

Title: _____

Date: _____

3.07 WITNESS:

- A. Owner

Company Name: _____

Signature: _____

Name: _____

Title: _____

Date: _____

- B. Architect

Company Name: _____

Signature: _____

Name: _____

Title: _____

Date: _____

*** END OF SECTION ***

Contractor's Initial _____

SECTION 01049
SUPPORTING FROM STRUCTURE

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.

1.02 SCOPE

Work Included:

1. This section provides guidelines and limitations for supporting all mechanical, electrical, plumbing or architectural items from the building structure, and for seismic bracing for all such items.
2. Design and install all support and bracing systems except as noted. Provide for attachment to portions of the building structure capable of bearing the loads imposed. Design systems to not overstress the building structure.

Work Not Included:

1. The Contractor is not required to design support and bracing for items for which the contract documents provide specific attachment, support, and bracing. Items specifically noted in the CBC as not requiring bracing may be exempt from seismic bracing if all conditions of attachment in the CBC are complaint. Seismic bracing is not typically required for the following items:
 - a. Gas piping less than 1 inch inside diameter.
 - b. Piping for boilers and mechanical equipment less than 1.25 inches inside diameter.
 - c. All other piping less than 2.5 inches inside diameter, unless racked together.
 - d. All piping and duct suspended by individual hangers 12 inches or less in length with flexible connections.
 - e. All rectangular air handling ducts less than 6 square feet in cross sectional area.
 - f. All round air handling ducts less than 28 inches in diameter.
 - g. All electrical conduits less than 2.5 inches inside diameter, unless racked together.

1.03 RELATED WORK (See also Table of Contents)

Information relating solely to mechanical or electrical work is included under those divisions, except as specifically indicated herein.

1.04 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.05 QUALITY ASSURANCE

A. General:

1. Design and install all support systems to comply with the requirements of the 2007 California Building Code Chapter 16.

2. For seismic bracing design engage the services of a structural engineer licensed in California.
 3. For guidelines regarding seismic bracing for mechanical, electrical and plumbing systems, refer to the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA), "Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Piping Systems". Where SMACNA guidelines deviate from CBC requirements, CBC requirements shall govern
- B. Standards and References: (Latest Edition unless specified otherwise)
1. The General Conditions, Supplementary Conditions, and applicable portions of Division 1 apply to the work of this Section as if printed herein.
 2. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual or test designation in effect the date of Notice to Proceed with the Work given.
- C. Submittals: (In accordance with Article 5 of the General Conditions, Project Manual Section 00700):
1. Submit shop drawings for all substructures and attachment methods.
 2. Submit proposed alternative methods of attachment for review by the Architect, prior to deviating from the requirements given below.
 3. For all seismic bracing systems, submit structural calculations and details prepared and signed by the Contractor's licensed engineer which include all resultant forces applied to the building structure. Do not overstress building structure. Calculations will be reviewed for compliance with design criteria, not for arithmetic.

PART 2 -- PRODUCTS

2.01 MATERIALS

- A. Furnish all substructures and fasteners required to comply with the limitations given below. Use materials as specified in the various sections and as appropriate to the use.
- B. All exterior materials: hot dipped galvanized or stainless steel.

PART 3 -- EXECUTION

3.01 GUIDELINES AND LIMITATIONS

- A. The General Contractor shall coordinate the load requirements from all sub-contractors so that no combination of loads exceeds the limitations given below without written approval.
- B. Maximum Loading: Attach no loads greater than the following without specific approval of the Structural Engineer.
 1. Metal deck without concrete fill - acoustical tile and gypsum board ceilings only; no piping, ducting or conduit. Maximum ceiling weight - 3.5 psf. Maximum wire hanger load = 60#.
 2. Metal deck with concrete fill - ceilings as indicated for metal deck without concrete fill above, plus electrical conduits, gas piping and ducting not exceeding 3.0 psf. Maximum point load from trapeze = 200 lbs. at 8'-0" cc each way. Mechanical units hung from concrete filled deck shall not exceed 500 lbs.
 3. Steel beams and girders: water and gas piping, electrical conduits, ducting and trapeze of same not to exceed 3.0 psf. Maximum load on a single span = 600#.

Mechanical units hung from beams shall not exceed 1000# unless specifically indicated on structural plans.

4. Cast-In-Place concrete slabs - ceilings, piping, conduit and ducts shall not exceed 10 psf. Maximum hanger load 600#. Mechanical units hung from slabs shall not exceed 800#.
5. Wood sawn joists - loads from ceilings, piping, conduit and ducting shall not exceed 5.0 psf. Maximum concentrated load = 300 lbs. per joist.
6. Steel Joists - Loads from ceiling, piping, conduit and ducting shall not exceed 8 psf. Maximum concentrated load = 500 lbs. per joist.

3.02 SEISMIC BRACING

- A. In applying formulas from Chapter 16 of the 2007 CBC the value for I_p (importance factor) shall be assumed to be no less than 1.0. See structural drawings for other seismic factors.
- B. Design and install seismic bracing so as not to ground out vibration and sound isolation items.

*****END OF SECTION*****

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SECTION 01200
PROJECT MEETINGS

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.

1.02 DESCRIPTION

- A. Work Included: To enable orderly review during progress of the Work, and to provide for systematic discussion of problems, the Architect will conduct project meetings throughout the construction period.
- B. The Contractor's relations with his subcontractors and materials suppliers, and discussions relative thereto, are the Contractor's responsibility and normally are not part of project meetings content.

1.03 QUALITY ASSURANCE

For those persons designated by the Contractor to attend and participate in project meetings, provide required authority to commit the Contractor to solutions agreed upon in the project meetings.

1.04 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.05 SUBMITTALS

- A. In accordance with Article 5 of the General Conditions, Project Manual Section 00700.
- B. Agenda items: To the maximum extent practicable, advise the Architect at least 24 hours in advance of project meetings regarding items to be added to the agenda.
- C. Minutes:
 - 1. The Architect will compile minutes of each project meeting, and will furnish copies to the Contractor and to the Owner.
 - 2. Recipients of copies may make and distribute such other copies as they wish.

PART 2 -- PRODUCTS

(No products are required in this Section.)

PART 3 -- EXECUTION

3.01 MEETING SCHEDULE

- A. Progress Review Meetings will be held every other week, except for the Pre-Construction Meeting, which will occur as described below. Additional meetings will be held as needed in order to accomplish the Project Schedule.
- B. Progress Review Group will coordinate as necessary to establish mutually acceptable schedule for meetings.

3.02 MEETING LOCATION

The Architect will establish meeting location. To the maximum extent practicable, meetings will be held at the job site.

3.03 PRE-CONSTRUCTION MEETING

- A. A Pre-Construction Meeting will be held within 15 working days after the Owner has issued the Notice to Proceed.
 - 1. Provide attendance by authorized representatives of the Contractor and major subcontractors.
 - 2. The Architect will advise other interested parties, including the Owner, and request their attendance.
- B. Minimum agenda: Data will be distributed and discussed on at least the following items:
 - 1. Organizational arrangement of Contractor's forces and personnel, and those of subcontractors, materials, suppliers, and Architect.
 - 2. Channels and procedures for communication.
 - 3. Construction schedule, including sequence of critical work. (To be presented by Contractor)
 - 4. Contract Documents, including distribution of required copies of original Documents and revisions.
 - 5. Processing of Shop Drawings and Submittals to the Architect.
 - 6. Processing of Requests For Information (RFI's).
 - 7. Processing of Requests for Proposal, field decisions, and Change Orders.
 - 8. Rules and regulations governing performance of the work.
 - 9. Procedures for safety and first aid, security, quality control, housekeeping, and related matters.
 - 10. Format and procedures for submitting "Application and Certificate for Payment" and "Schedule of Values" forms.

3.04 PROJECT MEETINGS

- A. Attendance:
 - 1. To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of the Work.
 - 2. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspect of the Work is involved.
- B. Minimum agenda:
 - 1. Review, revise as necessary, and approve minutes of previous meetings.
 - 2. Review progress of the Work since last meeting, including status of submittals for review.
 - 3. Identify problems that will impede planned progress.
 - 4. Develop corrective measures and procedures to regain planned schedule.
 - 5. Complete other current business.
- C. Revisions to minutes:
 - 1. Unless published minutes are challenged in writing prior to the next regularly schedule progress meeting, they will be accepted as properly stating the activities and decisions of the meeting.

2. Persons challenging published minutes shall reproduce and distribute copies of the challenge to all indicated recipients of the particular set of minutes.
3. Challenge to minutes shall be settled as priority portion of "old business" at the next regularly scheduled meeting.

***** END OF SECTION *****

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SECTION 01350
SUBMITTAL LIST

PART 1 -- GENERAL

1.01 SCOPE OF WORK

- A. Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.
- B. Submit Shop Drawings, Product Data, Samples and other information according to Article 5 – Shop Drawings & Submittals of the General Conditions.
- C. Provide specific information according to the requirements of each Specification Section.

1.02 SUBSTITUTIONS

Substitutions will be considered per Article 5.3 of the General Conditions, Project Manual Section 00700.

1.03 SUBMITTALS

In accordance with Article 5 of the General Conditions, Project Manual Section 00700.

1.04 SUBMITTAL RESPONSE

- 1 = No Exception taken
- 2 = Approved as Noted
- 3 = Revise & Resubmit
- 4 = Submit Specified Item
- 5 = Rejected

SECTION #	SECTION NAME	RECEIVED	RETURNED	RESPONSE
02070	Selective Demolition & Reconstruction			
02220	Excavating, Backfilling & Compacting			
02510	Asphalt Paving			
02550	Site Concrete Work			
02580	Pavement Marking			
02660	Sewer & Water Main Construction			
02666	Water System			
02668	Fire Water System			
02720	Site Drainage			
02730	Sanitary Sewers			
02752	Asphalt Concrete Paving			
02755	Pavement Marking			
02780	Interlocking Concrete Unit Paving			
02781	Detectable Warning Surface: Precast Tactile			
02782	Detectable Warning Surface: cast-in-Place			
02792	Playground Poured-in-Place 3-part			
02830	Wrought Iron Fences & Gates			
02835	Chain Link Fences and Gates			
02860	Playground Equipment			
02870	Site Furnishings			
03100	Concrete Formwork			

SECTION #	SECTION NAME	RECEIVED	RETURNED	RESPONSE
03300	Cast in Place Concrete			
03320	Concrete Sealers			
03345	Concrete Finishing			
03410	Plant-Precast Structural Concrete Panels			
03470	Tilt-Up Precast Concrete			
04100	Mortar and Grout			
04200	Reinforced Unit Masonry System			
04220	Concrete Unit Masonry			
04270	Glass Masonry Unit System -Pittsburg Corning			
04270	Glass Masonry Unit System - Weck			
04730	Manufactured Stone Veneer			
05120	Structural Steel			
05300	Metal Deck			
05410	Metal Stud Framing			
05500	Metal Fabrications			
05720	HDI Railing Systems			
05720	Metal Stairs & Railings			
06152	Composite Decking			
06152	Timbertech			
06170	Prefabricated Structural Wood & Trusses			
06410	Casework			
06410	W.I.C. Certified Cabinet Work			
06600	Plastic Surfacing Materials			
06610	Fiberglass Planters			
07120	Waterproofing & Damproofing			
07175	Water Repellent Coatings			
07190	Anti-Graffiti Protection			
07195	Water Repellent Protection			
07210	Thermal Insulation			
07240	Exterior Insulation & Finish System (EIFS)			
07320	Tile Roofing			
07412	Corrugated Aluminum Panels			
07420	Fiberglass Reinforced Plastic Roofing & Sliding			
07500	Adhered Feltback PVC Thermoplastic			
07500	Built-Up Roofing			
07510	Silicone Polyurethane Foam Roofing			
07540	Asphalt Shingle Roofing			
07550	Standing Seam Metal Roofing			
07600	Flashing & Sheet Metal			
07720	Roof Hatches & Safety Railing			
07840	Fire Stopping			
07900	Caulking & Sealants			
08100	Metal Doors & Frames			
08200	Wood Doors & Frames			

SECTION #	SECTION NAME	RECEIVED	RETURNED	RESPONSE
08360	Insulated Rolling Service Doors			
08360	Rolling Service Doors			
08370	Horizontal Sliding, Accordion - Type Fire Doors			
08400	Aluminum Entrance & Framing Systems			
08450	Aluminum Automatic Doors			
08500	Aluminum Windows			
08620	Unit Skylights			
08710	Finished Hardware			
08800	Glazing			
08860	Sloped Glazing			
09200	Lath & Plaster			
09250	Gypsum Board Systems			
09300	Tilework			
09350	Stone Flooring			
09510	Acoustical Ceiling Tile			
09620	Weight Room Flooring			
09624	Multipurpose/Gymnasium Sport Flooring			
09645	Indoor Resilient Athletic Surfacing			
09645	Multipurpose Sports Flooring			
09650	Resilient Flooring			
09660	Fluid-Applied Flooring			
09670	Epoxy Resinous Flooring			
09670	Epoxy Floor Coating			
09680	Carpet			
09710	Acoustical Wall Panels			
09720	Fabric Wall Panels			
09720	Fiber Reinforced Polyester (FRP) Panels			
09720	High Impact Wall Covering			
09720	Wall Covering			
09742	Thin Film Epoxy Coating			
09770	Prefinished Wall Panel System			
09830	Elastomeric Coatings Sherwin Williams			
09830	Elastomeric Coatings			
09900	Painting			
10100	Project Screens			
10120	Tackboards			
10155	Metal Toilet Partitions			
10155	Laminated Plastic Toilet Partitions			
10155	Solid Polymer Toilet Partitions			
10200	Louvers			
10260	Corner & Wall Guards			
10270	Access Flooring			
10350	Flagpoles			
10400	Identifying Devices			

SECTION #	SECTION NAME	RECEIVED	RETURNED	RESPONSE
10410	Illuminated Directories			
10500	Metal Lockers			
10520	Fire Protection Specialties			
10800	Toilet & Bath Accessories			
11450	Residential Appliances			
11480	Athletic Equipment			
12345	Laboratory Casework, Lab Fixtures &			
12500	Window Treatment			
12660	Bleachers			
13100	Metal Carports			
13130	Fabric Shade Structures			
13500	Metal Building Systems			
13700	Bosch UML Series General Purpose Color LCD			
13710	Digital Video Recorders & Analog Recording			
13720	Bosch Flexidome VND-495V Series Day/Night			
14240	Hydraulic Passenger Elevators			
15400	Plumbing			
15600	HVAC			
16000	Electrical			
16721	Fire Alarm Systems			

END OF SECTION

SECTION 01410
TESTING LABORATORY SERVICES

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.

1.02 DESCRIPTION

A. Work Included:

1. Cooperate with the Owner's selected testing agency and all others responsible for testing and inspecting the Work.
2. The Contractor shall provide other testing and inspecting as in this Section and/or elsewhere in the Contract Documents.

B. Related Work:

1. Requirements for testing may be described in other Sections of the Project Manual.
2. Where no testing requirements are described, but the Owner decides that testing is required, the Owner may require the testing to be performed under current pertinent standards. Payment for testing will be made as described in this Section.

C. Work Not Included:

1. Selection of testing laboratory: The Owner will select a pre-qualified independent testing laboratory.
2. Payment for initial testing: The Owner will pay for all initial services of the testing laboratory except as further described in Article 2.01 of this Section.

1.03 QUALITY ASSURANCE

- A. The testing laboratory will be qualified to the Owner's approval in accordance with ASTM E329.
- B. Testing will be in accordance with all pertinent codes and regulations, and with selected standards of the American Society for Testing and Materials.

1.04 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.05 SUBMITTALS

In accordance with Article 5 of the General Conditions, Project Manual Section 00700.

PART 2 -- PRODUCTS

2.01 PAYMENTS FOR TESTING INVOLVING NON-COMPLIANCE

When initial tests indicate non-compliance with the Contract Documents, the costs of initial tests as well as costs of subsequent retesting occasioned by the non-compliance will be paid by the Owner and the amount deducted from the Contract Sum.

2.02 SPECIFIC TESTS AND INSPECTIONS

- A. Provide all tests and inspections required by the 2007 California Building Code, required by provisions of the Contract Documents, and such other tests and inspections as are dictated by the Architect.
- B. Tests include, but are not necessarily limited to, those described in detail in Part 3 of this Section.

PART 3 -- EXECUTION

3.01 TAKING SPECIMENS

The testing personnel, unless otherwise provided in the Contract Documents, shall take all specimens and samples for testing. The testing laboratory will provide all sampling equipment and personnel. The testing laboratory will perform all deliveries of specimens and samples to the testing laboratory.

3.02 COOPERATION WITH TESTING LABORATORY

Provide access to the Work at all times and at all locations where the Work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.

3.03 OWNER NOTIFICATION

- A. The Contractor shall notify the Owner's representative a sufficient time in advance of the manufacture of material to be supplied by him under the Contract Documents, which must be terms of the Contract be tested, in order that the Owner may arrange for the testing of same at the source of supply.
- B. Any material shipped by the Contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said representative that such testing and inspection will not be required and shall not be incorporated in the job.

3.04 TEST REPORTS

A copy of all test reports shall be forwarded to both the Owner and the Architect by the testing agency. Such reports shall include all tests made, regardless of whether such tests indicate that the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations as required shall also be reported. The reports shall show that the material or materials were sampled and tested in accordance with the requirements of California Building Code and with the approved specifications. Test reports shall show the specified design strength. They shall also state definitely whether or not the material or materials tested comply with requirements of the Contract Documents.

3.05 SOIL INSPECTING AND TESTING

- A. Make required inspections and tests including, but not limited to:
 - 1. Visually inspect on-site and imported fill and backfill, making such tests and retests as are necessary to determine compliance with the Contract requirements and suitability for the proposed purpose.
 - 2. Make field density tests on samples from in-place material as required.
 - 3. As pertinent, inspect and test the scarifying and recompacting of cleaned subgrade; inspect the progress of excavating, filling, and grading; make 90% density tests at fills and backfills; and verify compliance with provisions of the Contract Documents and governmental agencies having jurisdiction.
- B. Make and distribute necessary reports and certificates.

3.06 CONCRETE TESTING AND INSPECTIONS

- A. General: Concrete testing and inspection shall comply with Chapter 19 requirements for "Testing and Inspection," CBC, Current Edition.
- B. Portland cement:
 - 1. Secure from the cement manufacturer Certificates of Compliance delivered directly to the concrete producer for further delivery directly to the testing laboratory.
 - 2. Require the Certificates of Compliance to positively identify the cement as to production lot, bin or silo number, dating and routing of shipment, and compliance with specified standards.
 - 3. If so required by the Architect, promptly provide such other specific physical and chemical data as requested.
 - 4. One sample shall be taken for each 100 tons of cement except that when used in bulk loading ready-mix plants where separate bins for pre-tested cement are not available, grab samples shall be taken for each shipment of cement placed in the bin with not less than one sample being taken for each day's pour and such samples shall be subsequently tested if required by the Architect, Structural Engineer (or the Office of the State Architect.)
- C. Aggregate:
 - 1. Provide on test unless character of material changes, material is substituted, or additional test as requested by the Architect.
 - 2. Sample from conveyor belts or batching gates at the ready-mix plant:
 - a. Sieve analysis to determine compliance with specified standards and grading;
 - b. Specific gravity test for compliance with specified standards.
- D. Laboratory design mix:
 - 1. Laboratory design mix shall comply with Structural Engineers requirements as stated in Section 02550 and 03300 as found in these specifications.
 - 2. After acceptance of aggregate, and whenever character or source of materials is changed, provide mix design in accordance with ACI 613.
 - 3. Provide designs for all mixes prepared by a licensed Civil Engineer registered in the State of California.
- E. Molded concrete cylinders:
 - 1. Provide three test cylinders for each 50 cubic yards, or fraction thereof, of each class of concrete of each day's placement.
 - 2. Test one cylinder at seven days, one at 28 days, and one when so directed.
 - 3. Report the mix, slump, gage, location of concrete in the structure, and test results.
 - 4. Take specimens and make tests in accordance with the applicable ASTM standard specifications.
- F. Core tests:
 - 1. Provide only when specifically so directed by the Architect because of low cylinder test results.

2. Cut from locations directed by the Architect, securing in accordance with ASTM C42, and prepare and test in accordance with ASTM C39.
3. Cores shall be of a diameter determined by the Testing Laboratory but no less than 4" in diameter.

G. Placement inspections:

1. The Owner's Inspector shall inspect placement of concrete.
2. Throughout progress of concrete placement, make slump tests to verify conformance with specified slump.
3. Using all required personnel and equipment, throughout progress of concrete placement verify that finished concrete surfaces will have the level or slope that is required by the Contract Documents.
4. A project record shall be kept on the time and date of placing concrete in each portion of the structure. Such record shall be kept until the completion of the structure and shall be open to inspection by the Owner and his Representatives.

H. Batch plant inspections:

1. The quality and quantity of materials used in transit mixed concrete and in batched aggregate shall be continuously inspected at the location where materials are measured by a specifically approved inspector.

3.07 MORTAR AND GROUT TESTS

- A. General: Mortar and grouts tests shall comply with Chapter 21 requirements of the CBC, Current Edition, for "Tests and Inspections."
- B. At the beginning of all masonry work, at least one test sample of the mortar and grout shall be taken on three successive working days and at least one-week intervals thereafter. The samples shall be continuously stored in moist air until tested. They shall meet the minimum strength requirement given in Section 04100 of these Specifications.
- C. ~~Additional samples shall be taken whenever any change in materials or job conditions occur, or whenever in the judgment of the Architect, Structural Engineer (or the Division of the State Architect), such tests are necessary to determine the quality of the material.~~

3.08 CONCRETE REINFORCEMENT INSPECTION AND TESTING

- A. General: Concrete reinforcement inspection and testing shall comply with Chapter 19 requirements for "Inspections of Welded Reinforcement Bars," CBC 1998.
- B. Prior to use, test all reinforcement steel bars for compliance with the specified standards.
 1. Where samples are taken from bundles delivered from the mill, with the bundles identified as to heat number, and provided the mill analysis accompanies the report, then, one tensile test and one bend test shall be made on a specimen from each 10 tons or fraction thereof for each size of reinforcing steel.
 2. Tag identified steel at the supplier's shop. When steel arrives at the job site without such tags, test it as unidentified steel.
- C. Unidentified Steel:
 1. Have the testing laboratory select samples consisting of two pieces, each 18" long, of each size.
 2. Have the testing laboratory make one tensile test and one bend test for each 2-1/2 tons or fraction thereof of each size of unidentified steel.
 3. Costs of tests for unidentified steel will be paid by the Owner and deducted from the Contract sum.

D. Provide continuous inspection for all welding of reinforcement steel.

3.09 STRUCTURAL STEEL INSPECTING AND TESTING

A. Prior to use, test all structural steel for compliance with the specified standards.

1. Material identified by mill test reports, and certified by the testing laboratory, does not require additional testing. Require the supplier to furnish mill test reports to the laboratory for certification.
2. Tag identified steel at the supplier's shop. When steel arrives at the job site without such tags, test it as unidentified steel.

B. Unidentified Steel:

1. Have testing laboratory make one tensile test and one bend test for each five tons or fraction thereof of each shape and size of unidentified structural steel.
2. Costs of tests for unidentified steel will be paid by the Owner and deducted from the Contract sum.

C. Shop Welding:

1. Provide qualified testing laboratory inspector. The jurisdictional authority shall approve inspector.
2. On single pass welds, inspect after completion of welding prior to painting.
3. On multiple pass welds, and on butt welds with cover pass on the backside, provide continuous inspection.

D. Field Welding: Provide continuous inspection by a qualified testing laboratory inspector. The jurisdictional authority shall approve inspector.

3.010 ROOFING AND WATERPROOFING INSPECTING AND TESTING

A. Prior to start of membrane waterproofing and roofing installation, conduct a job site meeting attended by representatives of the installing subcontractors, the Contractor's field superintendent, the testing laboratory inspector, and the Architect, to agree upon procedures to be followed.

B. Prior to start of installation, verify that the materials at the job site comply with the specified standards, that the subcontractor is qualified to the extent specified, and that the installing personnel are fully informed as to procedures to be followed.

C. During installation, verify that materials are installed in strict accordance with the manufacturers' recommendations as accepted by the Architect.

D. When so directed by the Architect, make test cuts to verify conformance with the specified requirements.

3.011 SCHEDULES FOR TESTING

A. Establishing schedule:

1. By advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.
2. Provide all required time within the construction schedule.

B. Adherence to schedule: When the testing laboratory is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra charges for testing attributable to the delay may be back-charged to the Contractor and shall not be borne by the Owner.

3.012 INSPECTION BY THE OWNER

The Owner or his representative shall at all times have access to the shops wherein Work is being fabricated or assembled and inspection is required. The Contractor shall provide safe access for such inspection.

3.013 OWNER'S INSPECTOR

An inspector employed by the Owner in accordance with the requirements of California Building Code Amendments will be assigned to the Work. The work of construction in all stages of progress shall be subject to the personal continuous observation of the inspector. He shall have free access to any or all parts of the work at any time. The Contractor shall furnish the inspector reasonable facilities for obtaining such information as may be necessary to keep him fully informed respecting the progress and manner of the work and the character of the materials. Inspection of the work shall not relieve the Contractor from any obligation to fulfill this contract. The inspector and/or Owner shall have authority to stop the work whenever the provisions of the Contract Documents are not being complied with and the Contractor shall instruct his employees accordingly.

3.014 OWNER'S INSPECTOR -- FIELD OFFICE

The Contractor shall provide for the use of the Owner's Inspector a temporary office to be located as directed by the Inspector and to be maintained until the Owner authorizes removal. This office shall be of substantial waterproof construction with adequate natural light and ventilation by means of stock design windows. The door shall have a lock. The Contractor shall provide a table satisfactory for the study of plans and two chairs. The Contractor shall provide and pay for adequate electric lights, private local telephone service with a loud exterior bell, and adequate heat or air conditioning for this field office until completion of the Contract. Minimum area of field office shall be 144 square feet.

***** END OF SECTION *****

SECTION 01420

SOILS REPORT

Copies of Report are available upon request from the Owner.

***** END OF SECTION *****

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SECTION 01730
OPERATION AND MAINTENANCE ITEMS

PART 1 -- GENERAL

1.01 SUMMARY

- A. Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.
- B. Work Included: To aid the continued instruction of operating and maintenance personnel, and to provide a positive source of information regarding the products incorporated into the Work, furnish and deliver the data described in this Section and in pertinent other Sections of these Specifications.

1.02 QUALITY ASSURANCE

In preparing data required by this Section, use only personnel who are thoroughly trained and experienced in operation and maintenance of the described items, completely familiar with the requirements of this Section, and skilled in technical writing to the extent needed for communicating the essential data.

1.03 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.04 SUBMITTALS

- A. In accordance with Article 5 of the General Conditions, Project Manual Section 00700.
- B. Submit two copies of a preliminary draft of the proposed Manual or Manuals to the Architect for review and comments.
- C. Unless otherwise directed in other Sections, or in writing by the Architect, submit (3) three copies of the final Manual to the Architect prior to indoctrination of operation and maintenance personnel.

PART 2 -- PRODUCTS

2.01 OPERATION MANUALS

- A. Where instruction Manuals are required to be submitted under other Sections of these Specifications, prepare in accordance with the provisions of this Section.
- B. Reference Chart: See Section 01900 – List of Project Close-Out Items for summary of Sections that require submittal of Operation Manuals.
- C. Format:
 - 1. Size: 8-1/2" x 11"
 - 2. Paper: White bond, at least 20 lb. weight
 - 3. Text: Neatly written or printed
 - 4. Drawings: 11" in height preferable; bind in with text; fold-out acceptable; larger drawings acceptable but fold to fit within the Manual and provide a drawing pocket inside rear cover or bind in with text.
 - 5. Flysheets: Separate each portion of the Manual with neatly prepared flysheets briefly describing contents of the ensuing portion; flysheets may be in

color.

6. Binding: Use heavy-duty plastic or fiberboard covers with binding mechanism concealed inside the Manual; 3-ring binders will be acceptable; all binding is subject to the Architect's acceptance.
 7. Measurements: Provide all measurements in U.S. standard units such as feet-and-inches, lbs., and cfm.
- D. Provide front and back covers for each Manual, using durable material accepted by the Architect, and clearly identified on or through the cover with at least the following information:

OPERATING AND MAINTENANCE INSTRUCTIONS:

Name and Address of Work

Name of Contractor

General Subject of this Manual

Space for Signature of the Architect and Date

- E. Contents: Include at least the following:
1. Neatly typewritten index near the front of the Manual, giving immediate information as to location within the Manual of all emergency information regarding the installation.
 2. Complete instructions regarding operation and maintenance of all equipment involved including lubrication, disassembly, and reassembly.
 3. Complete nomenclature of all parts of all equipment.
 4. Complete nomenclature and part number of all replacement parts, name and address of nearest vendor, and all other data pertinent to procurement procedures.
 5. Copy of all guarantees and warranties issued.
 6. Manufacturer's bulletins, cuts, and descriptive data, where pertinent, clearly indicating the precise items included in this installation and deleting, or otherwise clearly indicating, all manufacturer's data with which this installation is not concerned.
 7. Such other data as required in pertinent Sections of these Specifications.

2.02 INSTRUCTION MANUALS

- A. Preliminary:
1. Prepare a preliminary draft of each proposed Manual.
 2. Show general arrangement, nature of contents in each portion, probable number of drawings and their size, and proposed method of binding and covering.
 3. Secure the Architect's acceptance prior to proceeding.
- B. Final: Complete the Manuals in strict accordance with the accepted preliminary drafts and the Architect's review comments.
- C. Revisions: Following the indoctrination and instruction of operation and maintenance personnel, review all proposed revisions of the Manual with the Architect.

***** END OF SECTION*****

SECTION 01900
LIST OF PROJECT CLOSE-OUT ITEM

PART 1 -- GENERAL

1.01 SUMMARY

- A. Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.
- B. The Lists in this Section are provided for the convenience of the General Contractor and shall not diminish the requirements of the specific Sections of the Project Manual.

1.02 QUALITY ASSURANCE

In preparing data required by this Section, use only personnel who are thoroughly trained and experienced in operation and maintenance of the described items, completely familiar with the requirements of this Section, and skilled in technical writing to the extent needed for communicating the essential data.

1.03 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.03 SUBMITTALS

- A. In accordance with Article 5 of the General Conditions, Project Manual Section 00700.
- B. Unless otherwise directed in other Sections, or in writing by the Architect, submit (3) three copies of the final Manual to the Architect prior to indoctrination of operation and maintenance personnel.

PART 2 -- ITEMS

2.01 REPORTS

Section:	Name:	Comments:
02666	Potable Water System	Per Item 3.03.D & 3.03.E
15400	Plumbing	Per Item 3.04.A
15600	HVAC	Per Item 1.04
16000	Electrical	Per Item 1.05
16721	Fire Alarm Systems	Per Item 3.3

2.02 AS-BUILT DRAWINGS (2 SETS)

Section:	Name:	Comments:
02940	Irrigation	
15400	Plumbing	
15600	HVAC	
16000	Electrical	

2.03 EXTRA MATERIALS

Section:	Name:	Comments:
02780	Interlocking Unit Paving	5% of each typ.
02782	Detectable Warning Surface	2% of each type.
09300	Tile	2% (1 box minimum)

Section:	Name:	Comments:
09350	Stone Flooring	10 pieces of each type of stone unit specified.
09510	ACT	3% (1 box minimum)
09645	Athletic Surfacing	1% of each type.
09650	Resilient Flooring	5% (1 box minimum)
09680	Carpet	5%
09710	Acoustical Wall Panels	5%
09720	Fabric Wall Panels	2% of each color and pattern.
09720	Wall Coverings	2% of each color and pattern.
09900	Painting	10% (1 gallon per color minimum)
10270	Access Flooring	Per Item 1.09
10800	Accessories	(2) Master Keys
15330	Fire Sprinkler	Per Item 1.10
16721	Fire Alarm	Per Item 1.11

2.04 MAINTENANCE & OPERATION MANUALS (2 BINDERS)

Section:	Name:	Comments:
02940	Irrigation	Per Item 1.012
04730	Manufactured Stone Veneer	Per Item 1.04 - B
07240	Exterior Insulation and Finish System (EIFS)	Per Item 1.010
09350	Stone Flooring	Per Item 1.05
09650	Resilient Flooring	Per Item 1.05
09660	Fluid-Applied Flooring	Per Item 3.05 - A
09670	Epoxy Resinous Flooring	Per Item 3.06
09720	Fabric Wall Panels	Per Item 1.04 - D
10270	Access Flooring	Per Item 1.07
12345	Metal Laboratory Casework	Per Item 1.06
13850	Security Equipment	Per Item 1.06 - D
15010	Mechanical	Per Item 1.10
15190	Mechanical ID	
15330	Fire Sprinkler	Per Item 1.9
15400	Plumbing	Per Item 3.02
15600	HVAC	Per Item 3.07
16000	Electrical	Per item 3.013

2.05 SUPPLEMENTAL WARRANTIES

Section	Name:	Items:	Time:	Comments:
02782	Detectable Warning Surface	All	5 years	
02792	Playground Surfacing		5 years	
02950	Landscape Material	15 gallon or less	90 days	
		24" or greater	1 year	
02980	Landscape	Maintenance	90 days	
04270	Glass Masonry Unit	Glass Unit	5 years	
06152	Timbertech	All	25 years	
06410	Custom Casework	All	2 years	
07175	Water Repellent Coatings	Material	5 years	
07210	Insulation	All	5 years	
07412	Metal Wall Panels	Material	20 years	
07540	Membrane Roofing	Complete System	30 years	
07500	Built-Up Roofing	All	10 years	
07510	Foam Roofing	All	10 years	

Section	Name:	Items:	Time:	Comments:
07550	Standing Seam Metal Roof	Labor & Materials	2 years	
		Finish	20 years	
07600	Flashing and Sheet Metal	All	2 years	
07900	Sealants & Caulking	All	5 years	
08360	Insulated Rolling Service Doors	All	2 years	
08370	Accordion Fire Doors	Testing & Inspection	5 years	
08400	Aluminum Entrance Systems	Labor & Materials	2 years	
08500	Aluminum Windows	Labor	2 years	
08710	Finish Hardware	Locksets	3 years	
		Heavy-Duty Locksets	7 years	
		Exit Devices	3 years	1-year for electrical
		Closers	10 years	2-years for electrical
		Hinges	Lifetime	
		Other	2 years	
08800	Glazing	All	2 years	
09624	Sport Flooring	Coverings	2 years	
09645	Indoor Resilient Athletic Surfacing	Materials & Labor	2 years	
		Installation	2 years	
		Wear	15 years	
09645	Multi-Purpose Sports Flooring	Materials	2 years	
		Installation	2 years	
		Wear	15 years	
09670	Epoxy Resinous Flooring	Materials	5 years	
09720	Wall Coverings	Materials	5 years	
09725	Vinyl Wallcoverings	Manufacturing defects	5 years	
09742	Thin Film Epoxy Coating	Materials & Labor	3 years	
10155	Solid Polymer Toilet Partitions	Materials & Labor	15 years	
10650	Accordion Partitions	All	2 years	
		Track Equipment	10 years	
10650	Operable Partitions	Materials & Labor	2 years	
11400	Food Services Equipment	Compressor	5 years	
11452	Food Service Equipment	Compressor	5 years	
13130	Fabric Shade Structures	Materials	10 years	
13500	Metal Building System	Materials & Roof System	20 years	
13700	CCTV	Equipment	3 years	
15400	Plumbing	Water Hammer Arrestors	Lifetime	
15600	HVAC Equipment	Equipment Motors	5 years	
16000	Electrical	System	2 years	

END OF SECTION

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SECTION 02660
SEWER AND WATER MAIN CONSTRUCTION

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 DESCRIPTION

- A. Construct Sewer and Water Mains and appurtenances as shown on the plans to the satisfaction of the Governing Agency.
- B. Contractor shall obtain the needed permits from Special District and shall coordinate all required inspections with Special District and as required by the Owner's Inspector.

1.03 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.04 SUBMITTALS

- A. In accordance with Article 5 of the General Conditions, Project Manual Section 00700.
- B. Submittal: List of material proposed, accompanied by manufacturers latest printed literature with technical data.
- C. Certificates: Manufacturers certification that materials meet specified requirements.
- D. Certification: Certificate of compliance from testing firm that on-site potable water system is disinfected in accordance with AWWA Standard C601.

1.05 RECORD DRAWINGS

Comply with pertinent provisions of Article 5 of the General Conditions.

1.06 SEQUENCING OF CONSTRUCTION

- A. Protect existing service facilities and other existing utilities in place.
- B. Install site systems as soon as conditions permit other facilities and improvements to follow.
- C. Install tops of manholes, junction chambers, vaults, boxes, valve boxes, etc., unless otherwise specifically indicated on the drawings, to an elevation 3" below rough grade and raise to final elevation after paving.

PART 2 -- PRODUCTS

2.01 MATERIALS

All materials and equipment shall be as specified on the plans or as required by the AWWA specifications and standards.

- A. Water lines:
 - 1. Piping 2" or smaller than in diameter to be PVC Schedule 40.
 - 2. Piping larger than 2" in diameter to be PVC Class 150.
 - 3. 14-gauge copper tracer wire to be installed above all mains.

- B. Sewer lines: shall be Schedule 40 ABS pipe per ASTM-F628-91 with solvent weld fittings per ASTM D2661.
- C. Fire Hydrants: Type as specified by the Governing Agency

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Correct conditions detrimental to timely and proper completion of the Work.
- C. Do not proceed until unsatisfactory conditions are corrected.
- D. Beginning of installation means acceptance of conditions.

3.02 SEWER AND WATER MAIN CONSTRUCTION

The Contractor shall supply all materials, labor, tools and equipment to complete the work to the satisfaction of the Governing Agency.

3.03 FINAL VALVE AND MANHOLE ADJUSTMENT

The Contractor shall adjust the water valves and manholes to grade after Concrete flatwork and final grading has been installed / completed.

*****END OF SECTION*****

SECTION 02666

WATER SYSTEM

PART I -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 DESCRIPTION

Work in This Section: Work includes, but is not limited to:

1. Contractor shall furnish and install all piping, valves, fillings, etc. as shown on the plans, as specified herein, and as required to make the on-site water system completely operational.
2. Water system - From the Utility Company main or point of connection to within 5 feet of the Building or other Building point of connection as indicated on the drawing.
3. Related Work: Documents affecting work of this Section include, but are not necessarily limited to, Special Conditions, and Sections in Division 1 of these Specifications

1.03 QUALITY ASSURANCE

- A. Perform all work in accordance with applicable provisions of "Uniform Plumbing Code", current Edition, International Association of Plumbing and Mechanical Officials, Los Angeles, California (UPC).
- B. Underground Conduit Construction shall be in accordance with Section 306 of "Standard Specifications for Public Works Construction", current Edition, published by Building News, Inc., Los Angeles, California (PWC Specifications).
- C. Disinfection of on-site water system shall be in accordance with American Water Works Associates (AWWA) Standard C601.
- D. Installation of water service line, meter and backflow preventer shall be in accordance with Local Governing Agency requirements.

1.04 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.05 SUBMITTALS

- A. In accordance with Article 5 of the General Conditions, Project Manual Section 00700.
- B. Submittal: List of material proposed, accompanied by manufacturers latest printed literature with technical data.
- C. Certificates: Manufacturers certification that materials meet specified requirements.
- D. Certification: Certificate of compliance from testing firm that on-site potable water system is disinfected in accordance with AWWA Standard C601.

1.06 RECORD DRAWINGS

Comply with pertinent provisions of Article 5 of the General Conditions.

1.07 SEQUENCING OF CONSTRUCTION

- A. Protect existing water service facilities and other existing utilities in place.

- B. Install site water system as soon as conditions permit other facilities and improvements to follow.
- C. Note that work includes the abandonment of existing water system serving the current building, which will remain in service. Sequence construction such that new water service is installed and operational prior to demolishing existing service. Connect existing building to new service, providing a temporary connection where required. Coordinate with and provide assistance to local Utility as required to abandon existing service.
- D. Install tops of manholes, junction chambers, vaults, boxes, valve boxes, etc., unless otherwise specifically indicated on the drawings, to an elevation 3" below rough grade and raise to final elevation after paving.

1.08 PROJECT CONDITIONS

- A. Site Information: Perform site survey, research public utility records, and verify existing utility location. Verify that water system piping may be installed in accordance with original designs and proposed standards.
 - 1. Locate existing water mains and verify any new work to be performed in conjunction therewith. If any pre-existing damage to any portion of the existing water system is discovered, report it in writing to the Owners Representative prior to start of any work connected with or in the area of the damaged portion. Repair or replace any damaged existing water system or portion thereof, which is not reported as described herein, at no additional cost to Owner.
 - 2. Where new water mains connect to existing system, excavate carefully expose and verify horizontal and vertical locations of all points of connection; notify Architect of any discrepancies. Perform all such required exploratory work far enough in advance of storm water main construction to allow for Architect to redesign any systems as required to meet existing condition. No time delays will be allowed due to failure of Contractor to perform this work early enough in his construction period. Any water system that must be reconstructed due to failure of Contractor to verify grades must be completed at no additional cost to the Owner.
- B. Verify and coordinate installation locations to assure clearance from all other utilities and from footings and foundations. Pay particular attention to structural details pertaining to piping installations with respect to foundations. Where utilities fall within the zone of influence of footings or foundations as shown on these details, deepen footings, relocate piping, or, if approved by the Soils Engineer, modify trench backfill connections, materials or methods, all at no additional cost.

PART 2 -- PRODUCTS

2.01 WATER SYSTEMS

- A. Pipe: Poly Vinyl Chloride (PVC)
 - 1. 4" and larger - Polyvinyl Chloride (PVC 1120) pressure pipe shall conform to AVMA C-900, DR 18, with elastomeric type gaskets per ASTM F477 in bell-and-spigot joints. Pipe shall be UL listed.
 - 2. 2" and smaller - PVC shall conform to ASTM D1785, schedule 40. Joints shall conform to ASTM D2564.
- B. Gate Valves (less than 4 inches):
 - 1. Iron body, bronze mounted, parallel seat, double disc, non-rising stem, bottom or side wedging, and comply with AWWVA C-500 specifications.

2. Suitable for a working pressure of 150 psi. The working pressure and the name of the manufacturer cast in plain letters on the body of the valve.
 3. Open by turning counterclockwise.
 4. Entire wedging mechanism of solid bronze, designed to allow the gates to function properly when water pressure is exerted from either or both directions.
 5. Valve stems shall be solid bronze.
 6. Stem nuts shall be solid bronze.
 7. All cast or rolled bronze used in the manufacture of gate valves, which will be in contact with water, shall contain a maximum zinc content of 5 percent and a maximum aluminum content of 2 percent.
- C. Gate Valves (4 inches and larger):
1. Valves shall be line size, 150 psi working pressure, UL listed, non-rising stem, resilient seat gate valves per AWWA C-509 and shall be opened counter clockwise.
 2. Valves shall have the manufacturers name, catalog number and marking pressure molded or stamped in places where the name and number may be easily seen when the valves are installed. Valves shall be painted as specified in Section 27, AWWA Specifications C-500. Valves shall be furnished complete with accessories. Valve joints shall be in accordance with all applicable requirements specified for joints and shall be for buried service.
- D. Check valves: Swing type spring loaded for 150 psi working pressure, set readily and tightly with the face of the closure elements made of a corrosion resistant material such as bronze composition conforming to ASTM B-62.
- E. Backflow Devices: Per Local Governing Agency Standard Specifications.
- F. Meters: Meter shall be furnished by Local Governing Agency and installed by Contractor. Contractor shall schedule and coordinate this work with the Local Governing Agency.
- G. Air / Vacuum Valves and Blowoffs shall be per Local Governing Agency Standards.
- H. Valve Boxes: Unless otherwise specified, the following options may be provided. All valve box covers shall have "WATER" cast in the top using sharp faced letters of 1" minimum height:
1. Cast iron, slip adjustment type of appropriate size for valve. Alhambra No. A-3009 or approved equal.
 2. Pre-cast concrete with cast iron cover. For valves larger than 2", Brooks 3-RT series or approved equal. For valves 2" and smaller, Brooks 1-R series (1-RT in traffic areas) or approved equal.
- I. Marker Tape: Manufacturers standard permanent bright blue continuous-printed detectable plastic tape intended for direct burial; not less than 6" wide x 4-mil thickness. Black print shall read, "CAUTION - WATER LINE BURIED BELOW".
- J. Thrust Blocks: per Local Governing Agency Standards.

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Correct conditions detrimental to timely and proper completion of the Work.

- C. Do not proceed until unsatisfactory conditions are corrected.
- D. Beginning of installation means acceptance of conditions.

3.02 FIELD CONDITION

- A. Verify drawing dimensions with actual field conditions. Inspect related work and adjacent surfaces. Correct improper conditions.
- B. Coordinate all work of this section with related trades.
- C. All water used on this project must be delivered through a Water District furnished construction meter or approved alternative. The Contractor shall be responsible for the cost of all construction water: including that used for loading of new lines, testing, flushing, and disinfecting.
- D. Verify and coordinate installation locations to assure clearance from all other utilities and from footings and foundations. Pay particular attention to structural details pertaining to piping installations with respect to foundations. Where utilities fall within the zone of influence of footings or foundations as shown on these details, deepen footings, relocate piping, or, if approved by the Soils Engineer, modify trench/backfill conditions, materials or methods, all at no additional cost.

3.03 TRENCH EXCAVATION, BEDDING, AND BACKFILL

- A. Perform all trench excavation and all additional excavation required for vaults or other structures forming a part of the pipeline. Trench excavation and backfill shall conform to the requirements of Section 02200 of these specifications and Section 306-1.2 of the PWC Specifications and shall require the approval of the Soils Engineer.
- B. For 4" diameter pipe and larger, bedding material shall normally extend from 3" below the pipe invert to a point 1 foot above the top of pipe. Bedding material shall be a mixture of sand, gravel, crushed aggregate or approved native material. Bedding material shall have a sand equivalent of 30 or more, and have a coefficient of permeability greater than 0.001 centimeters per second. Bedding material shall be sized within the following range:

Sieve Size:	Percent Passing:
3/4"	100
No. 4	35 - 65
No. 200	0-10

- C. For piping less than 4" in diameter, bedding shall be a granular material free from rocks as approved by the Soils Engineer.
- D. Bedding shall be compacted to 90 percent of the Maximum Relative Density, unless otherwise specified.
- E. In backfilling the trench, take all necessary precautions to protect the pipe from damage due to shifting.
- F. Bury marker tape 6" to 12" below finished grade, directly above pipe.

3.04 PIPE LAYING, JOINTING AND TESTING

- A. Survey line and grade: Provide grade controls and survey lines in accordance, with Section C) 1050.
- B. Pipe installation: the Inspector will inspect Pipe in the field before and after laying. Any corrective work shall be done by the Contractor and approved by the Inspector at no cost to the Owner. Installation of pipe shall conform to the requirements of Section 306.1.2 of the PWC Specifications.

- C. Install concrete thrust blocks against undisturbed soil at all 4" diameter or larger bends, tees, crosses, valves, pipe ends and where changes in pipe diameters occur at reducers or in fittings. Thrust blocks shall be Class 420-C-2500 Portland Cement.
- D. Testing of pipelines: Perform all tests required by governing agencies. Testing shall be performed in accordance with Section 306-1.4 of PWC Specifications. Furnish all water, materials, and labor for making the required tests. All tests shall be made in the presence of the Inspector. Notify the Inspector at least 48 hours before performance of the required tests.
- E. Disinfection: before acceptance of the onsite potable water system, an approved testing firm hired by the Contractor as prescribed in AWWA Standard C601 shall disinfect each unit of completed water line. The disinfection and testing procedures shall continue at the contractors expense until tests indicate that satisfactory bacteriological results have been obtained. The testing firm shall provide a certificate of compliance to the Owner that the unit tested met the AWWA requirements.

3.05 LOCAL GOVERNMENTAL AGENCY

- A. Contractor shall purchase and maintain on the project site copies of the Governing Agencies' Standard Specifications and Standard Drawings for Water and Sanitary Sewer Facilities, Current Edition. Agency standards shall take precedence over these Specifications.
- B. Prior to final acceptance of the work obtain approval of all connections to the public main and all backflow assembly installations from the Local Governing Water District and submit copies of the Certificates of Completion to the Inspector for forwarding to the Owner.

3.06 DEFECTIVE WORK

Repair or replace defective work as at no additional cost to the Owner.

3.07 CLEAN-UP

Upon completion of work, leave the site clean and clear of debris and construction materials.

***** END OF SECTION *****

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SECTION 02668
FIRE WATER SYSTEMS

PART I -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 DESCRIPTION

Work in This Section: Work includes, but is not limited to:

1. Fire water system with all appurtenances, complete, tested, and ready for service. Contractor shall make "Hot Tap" in accordance with the requirements of "Local Governing Agency" for domestic water systems.
2. Contractor shall furnish and install all piping, valves, fittings, etc. as shown on the plans, as specified herein, and as required to make the on-site fire water system completely operational.
3. Related Work: Documents affecting work of this Section include, but are not necessarily limited to, Special Conditions, and Sections in Division 1 of these Specifications.

1.03 QUALITY ASSURANCE

- A. Perform all work in accordance with applicable provisions of "Uniform Plumbing Code", current Edition, International Association of Plumbing and Mechanical Officials, Los Angeles, California (UPC), and "standard for the Installation of Private Fire Service Mains and their appurtenances", NFPA 24.
- B. Underground Conduit Construction shall be in accordance with Section 306 of "Standard Specifications for Public Works Construction", current Edition, published by Building News, Inc., Los Angeles, California (PWC Specifications).
- C. Disinfection of on-site water system shall be in accordance with American Water Works Associates (AWWA) Standard C601.

1.04 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.05 SUBMITTALS

- A. In accordance with Article 5 of the General Conditions, Project Manual Section 00700.
- A. Submittal: List of proposed materials, accompanied by manufacturers latest printed literature with technical data.
- B. Certificates: Manufacturers certification that materials meet specified requirements.

1.06 SEQUENCING OF CONSTRUCTION

- A. Protect existing water service facilities and other existing utilities in place.
- B. Install fire water system as soon as conditions permit other facilities and improvements to follow.
- C. Comply with City Fire Marshall's requirements prior to bringing combustible materials onto construction site.

- D. Install tops of manholes, junction chambers, vaults, boxes, valve boxes, etc., unless otherwise specifically indicated on the drawings, to an elevation 3" below rough grade and raise to final elevation after paving.

1.07 PROJECT CONDITIONS

- A. Site Information: Perform site survey, research public utility records, and verify existing utility location. Verify that water system piping may be installed in accordance with original designs and proposed standards.
 - 1. Locate water system piping and verify new work to be performed in conjunction therewith. If any pre-existing damage to any portion of the existing water system is discovered, report it in writing to the Owner's Representative prior to start of any work connected with or in the area of the damaged portion. Repair or replace any damaged existing water system or portion thereof, which is not reported as described herein, at no additional cost to Owner.
 - 2. Where new water mains connect to existing system, excavate, carefully expose and verify horizontal and vertical locations of all points of connection. Notify Architect of any discrepancies. Perform all such required exploratory work far enough in advance of water system construction to allow for Architect to redesign piping required to meet existing conditions. No time delays will be allowed due to failure of Contractor to perform this work early enough in his construction period. Any water system, which must be reconstructed due to failure of Contractor to verify grades, must be completed at no additional cost to Owner.
 - 3. Verify conditions required for connection to exist Rancho California Water District main. If night shutdown of existing main or other special arrangements is required, perform the work at no additional cost to owner.
- B. Verify and coordinate installation locations to assure clearance from all other utilities and from footings and foundations. Pay particular attention to structural details pertaining to piping installations with respect to foundations. Where utilities fall within the zone of influence of footings or foundations as shown on these details, deepen footings, relocate piping, or, if approved by the Soils Engineer, modify trench/backfill conditions, materials, or methods, all at no additional cost.

PART 2 -- PRODUCTS

2.01 WATER SYSTEMS

- A. Pipe:
 - 1. Polyvinyl Chloride (PVC 1120) pressure pipe shall conform to AWWA C-900; Class 150 (DR 18) with elastomeric-type sealing rings in bell-and-spigot joints. Pipe shall be UL and NSF-61 listed.
 - 2. Ductile Iron pipe, AWWA C-151, with cement mortar lining complying with AVANA C-104, Class 51, unless otherwise indicated.
 - 3. Concrete cylinder pipe, AWWA C-301.
 - 4. Steel pipe, AWWA C-200, with cement mortar lining and coating, AWWA C-205, Type V.
- B. Fittings:
 - 1. PVC and Ductile Iron Pipe Fittings: AWWA C-1 10 or C-153, cement lined with rubber gaskets per AWWA C-111.
 - 2. Reinforced Concrete Pipe Fittings: As manufactured for concrete cylinder pipe.

3. Steel Water Pipe Fittings: AVMA C-208; welded joints per AVMA C-206.
- C. Valves:
1. Line-size gate valves, UL-listed, 175 psi working pressure, resilient wedge gate valve with non-rising stem, unless otherwise specified, with inside screw and shall open to the left or counter clockwise. Valves shall be equipped with double O-ring stem seals with both rings located above the collars or with Johns-Manville "Duro" packing, Style No. S-171, or approved equal, cut to fit in separate rings with staggered joints. Valves shall have the manufacturers name, catalog number and marking pressure molded or stamped thereon in places where the name and number may be easily seen when the valves are installed. Valves shall be painted as specified in Section 27, AWWA Specifications C-500. Valves shall be furnished complete with accessories. Valve joints shall be in accordance with all applicable requirements specified for joints and shall be for buried service.
 2. Valve boxes: Unless otherwise specified, the following options may be provided. All valve box covers shall have "WATER" cast in the top using sharp faced letters of 1" minimum height:
 - a. Cast iron, slip adjustment type of appropriate size for valve. Alhambra or approved equal.
 - b. Pre-cast concrete with cast iron cover. Brooks 3-RT series or approved equal.
- D. Fire Hydrants: James Jones Model J-3765 with (1) 4" and (2) 2-1/2" outlets per Water District requirements.
- E. Air release valves: Per Water District requirements.
- F. Double Check Detector Check Assembly: Per Water District requirements.
- G. Accessories: Provide anchorages for tees, crosses, plugs, and caps, bend valves and hydrants. After installation, apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of ferrous anchorages. Clamps, straps and washers, steel, ASTM A-506; steel rods per ASTM A-575. Rod couplings shall be malleable iron: ASTM A-1 97. Steel bolts per ASTM A-30-1.
- H. Thrust blocks: Per Water District requirements.
- I. Marker Tape: Manufacturers standard permanent bright blue continuous-printed plastic tape intended for direct burial; not less than 6" wide x 4-mil thickness. Black print shall read, "CAUTION - WATER LINE BURIED BELOW".

PART 3-- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Correct conditions detrimental to timely and proper completion of the Work.
- C. Do not proceed until unsatisfactory conditions are corrected.
- D. Beginning of installation means acceptance of conditions.

3.02 FIELD CONDITIONS

- A. Verify drawing dimensions with actual field conditions. Inspect related work and adjacent surfaces. Correct improper conditions.
- B. Coordinate all work of this section with related trades.

- C. All water used on this project must be delivered through a Water District construction meter obtained and paid for by the Contractor, who will be responsible for the cost of all construction water, including that used for loading of new lines, testing, flushing and disinfecting.

3.03 TRENCH EXCAVATION, BEDDING, AND BACKFILL

- A. Perform all trench excavation and all additional excavation required for vaults or other structures forming a part of the pipeline. Trench excavation and backfill shall conform to the requirements of Section 02220 of these specifications and Section 306-1.2 of the PWC Specifications and shall require the approval of the Soils Engineer.
- B. Bedding material shall normally extend from 3" below the pipe invert to a point 1 foot above the top of pipe. Bedding material shall be a mixture of sand, gravel, crushed aggregate or approved native material. Bedding material shall have a sand equivalent of not less than 30 or have a coefficient of permeability greater than 0.001 centimeters per second. Bedding material shall be sized within the following range:

Sieve Size:	Percent Passing:
3/4"	100
No. 4	35 - 65
No. 200	0-10

- C. Bedding shall be compacted to 90 percent of the Maximum Relative Density.
- D. In backfilling the trench, take all necessary precautions to protect the pipe from damage due to shifting.
- E. Bury marker tape directly above pipe, 6" to 12" below finished surface of trench backfill.

3.04 CONNECTIONS TO EXISTING MAINS

Connection to existing public main will be per Water District Standard. Contractor shall coordinate this work with the Water District and shall install the service lateral and double check detector check per the water district standards and as shown on contract drawings. All work in public right-of-way shall be in accordance with City Standards. Obtain and pay for encroachment permits from City for all work in City right-of-way.

3.05 PIPE LAYING, JOINTING AND TESTING

- A. Survey line and grade: Provide grade controls and survey lines in accordance with Section 01055.
- B. Pipe installation: the Inspector will inspect Pipe in the field before and after laying. Any corrective work shall be approved by the Inspector at no cost to the Owner. Installation of pipe shall conform to the requirements of Section 306.1.2 of the PWC Specifications.
- C. Install concrete thrust blocks against undisturbed soil, or other restraining devices is detailed, at bends, tees, crosses, valves, pipe ends and where changes in pipe diameters occur at reducers or in fittings.
- D. Flush system in accordance with NFPA 24.
- E. Testing of pipelines: Perform all test required by governing agencies. Testing shall be performed in accordance with Section 306-1.4 of PWC Specifications. Furnish all water, materials, and labor for making the required tests. All tests shall be made in the presence of the Inspector. Notify the Inspector at least 48 hours before performance of the required tests.
- F. Disinfection: Before acceptance of the onsite fire water system, each unit of completed voter line shall be disinfected by an approved testing firm hired by the Contractor as

prescribed in AWWA Standard C601. The disinfection and testing procedures shall continue at the contractors expense until tests indicate that satisfactory bacteriological results have been obtained. The testing firm shall provide a certificate of compliance to the Architect that the unit tested met the AWWA requirements.

3.06 DEFECTIVE WORK

Repair or replace defective work no additional cost to the Owner.

3.07 ACCEPTANCE BY LOCAL GOVERNING AGENCY

Prior to final acceptance of the work obtain approval of the double check detector check installation from the governing Water District and submit copies of the Certificates of Completion to the Inspector for forwarding to the Owner.

3.08 CLEAN-UP

Upon completion of work, leave the site clean and dear of debris and construction materials.

***** END OF SECTION *****

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SECTION 02730
SANITARY SEWERS

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 DESCRIPTION

- A. Work in This Section: Contractor shall furnish and install all piping, manholes, cleanouts, etc. as shown on the plans, as specified herein, and as required to make the on-site sanitary sewer system completely operational. Work includes, but is not limited to:
1. Sanitary Sewer System to points of connection 5 feet outside of buildings, unless otherwise shown on the plans.
 2. Connection to existing systems.
 3. Manholes and Cleanouts
 4. Related Work: Documents affecting work of this Section include, but are not necessarily limited to, Special Conditions, and Sections in Division 1 of these Specifications
- B. Related Work Not In This Section:
1. Section 01055: Field Engineering
 2. Section 02220: Excavating, Backfilling and Compacting
 3. Section 02752: Asphalt Concrete Paving
 4. All other site utilities, such as Drainage, Water, Gas, Electric, Irrigation, etc.

1.03 QUALITY ASSURANCE

- A. Perform all work in accordance with applicable provisions of "Uniform Plumbing Code", current Edition, International Association of Plumbing and Mechanical Officials, Los Angeles, California. (UPC), and current standards of the local Water District.
- B. Underground Conduit Construction shall be in accordance with Section 306 of "Standard Specifications for Public Works Construction", current Edition, published by Building News, Inc., Los Angeles, California (PWC Specifications).

1.04 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.05 SUBMITTALS

- A. In accordance with Article 5 of the General Conditions, Project Manual Section 00700.
- A. Material List: Submit a list of material proposed for use for approval.
- B. Provide written certification that the entire system is clean and free of obstructions.
- C. Record Drawings: Submit record drawings of installed sanitary sewer system in accordance with Section 01720.

PART 2 -- PRODUCTS

2.01 PIPE MATERIALS: Unless a specific pipe option is indicated on the plans, the following options may be used:

- A. Extra strength vitrified clay pipe: Conform to ASTM C700. Compression joints shall conform to ASTM C425.
- B. ABS plastic solid wall pipe: Per ASTM D2751 and PWC Specifications, Section 207-15 as modified therein. Joint solvent cement shall be an ABS cement conforming to ASTM D2235. Gaskets shall conform to PWC Specifications, Section 208-4.
- C. Polyvinyl Chloride (PVC) Plastic Sewer Pipe: Conform to ASTM D3034, SDR 35. PVC sewer pipe shall have gasketed joints conforming to the requirements of PWC Specifications, Section 208-4.

2.02 CONCRETE MANHOLES

- A. Concrete manholes, unless otherwise specified, shall conform to the specifications referenced on the plans.
- B. Manhole covers shall be marked "SEWER".

2.03 CLEANOUTS

Cleanouts to grade shall be constructed of the same material and same size as associated line; terminate at surface in a concrete or cast iron body with tight-fitting cast iron or brass top. In paved area, top to be traffic-rated; in walks, lawns or planters surface to be smooth, non-tripping. "SEWER" shall be cast into cover in sharp 1" high letters.

2.04 MARKER TAPE

Manufacturers standard permanent bright green, continuous-printed plastic tape intended for direct burial; not less than 6" wide x 4-mil thickness. Black print shall read "CAUTION-SEWER LINE BURIED BELOW".

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed
- B. Correct conditions detrimental to timely and proper completion of the Work.
- C. Do not proceed until unsatisfactory conditions are corrected.
- D. Beginning of installation means acceptance of conditions.

3.02 FIELD CONDITIONS

- A. Verify drawing dimensions and elevations with actual field conditions. Inspect related work and adjacent surfaces. Correct all improper conditions.
- B. Coordinate all work of this section with related trades. Immediately notify Architect should conflicts with other utilities be encountered.
- C. Perform all work within the Road right-of-way in accordance with traffic and detour plan approved by the City. Provide all required traffic control devices and personnel. Perform night work if required at no additional cost to Owner.
- D. Verify elevation(s) of point of connection to existing main prior to construction. Where new sanitary sewers connect to existing sewers, excavate carefully, expose and verify horizontal and vertical location of all points of connections. Notify Architect of any discrepancies. Perform all such required exploratory work far enough in advance of sewer construction to allow Architect to redesign sewers as required to meet out-fall conditions. No time delays will be allowed due to failure of Contractor to perform this

work early enough in the construction period. Any sanitary sewer, which must be reconstructed due to failure of Contractor to verify grades, must be completed at no additional cost to Owner.

- E. Verify and coordinate installation locations to assure clearance from all other utilities and from footings and foundations. Pay particular attention to structural details pertaining to piping installations with respect to foundations. Where utilities fall within the zone of influence of footings or foundations as shown on these details, deepen footings, relocate piping, or, if approved by the Soils Engineer, modify trench/backfill conditions, materials or methods, all at no additional cost to the Owner.

3.03 TRENCH EXCAVATION, BEDDING, AND BACKFILL

- A. Perform all excavation for the construction of trenches and all additional excavation required for manholes or other structures forming a part of the pipeline. Trench excavation and backfill shall conform to the requirements of Section 02220 of these specifications and Section 306-1.2 of the PWC Specifications and shall require the approval of the Soils Engineer.
- B. Bedding material shall normally extend from 3" below the pipe invert to a point 1 foot above the top of the pipe. Bedding material shall be a mixture of sand, gravel, crushed aggregate or approved native material. Bedding material shall have a sand equivalent of not less than 30 or have a coefficient of permeability greater than 0.001 centimeters per second. Bedding material shall be sized within the following range:

Sieve Size:	Percent Passing:
3/4"	100
No. 4	35 - 65
No. 200	0-10

- C. Bedding shall be compacted to 90 percent of the Maximum Relative Density.
- D. In backfilling the trench, take all necessary precautions to protect the pipe from damage due to shifting.

3.04 PIPE LAYING, JOINTING AND TESTING

- A. Survey, line and grade: Provide grade controls and survey lines in accordance with Section 01055.
- B. Pipe installation: the Inspector will inspect Pipe in the field before and after laying. Any corrective work shall be done by the Contractor and approved by the Inspector at no cost to the District. Installation of pipe shall conform to the requirements of Sections 306-1.2 of the PWC Specifications.
- C. Unless otherwise specified, match soffits at all sewer connections, laterals, manholes, etc.
- D. Bury marker tape 6" to 12" below finished grade, directly above pipe.
- E. Testing of pipelines: Perform all tests required by governing agencies. Testing shall be performed in accordance with Section 306-1.4 of PWC Specifications. Furnish all water, materials and labor for making the required tests. All tests shall be made in the presence of the Inspector. Notify the Inspector at least 48 hours before performing the required tests.

3.05 CONNECTIONS TO EXISTING MAINS

Connect on site sewer system to existing system. Comply with all requirements of governing Water District and the City for work within the public right-of-way.

3.06 CLEAN-UP

- A. Upon completion of work, all sanitary sewer systems shall be left free from silt, debris, and obstructions.
- B. Clear dirt and other superfluous material from interior of pipe as work progresses. Maintain swab or drag in line and pull past each joint as it is completed.
- C. Place plugs in ends of uncompleted conduit at end of day or whenever work stops.
- D. Flushing of lines: Prior to acceptance of work, flush each line to ensure that the entire system is clean and free of all obstructions.

***** END OF SECTION *****

SECTION 03100
CONCRETE FORMWORK

PART 1 -- GENERAL

1.01 DESCRIPTION

- A. Work included: Provide formwork in accordance with provisions of this Section for cast-in-place concrete shown on the Drawings or required by other Sections of these Specifications.
- B. Related work:
 - 1. Section 02220: Excavating, Backfilling, and Compacting
 - 2. Section 03200: Concrete Reinforcement
 - 3. Section 03300: Cast-in-Place Concrete

1.02 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Design of formwork is the Contractor's responsibility.
- C. Standards: In addition to complying with pertinent regulations of governmental agencies having jurisdiction, comply with pertinent provisions of ACI 347.

1.03 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.04 SUBMITTALS

- A. In accordance with Article 5 of the General Conditions, Project Manual Section 00700.
- B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit manufacturers' data and installation instructions for propriety materials including form coatings, ties, and accessories and manufactured systems if used.

PART 2 -- PRODUCTS

2.01 FORM MATERIALS

- A. Except for metal forms, use new materials, Materials may be re-used during progress of the Work, provided they are completely cleaned and reconditioned, re-coated for each use, and capable of producing formwork of the required quality.
- B. For footings and foundations, use Douglas Fir boards or planks secured to wood or steel stakes, substantially constructed to shapes indicated and to support the required loads.
- C. For studs, walls, and supports, use Standard graded or better Douglas Fir, dimensions as required to support the loads but not less than 2" x 4".
- D. Wall forms:
 - 1. Exposed concrete surfaces:

- a) Use 3/4" minimum thickness Douglas Fir plywood, grade B/B, Class I or II, exterior, sanded both sides, complying with PS-1.
 - b) Seal edges and coat both faces with colorless coating which will not affect application of applied finishes.
2. Unexposed concrete surfaces:
- a) Use 1" x 6" shiplap Douglas Fir boards, surfaced one side and two edges, or 3/4" minimum thickness Douglas Fir plywood, grade B/B plyform, Class I or II, sanded both sides, mill-oiled.

2.02 FORM TIES

Hold inner and outer forms for vertical concrete together with combination steel ties and spreaders accepted by the Architect.

1. Space ties symmetrically in tiers and rows, each tier plumb from top to bottom and each row level.
2. At horizontal pour lines, locate ties not more than 6" below the pour lines. Tighten after concrete has set and before the next pour is made.
3. For exposed concrete surfaces, provide form ties of removable type with she-bolts equipped with permanent plugs and a system accepted by the Architect for fixing the plugs in place.

2.03 DESIGN OF FORMWORK

General:

1. Design, erect, support, brace, and maintain formwork so it will safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure.
2. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose.
3. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position.
4. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities, and within the allowable tolerance.
5. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints, and provide backup material at joints as required to prevent leakage and prevent fins.

2.04 EARTH FORMS

- A. Foundation concrete may be placed directly into neat excavations provided the foundation trench walls are stable as determined by the Architect and Structural Engineer (subject to the approval of the Office of the State Architect). In such case the minimum formwork shown on the drawings is mandatory to insure clean excavations immediately prior to and during the placing of concrete.
- B. Provide additional concrete 1" on each side of the minimum design profiles and dimensions shown on the Drawings.

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.

- B. Correct conditions detrimental to timely and proper completion of the Work.
- C. Do not proceed until unsatisfactory conditions are corrected.
- D. Beginning of installation means acceptance of conditions.

3.02 FORM CONSTRUCTION

A General:

1. Construct forms complying with ACI 347 to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, and level and plumb work in the finished structure.
2. Provide for openings, offsets, keyways, recesses, moldings, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features as required.

B Fabrication:

1. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
2. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
3. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.
4. Provide top forms for inclined surfaces where so directed by the Architect.

C Forms for exposed concrete:

1. Drill forms to suit ties being used, and to prevent leakage of cement paste around tie holes. Do not splinter forms by driving ties through improperly prepared holes.
2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back the joints with extra studs or girts to maintain true, square intersections.
3. Use extra studs, walls, and bracing to prevent objectionable bowing of forms between studs, and to avoid bowed appearance in concrete. Do not use narrow strips of form material which will produce bow.

D Corner treatment:

1. Unless shown otherwise, form chamfers with 3/4" x 3/4" strips, accurately formed and surfaced to produce uniformly straight lines and tight edges.
2. Extend terminal edges to required limit, and miter the chamfer strips at changes in direction.

E Locate control joints as indicated on the Drawings and where required but not shown on the Drawings, as accepted by the Architect.

F Provisions for other trades:

1. Provide openings in concrete formwork to accommodate work of other trades.
2. Verify size and location of openings, recesses, and chases with the trade requiring such items.
3. Accurately place and securely support items to be built into the concrete.

3.03 FORM COATINGS

Coat form contact surfaces with form coating compound before reinforcement is placed.

1. Do not allow excess form coating material to accumulate in the forms or the come in contact with surfaces which will bond to fresh concrete.
2. Apply the form coating material in strict accordance with its manufacturer's recommendations.

3.04 REMOVAL OF FORMS

A. General:

1. Do not disturb or remove forms until the concrete has hardened sufficiently to permit form removal with complete safety.
2. Do not remove shoring until the member has acquired sufficient strength to support its own weight, the load upon it, and the added load of construction.
3. Do not strip horizontal concrete in less than three days.
4. Do not strip vertical concrete in less than three days.]

B. Finished surfaces:

1. Exercise care in removing forms from finished concrete surfaces so that surfaces are not marred or gouged, and that corners are true, sharp, and unbroken.
2. Release sleeve nuts or clamps, and pull the form ties neatly.
3. Do not permit steel spreaders, form ties, or other metal to project from, or be visible on, any concrete surface except where so shown on the Drawings.
4. Solidly pack form tie holes, rod holes, and similar holes in the concrete. For packing, use the cement grout specified in Section 03300 of these Specifications, flushing the holes with water before packing, screeding off flush, and grinding to match adjacent surfaces.

*****END OF SECTION*****

SECTION 03200
CONCRETE REINFORCEMENT

PART I -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 WORK INCLUDED

- A. Reinforcing steel bars, welded steel wire fabric for cast-in-place concrete, fabricated, placed and supported, as specified herein and shown on the Drawings.
- B. Support chairs, bolsters, bar supports, spacers, for supporting reinforcement, as needed for a complete and proper installation.

1.03 QUALITY ASSURANCE

- A. Perform concrete reinforcement work in accordance with CRSI Manual of Standard Practice, and Documents 63 and 65.
- B. Conform to ACI 301 and 315.

1.04 SHOP DRAWINGS

- A. Indicate sizes, spacings, locations and quantities of reinforcing steel, wire fabric, bending and cutting schedules, splicing, stirrup spacing, supporting and spacing devices.
- B. Prepare shop drawings under seal of professional structural engineer registered in the State of California.

1.05 CERTIFICATES

- A. Submit mill test certificates of supplied concrete reinforcing, indicating physical and chemical analysis.
- B. In lieu of mill test certificate provide samples:
 - 1. Samples for physical tests of reinforcement will consist of at least two pieces, each 18" long, of each size of reinforcement steel, selected by the testing agency from material at the building site or at the fabricator's or supplier's yard.
 - 2. Material to be sampled at the building site shall have been delivered thereto at least 72 hours before it is needed.
 - 3. Where samples are taken from bundles as delivered from the mill, with the bundles identified as to heat number, and provided mill analyses accompany the report, then one tensile test and one bend test will be made from a specimen of each ten tons or fraction thereof of each size of reinforcement steel.
 - 4. Where positive identification of the heat number cannot be made, or where random samples are taken, then one series of tests will be made from each 2-1/2 tons or fraction thereof of each size of reinforcement steel.

1.06 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.07 SUBMITTALS

In accordance with Article 5 of the General Conditions, Project Manual Section 00700.

PART 2 -- PRODUCTS

2.01 MATERIALS

- A. Reinforcing Steel: ASTM A615, 40 ksi for #4 and smaller and 60 ksi for #5 and larger yield grade billet-steel deformed bars, uncoated finish. Deformations shall conform with ASTM A305.
- B. Welded Steel Wire Fabric: ANSI/ASTM A185 plain type; in coiled rolls; uncoated finish.
- C. Stirrup Steel: ANSI/ASTM A82.
- D. Bending to conform to ASTM 318. Fabricate reinforcement in accordance with recommendations contained in CRSI "Manual of Standard Practices".
- E. Brackets for centering vertical steel shall be similar and equal to Wall-Brac as manufactured by W.C.R. Fabricators, San Clemente. (714) 492-2370.

2.02 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcement in place:
 - 1. Use wire bar type supports complying with CRSI recommendations, unless otherwise shown on the Drawings.
 - 2. Do not use wood, brick or other non-complying material.
 - 3. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs and to prevent vapor barrier puncture.
 - 4. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with either hot-dip galvanized or plastic-protected legs.

2.03 FABRICATION

- A. Fabricate reinforcing bars to conform to the required shapes and dimensions with fabrication tolerances complying with ACI 315, providing concrete cover specified in Section 03300. In case of fabricating errors, do not straighten or rebend reinforcement in a manner that will weaken or injure the material.
- B. Reinforcement with any of the following defects will not be acceptable:
 - 1. Bar lengths, depths and/or bends exceeding the specified fabrication tolerances;
 - 2. Bends or kinks not shown on the Drawings;
 - 3. Bars with reduced cross-section due to excessive rusting or other cause.
- C. Locate reinforcing splices not indicated on Drawings at points of minimum stress. Indicate location of splices on shop drawings.
- D. Weld reinforcing bars in accordance with ANSI/AWS D1.4.
- E. Reinforcement shall be clean and shall be free from oil, excessive mill scale or rust, and shall be stored on the site in such a manner as to permit easy access for proper inspection and identification.

Reinforcement shall be shop-bent to shapes and dimensions as shown and shall be placed where indicated on the Drawings or reasonably required to carry out the intent of the Drawings and Specifications. Reinforcement shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the Drawings shall not be used.

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Correct conditions detrimental to timely and proper completion of the Work.
- C. Do not proceed until unsatisfactory conditions are corrected.
- D. Beginning of installation means acceptance of conditions.

3.02 INSTALLATION

- A. Comply with the specified standards for detail and method of placing reinforcement and supports, except as may be modified herein.
- B. Clean reinforcement to remove loose rust and mill scale, earth, and other materials which reduce or destroy bond with concrete.
- C. Position, support and secure reinforcement against displacement by formwork, construction and concrete placing operations.
- D. Locate and support reinforcement by metal chairs, runners, bolsters, spacers and hangers, as required. (Such chairs or stools shall be bound, shall have squared vertical sides, and shall conform to the requirements for Grade A concrete as specified herein.)
- E. Place reinforcement to obtain minimum coverages for concrete protection.
- F. Arrange, space and securely tie bars and bar supports together with the specified tie wire.
- G. Set wire ties so twisted ends are directed away from exposed concrete surfaces.
- H. Do not displace or damage vapor barrier required by Section 03300. If vapor barrier is damaged, Contractor shall repair or replace that section to be water resistant.
- I. Install welded wire fabric in as long lengths as practicable, lapping adjoining pieces at least one full mesh.
- J. Provide sufficient numbers of supports and of strength to carry the reinforcement.
- K. Do not place reinforcing bars more than 2" beyond last leg of any continuous bar support.
- L. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
- M. Wall steel shall be wired together at all points where bars cross. Splices in horizontal bars shall be staggered so that adjacent splices will not be less than 4 feet apart, unless shown otherwise on the Drawings.
- N. Bars shall be continuous insofar as practical.
- O. Dowels required to receive and engage subsequent work shall be of sufficient length to develop the strength of the bar and be securely set in the forms prior to placing the concrete.
- P. All stirrups shall be accurately and securely wired to the bars at both top and bottom.

3.03 SPLICES

- A. Lap splices: Tie securely with the specified wire to prevent displacement of splices during placement of concrete.
- B. Splice devices:

1. Obtain the Architect's approval prior to using splice devices.
 2. Install in accordance with manufacturer's written instructions.
 3. Splice in a manner developing at least 125% of the yielding strength of the bar.
- C. Do not splice bars except at locations shown on the Drawings, unless otherwise specifically approved by the Architect.
- D. In general, the reinforcing steel shall be lapped at least 30 diameters.
- E. A clear space equal to 2-1/2 diameters (and in no case less than 1-1/2") shall be maintained between the spliced bars, unless otherwise directed by the Architect.
- F. Splices shall not be made at the points of maximum stress and where made, the splices shall be lapped as indicated on the Drawings or as otherwise required to develop the strength of the bars.

3.04 MASONRY REINFORCEMENT

- A. Splices for masonry wall shall lap not less than 40 bar diameters, except where otherwise shown.
- B. Vertical foundation dowels for masonry wall shall be accurately set to match reinforced masonry cells.
- C. Dowels shall not be bent after foundation concrete has been placed.

3.05 WELDED WIRE FABRIC

- A. Shall be rolled out, straightened, cut to size and laid in place reasonably flat.
- B. Splices in wire mesh shall lap not less than 8 inches and shall be tied with No. 16 or 18 gauge wire at not more than 12 inches.
- C. As concrete is placed, mesh used as reinforcement for slabs on grade shall be lifted at intervals as required to insure proper embedment in the concrete.

*****END OF SECTION*****

SECTION 03220

UNDERSLAB VAPOR BARRIER

PART 1 -- GENERAL

1.01 DESCRIPTION

- A. Division 0, Contract requirements and Division 1, General Conditions apply to this section.
- B. This Section describes the requirements for furnishing and installing moisture barrier and sand under concrete slabs-on-grade.
- C. Related Sections:
 - 1. Prepare subgrade according to Section 02200 and/or the Soils Report.
 - 2. Concrete is specified in Section 03300.

1.02 SUBMITTALS

- A. In accordance with Article 6.13 of the General Conditions.
- B. Product Data: Include independent laboratory test results showing compliance with ASTM and ACI Standards. Include manufacturer's installation instructions for placement, seaming, and pipe boot installation.

1.03 SUBSTITUTIONS

Substitutions will be considered per Article 6.4 of the General Conditions.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

Protect products against damage during field handling and installation.

PART 2 -- PRODUCTS

2.01 MANUFACTURERS

- A. Stego Wrap Vapor Retarder by Stego Industries
- B. Vapor-Block by Raven Industries
- C. Architect approved equal

2.02 MATERIALS

- A. Vapor Retarder must have the following qualities:
 - 1. 10 mil thickness minimum.
 - 2. Permeance of 0.01 UP perms as tested by ASTM E154.
 - 3. Puncture resistance of 2,600 grams per ASTM D1709, Method B.
 - 4. ASTM E 1745 Class A (Plastics) after conditioning testing.
- B. Vapor Retarder Tape:
 - 1. Water Vapor Transmission Rate :ASTM E 96, 0.3 perms or lower
 - 2. Minimum 8-mils thick
 - 3. Minimum 4 inches wide
 - 4. Manufactured from High Density Polyethylene
 - 5. Pressure Sensitive Adhesive
- C. Pipe Boots: Construct from vapor barrier sheeting material and pressure sensitive tape in accordance with manufacturer's instructions.

- D. Sand: Clean yard sand, free from excessive dirt, debris, organic matter, and fines smaller than No. 200 sieve size.

PART 3 -- EXECUTION

3.01 INSPECTION

- A. Below grade and grading work and items penetrating moisture barrier shall be completed prior to start of installation.
- B. Examine the areas and conditions under which work of this Section will be performed.
- C. Correct conditions detrimental to timely and proper completion of the Work.
- D. Do not proceed until unsatisfactory conditions are corrected.
- E. Beginning of installation means acceptance of conditions.

3.02 INSTALLATION REQUIREMENTS

A. Vapor Barrier Sheeting:

1. Install in accordance with manufacturer's instructions and ASTM E1643.
2. Unroll with the longest dimension parallel with the direction of the pour.
3. Lap vapor barrier over footings and seal to foundation walls.
4. Overlap joints 6-inches and seal with pressure sensitive tape.
5. Seal penetrations, including pipes, with pipe boot.
6. Penetrations through vapor barrier sheeting except for reinforcing steel and permanent utilities are not permitted.
7. Repair damaged areas by cutting patches of vapor barrier sheeting, overlapping damaged area 6-inches and taping all four sides with pressure sensitive tape.

B. Sand Cushion:

1. Provide 2-inch layer over moisture barrier, unless otherwise indicated.
2. Spread over surfaces required and work to fill voids; leave in stable condition with finished surfaces reasonably uniform at established grade.

*****END OF SECTION*****

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 SCOPE OF WORK

All of the requirements of the Contract Documents apply to this Section. The work under this section includes furnishing all labor, materials and equipment and performing all operations in connection with all concrete work indicated on the Drawings, specified herein or reasonably required to complete the work.

1.03 QUALITY CONTROL

- A. **INSPECTION:** All concrete work shall be under continuous inspection by a representative of the Owner. Concrete shall not be placed until and unless all forms, reinforcement and all embedded materials have been inspected and approved by the job inspector, nor shall concrete be placed outside of regular working hours unless satisfactory arrangements have been made with the inspector and he is available to observe.
- B. **TESTING:** It shall be the Contractor's responsibility to determine, prior to their delivery to the job site or to the batching plant, that all materials to be incorporated into the work comply with these Specifications. All costs incurred by the Contractor in complying with the above requirements, including the cost of concrete design mixes, shall be paid by the Contractor. The Owner will do such sampling and testing of materials and concrete after their arrival at the job site or batching plant as he may deem necessary, and all costs in connection therewith will be paid by the Owner. No concrete shall be placed until test results on materials to be used have been approved by the Architect.

1.04 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.05 SUBMITTALS

- A. In accordance with Article 5 of the General Conditions, Project Manual Section 00700.
- B. Contractor shall submit all necessary Product Data and a complete list of material sources for all products to be incorporated into the project for review and approval of the Architect. The Performance of all Mix Designs shall be established either by stamped by an individual licensed to specify concrete mix designs engaged by Concrete Supplier or by break test data from at least 30 different projects for each mix design.

PART 2 -- PRODUCTS

2.01 CONCRETE MIX

- A. All concrete mixes shall produce concrete that will work readily into corners and angles of forms and around reinforcement with the methods of placing employed on the work, but without permitting the materials to segregate or excess free water to collect on the surface.
- B. If the concrete fails to conform to these Specifications, the Architect may order a change in the mix or require that a new design mix be provided.

C. All mixes shall be submitted to and approved by the Architect prior to placement of concrete. All concrete mixes except Class C shall be designed by an approved testing laboratory. However, multiple use of mix designs will be permitted to the extent indicated below. Mixes shall produce concrete conforming to the following requirements:

1. Class A Concrete: For all concrete work except where otherwise indicated on the Drawings or specified herein.
 - a. Compressive strength at 28 days = 3000 pounds per square inch minimum
 - b. Aggregate size = 3/4 inch maximum.
 - c. Slump = 4 to 5 inches.
 - d. Reinforcing fibers: Shall be polypropylene, collated, fibrillated fibers from Fibermesh Company (615) 892-7243, or approved equal. Follow NER 284 and manufacturers requirements for installation. Only fibers designed and manufactured specifically for use in concrete and so certified shall be acceptable.
2. Class B Concrete: For all slabs on grade.
 - a) Compressive strength at 28 days = 3000 pounds per square inch minimum
 - b) Portland Cement Content = 5-1/2 sacks per cubic yard.
 - c) Aggregate size = 1 inch maximum.
 - d) Water Content = Maximum water / cement ratio of 0.48.
 - e) Slump = 4-1/2 to 5-1/2 inches.
 - f) Reinforcing fibers: Shall be polypropylene, collated, fibrillated fibers from Fibermesh Company (615) 892-7243, or approved equal. Follow NER 284 and manufacturers requirements for installation. Only fibers designed and manufactured specifically for use in concrete and so certified shall be acceptable.
3. Class C Concrete: For piping thrust blocks, for envelopes around conduit or piping, or such other uses as may be indicated on the drawings or specified herein.
 - a. Cement content = 4-1/2 sacks per cubic yard.
 - b. Slump - 4 to 6 inches.
 - c. Compressive strength at 28 days = 2500 pounds per square inch minimum

2.02 CONCRETE MATERIALS

- A. All materials shall be delivered, stored, and handled so as to prevent the inclusion of foreign material and/or damage. Packaged materials shall be delivered and stored in original packages until ready for use. Packages or materials showing evidence of damage shall be rejected.
- B. Aggregate (standard): Aggregate shall conform to the requirements of "Specification for Concrete Aggregates" (ASTM). Aggregates shall be stored and weighted separately and in a manner to avoid inclusion of foreign materials. No aggregate shall be incorporated into the work until approved by the Architect, and the source shall not be changed after such approval without written authorization from the Architect.

- C. Aggregate (for exposed aggregate slabs and walks on grade): Aggregate shall be an approved washed, hard, smooth, well rounded local beach-line rock, passing a 3/4 inch screen and retained on a 3/8 inch screen.
- D. Cement: All cement shall conform to "Standard Specifications for Portland Cement", ASTM Designation C-150 (latest), except where otherwise specified, and shall be of Type I or Type II. The brand of cement shall not be changed during the process of the work without written approval of the Architect. Sacked cement shall be so piled as to permit tally, inspection, and identification of each shipment.
- E. Water: Water for washing aggregates and for mixing and watering concrete shall be free from oil, acids, alkali, organic or other deleterious matter. During extremely warm summer months, mixing water shall be the coolest available at the site.
- F. Expansion Joint Filler shall be performed, asphalt saturated fiberboard containing not less than 25% nor more than 50% asphalt by weight (ASTM D1751).
- G. Curing Compound shall be an approved, clear, resin base compound. Compound for use on architectural concrete surface shall be field demonstrated to be non-staining and oil and wax free before it will be approved. Compound for use on roof deck surface shall be of a type that will not affect the bond of the roofing or membrane to be used. Curing compounds shall not be used on interior slab-on-grade floors to receive low permeable flooring.
- H. Admixtures shall be Pozzoloth, of the types specified herein or, at the option of the Contractor, as may be indicated by job conditions. Admixtures shall be used only after approval by the Architect.
- I. Bond Breaking Compounds must be approved by the Architect, and shall be suitable for the casting and erection techniques used.
- J. Color Pigment shall be Davis Colors as manufactured by Frank D. Davis Co., and shall be selected from the manufacturer's standards colors. (213) 269-7311.
- K. Form Lining for pre-cast concrete shall be Burke Form Coating.
- L. Form Coating for cast-in-place architectural concrete shall be Nox-Crete Form Coating.
- M. Waterstop: Waterstop - RY; flexible material with sodium bentonite; continuous maximum lengths; recessed from joint; a minimum of 2" concrete cover; as manufactured by Volclay, American Colloid Company or approved equal.
- N. Metal Formed Construction Joints: Burke Kold Keyed Joint or approved equal for use in light traffic areas, office areas.
- O. Reinforcing fibers: Shall be polypropylene, collated, fibrillated fibers from Fibermesh Co., or approved equal. Follow NER 284 and manufacturers requirements for installation. Only fibers designed and manufactured specifically for use in concrete and so certified shall be acceptable. (615) 892-7243.

2.03 FORM MATERIALS

- A All forms, unless otherwise indicated on the Drawings, or specified herein, shall be of wood. Before erection, the inside surface of all wood forms shall be coated with non-staining material to seal against moisture loss. Forms for architectural concrete and forms at construction joists shall also be coated with "Nox-Crete".
 - 1. Board Form for concrete shall be 1" x 6" T & G or shipped Douglas Fir, free from loose knots, holes and irregularities. Surface irregularities of T & G or shiplap must not exceed 1/8 inch.
 - 2. Plywood Forms shall be of five ply Douglas Fir Plywood form grade, not less than 5/8 inch thick.

3. Curb and Slab Edge Forms may be of steel or wood.
- B Form Ties. Form ties shall be of a type that can be removed, having no part of the tie permanently embedded less than 1-1/2 inches from any concrete surface. Ties passing through exposed surfaces shall be of the removable type that are removable without spalling concrete surfaces.

2.04 VAPOR BARRIER

All interior slabs shall be placed over 2" of sand over a Vapor Barrier.

1. Vapor Barrier shall be at least 3-mil "Vaporshield", a high density cross laminated poly or equal.
2. Vapor Barrier membrane shall be in as large sheets as possible with joints lapped 4-inches minimum and taped to form a watertight seal. All holes and penetrations by plumbing, conduit, etc., shall be sealed with tape and made watertight.

2.05 SOIL POISONING

- A. Soil shall be treated against subterranean termites by a reliable and established, licensed termite control firm thoroughly familiar with local soils and chemicals.
- B. Contractor shall notify Architect 24 hours before application of chemicals.
- C. Apply an aqueous solution of 2% chlordane or 0.3% Dieldrin or 0.5% Aldrin as follows:
 1. Under all floor slabs within the foundation walls -- 1 gallon per 10 square feet.
 2. Along inside of foundation walls -- 2 gallons per 5 lineal feet.
 3. Along outside of foundation walls -- 1 gallon per 5 lineal feet.
- D. Chemicals under slabs shall be applied after fill is tamped and rough plumbing installed. Chemicals shall be applied not more than 24 hours before pouring concrete.
- E. Guarantee: Treatment shall remain effective for not less than 5 years. The Contractor shall furnish a written 5 year guarantee in 3 copies stating if at any time during the 5 year period ground nesting termites occur, treatment will be applied to exterminate all infestation without cost to the Owner.

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Correct conditions detrimental to timely and proper completion of the Work.
- C. Do not proceed until unsatisfactory conditions are corrected.
- D. Beginning of installation means acceptance of conditions.

3.02 BATCHING AND MIXING

- A. Concrete, except as hereinafter, specified shall be mixed by a mechanical batch-type mixing plant. Plants shall be provided with adequate facilities for accurate measurement and control of each of the materials entering the mixer. All aggregate shall be measured by weight and stationary mixers shall be equipped with automatic apparatus for timing and for metering or measuring water. The apparatus shall have locks that will prevent unauthorized persons from changing the adjustment thereof. Fibermesh for slabs on grade shall be mixed into the concrete at the batch plant.
- B. Any concrete that has not been placed within 90 minutes after water is first added to the batch shall be rejected.

- C. Care shall be taken to avoid contamination of architectural concrete. All equipment must be thoroughly cleaned before use and each mixer shall be thoroughly washed out prior to charging with the first batch of each type of concrete to be used in exposed finished surfaces.
- D. Approximately two thirds of the mixing water shall be added to the mixer when charging with lightweight aggregate. The aggregate and water shall then be mixed for not less than three minutes before cement and the balance of the water is added.

3.03 TRANSMIT MIX CONCRETE

Transmit mixed concrete shall be mixed for a period of not less than 10 minutes at a peripheral drum speed of approximately 200 feet per minute, and mixing shall be continued until discharge is completed. At least three minutes of the mixing period shall be at the job. Transit mixers shall be equipped with water measuring devices consisting of either accurately calibrated water tanks or water meters.

3.04 FORMS

- A. General Construction. Forms, complete with all necessary cores and molds, shall be constructed to conform to shape, line, and dimensions as indicated on the Drawings, and shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly supported, braced and tied so as to maintain their position and shape when filled with wet concrete, and shall be removable without damage to the concrete.
- B. The limiting tolerance for thickness, misalignment, curvature, plumb and level shall be 1/4 inch plus or minus, for the surfaces shown on the Drawings; except that for concrete having a thickness of 4 inches or less, the thickness tolerance shall be plus 1/4 inch to minus 1/8 inch; for concrete in foundation walls below grade, the tolerance shall be plus 1/2 inch to minus 1/4 inch; and for footing pads the tolerance shall be plus 1 inch to minus 1/2 inch. Forms shall not be constructed more than 1 foot above any construction joint on the side of the wall from which concrete will be poured.
- C. Vertical surfaces of foundations may be formed against earth where, in the opinion of the Architect, such surfaces are suitable. Excavations for unformed concrete shall be provided with a surround consisting of 2 x 8 inch boards laid flat along the edges of the excavation and secured in place prior to placing concrete.
- D. Temporary openings shall be provided at a sufficient number of points in the form work to permit proper cleaning and inspection. No wood of any kind, either temporary or permanent, shall be used or installed inside of the forms unless otherwise indicated on the plans or as directed.
- E. Embedded Materials. Ample opportunity and full cooperation shall be given to the various trades to install their required embedded items. All embedded materials shall be securely fastened in place before placing of concrete is started. Bolts and anchors shall be attached to forms or adequate temporary supports to effectively prevent movement during placement concrete.
- F. Specific Requirements:
 - 1. Forms for Vertical Wall Closures. Forms for outside (exposed) surfaces shall be of new 5/8" plywood, free from surface irregularities. Vertical edges shall be carefully scribed to pre-cast panel edges, and joints shall be carefully caulked and finished to prevent leakage and provide a smooth form surface. Plywood shall be secured to back-up members at horizontal splices and joints shall be filled and sanded smooth. A full length vertical 2 x 8 shall be secured against and support each edge of this (exposed outside face) form. Ties shall have removable spreader cones and be used in pairs at about 6 foot centers. Tie holes in forms for exposed faces shall be drilled 1/32" small and ties shall be inserted from the inside face to avoid splintering the contact surface. All mortar leakage in and around exposed surfaces must be prevented. Window for concrete placement

shall be provided on inside (concealed) surfaces, with adequate provision for closure and for securing against displacement. Additional form ties at windows will not be permitted.

2. Forms for Bottom Wall Closures. Forms for outside (exposed faces) shall be of 2 inch lumber, plywood lined. Joints in lining shall be staggered with joints in back-up material and shall be filled and sanded smooth. Forms shall be supported in such a manner as to insure against movement and to provide a concrete surface in a plane with vertical closures. The top edge of the outside form shall be notched at 12 inches to permit the escape of air. Notches may be round, square or triangular and shall be approximately 1/2 inch deep.

3.05 PREPARATION FOR PLACING

Forms, soil bottoms, reinforcement and all embedded items shall be approved by the Inspector before concrete is deposited. Water and all foreign matter shall be removed from forms, excavations, and mixing and conveying equipment. Any flow of water shall be diverted with proper side drains, and shall be removed by methods which will avoid washing over freshly deposited concrete. Screeds shall be provided at all walls and not over eight feet apart in the field of slabs. All slabs shall receive a monolithic finish, unless otherwise shown on the Plans or specified herein. Alternate areas between construction joints shall be placed during any one pour. All materials, except transit-mix concrete, necessary to the placing and curing of any concrete pour shall be on the job site prior to the start of the pour.

3.06 HANDLING CONCRETE

- A. Conveying. Concrete shall be conveyed from mixer to forms as rapidly as practicable by a method which will prevent segregation or loss of ingredients. Belt conveyors, bucket chains, chutes or other similar equipment will not be permitted unless approved in writing by the Architect. Concrete for vertical wall closures shall be pumped into place, using equipment that will handle the specified mix without excessive water.
- B. Placing. Concrete placing shall be carried on as a continuous operation until the given unit of operation, approved by the Architect, is completed. Concrete shall be deposited as nearly as practicable in its final position to avoid flowing or rehandling. Drops of more than six feet (6') will not be permitted. It shall not be placed in such a manner as to leave accumulations of mortar on the form surfaces or reinforcement above the placed concrete. Where necessary, vertical ducts of canvas, rubber or metal shall be used in the forms. Concrete shall be uniformly distributed during the process of depositing, and in no case after deposition shall any portion be displaced in the forms more than six feet in a horizontal direction. Concrete in forms shall be deposited in uniform horizontal layers not deeper than 18". Each layer shall be placed while the previous layer is still soft. Concrete that has attained its initial set shall not be deposited in the work. No concrete shall be re-tempered nor shall any concrete be used that has stood for more than 30 minutes after the mixer has stopped or after discharge from the mixer. Concrete shall be placed in closures at bottom of wall panels in such a manner as to avoid trapping air against the outside form face.
- C. Cold Weather Placement. Concrete shall be mixed and placed only when the temperature is at least 50 degrees F., and rising.
- D. Hot Weather Placement. Concrete shall not be placed when the atmospheric temperature is above 100 degrees F and special care shall be taken for placement in temperatures over 80 degrees.
 1. All materials and equipment shall be stored in the shade.
 2. Shade shall be provided for all slabs to be placed or finished after 10:00 a.m.
 3. Special care shall be taken to obtain the coolest mixing water available.

4. Forms to receive concrete shall be kept cool by sprinkling until the pour has started.

When atmospheric temperatures exceed 80 degrees F., and/or wind velocities exceed 5 mph, the water content of concrete shall be adjusted and a retarding agent added as directed by the Architect.

- E. **Compaction.** Concrete shall be thoroughly compacted during placement, and shall be carefully worked around reinforcement and embedded items along surfaces and into corners of forms. Except where compaction by hand-tamping is specified, it shall be placed in layers not over 18" in depth and each layer shall be compacted with internal vibration equipment supplemented by hand-spading, rodding and tamping. Vibrators shall not be used to transport concrete inside forms. There shall be at least one vibrator per ten yards of concrete placed per hour, with one spare vibrator maintained on the job. Vibrators shall not be inserted into lower courses that have begun to set, nor into solid or sand bottoms. Where hand-tamping is used, there shall be not less than one man for each five cubic yards of concrete placed per hours, whose time shall be used in tamping ONLY.
- F. **Modified Mix.** Where conditions make puddling difficult, or where the reinforcing is congested, batches may be modified with Architect's review of revised mix design.
- G. **Record of Placing.** The Contractor shall coordinate keeping of a record with the Construction Manager at the job of the time and date of placing the concrete in each portion of the structure. Such record shall be kept until the completion of the structure and shall be open to the inspection of the Architect.
- H. **Wall Closures.** Placement of concrete in vertical wall closures shall be carried out in 18-inch lifts, with concrete being pumped through form windows in the back of the form. The number of closures poured during one operation shall be limited and the rate of pour regulated so that successive lifts are placed while the lift below is still liquid, while avoiding excessive depth of liquid material in the forms. Placing of concrete shall not be started until the Contractor can be sure, beyond a reasonable doubt, of the continuous arrival of material at the pump hopper. Concrete shall be compacted by rodding along the face of the form with a piece of reinforcing steel. The length of the rod for the first pour shall equal the height of the wall. The rod shall be shortened after each lift so that it will penetrate 6 inches into the lift below. Each lift shall be worked sufficiently to insure a solid mass, but care shall be used to avoid causing segregation of coarse aggregate.

3.07 CONSTRUCTION JOINTS

- A Location and detail of all construction joints not shown on the Plans shall be approved by the Architect in advance of placing operations and shall conform to ACI's recommendations.
- B Existing surfaces shall be thoroughly roughened and cleaned of all laitance, foreign matter, loose particles and dust before placing new concrete. Forms shall be re-tightened, and the existing surfaces in structural concrete treated as follows, immediately ahead of concrete placement:
 1. Vertical construction joints shall be washed with clean water and then slushed with a grout coat of neat cement. Form windows shall be provided as necessary for this operation.
 2. Horizontal construction joints shall be washed with clean water and, when so directed by the Architect, shall then be covered with a layer, not less than 2 inches nor more than 6 inches in thickness, of a modified mix as specified herein before. Form windows shall be provided as necessary to insure covering all joint surfaces.
- C Place formed construction joints in pattern placement sequence. Set top screed to required elevations. Secure to resist movement of wet concrete.

- D Horizontal concrete slab surfaces supporting concrete or masonry walls shall be wire brushed before hardening. Care shall be taken to avoid damage to adjoining concrete surfaces.
- E Install joint fillers in accordance with manufacturer's instructions. Use primers of type recommended by joint filler manufacturer.

3.08 PIPES AND CONDUITS

- A. Pipes other than conduit for electrical circuits shall not be embedded in structural concrete.
- B. Conduit Location. When placed in structural slabs, conduit shall be located within the middle half of the slab and should not be placed between reinforcing steel and the bottom of the slab. Conduit in slabs on grade shall be placed below reinforcement steel and shall be supported on concrete blocks to insure complete concrete encasement. Blocks for supporting conduit shall be as specified for the support of reinforcement bars in the section "Reinforcing Steel". When located in columns, walls or beams, conduit shall be located so that, in the opinion of the Architect, the strength of the structure is not impaired.
- C. Conduit Size. No conduit placed in a concrete slab shall have an outside diameter greater than one-third the thickness of the slab. No conduit larger than 1 inch shall be embedded in floor slabs. Larger conduit shall be below bottom surface of slabs and encased separately.
- D. Sleeves. Appropriate sleeves shall be provided for all pipe or conduit passing through any walls or floors. Sleeves shall be so located so as not to impair the strength of the structure. Openings larger than 12 inches in dimension will not be permitted unless specifically shown on the Drawings.

3.09 REMOVAL OF FORMS

The removal of forms shall be carried out in such a manner as to insure the complete safety of the structure and to avoid damage to concrete surfaces. In no case shall supporting forms or shoring be removed until concrete has hardened sufficiently to permit their removal with safety. Soffit forms and supports for beams, lintels and slabs above grade shall remain in place until laboratory tests show that they can be removed safely. Forms for surfaces to be sandblasted, except beam soffits, may be removed after three days, if removal can be accomplished without damage to concrete surfaces.

3.010 SLABS ON EARTH

- A. Placing. Concrete shall be placed in one continuous operation between construction joints after soil poisoning, vapor barrier and sand protection have been laid. Spreading by hand shall be with shovels; rakes shall not be used. Workmen shall be required to remove all dirt or mud from their footwear before stepping into freshly mixed concrete. Concrete shall be thoroughly compacted by hand tamping in such a manner as to force the larger aggregate into the body of the slab and bring to the top a minimum of free mortar. Surfaces shall be carefully screeded off after compacting, using approved screeds accurately set to the finished grade of the slab, and shall be worked to a true and even grade free from waves and irregularities.
- B. Finishing. All slabs shall receive a monolithic finish unless otherwise specified. All slab marking and jointing shall be as detailed and at locations indicated on the Drawings. Perimeters of all slab areas and edges of all walks shall be finished with an edger unless otherwise indicated. Edging tools shall have a radius of 1/8 inch for joints and 1/4 inch for discontinuous edges unless otherwise shown. Corners or edges of slabs which have crumbled and any area which lacks sufficient mortar for proper finishing shall be corrected by removing all loose aggregate and/or soupy mortar and filling with a suitable concrete mixture. Unnecessary tool marks shall be limited and all edges and joints shall be smooth and true to line. Where tooled joints (T.J.) are indicated on the Drawings,

such joints shall be formed using a marking tool with a knife extension. The total depth of depression thus formed shall be not less than 1/2 inch nor greater than 3/4 inch. Such additional scoring as may be required by the Architect shall be with a standard marking tool (without extension) and will be at approximately 4 feet each way. At the Contractor's option, saw-cut joints may be submitted for the weakened plane joints shown, except in exposed aggregate surfaces. Saw cuts must be uniform, straight, to the depth indicated for W.P. joints, and shall be made as soon as they can be made without spalling the concrete surface. Any spillage or splatter of concrete mortar on adjacent slabs or structures shall be removed immediately by flushing with water.

- C. Sealing – Joint sealing is described in the section "Caulking".

3.011 CONCRETE FINISHES

- A. All exposed concrete surfaces, exterior and interior, shall be uniformly finished and shall have a surface texture as hereinafter described. Surfaces shall be free from rough spots, stains, hardened mortar or grout, and other imperfections. Cleaning and repairing of concrete surfaces shall be as directed by the Architect.
- B. Steel trowel finish shall be used for finish building floor slabs, for top surfaces of pre-cast elements and for all concrete bases and curbs except where otherwise indicated on the Drawings or specified herein.
- C. Steel troweling of floated surfaces may begin as soon as the surface has hardened enough to prevent excess fine material from working to the surface. The finished surface shall be hard and smooth and care shall be taken to minimize trowel marks and trowel "burn". Dusting will not be permitted except as hereinafter specified. Except where warped surfaces are indicated, slabs shall be finished to a true plane surface, free from humps or sags. The finished surface shall not deviate more than 1/8 inch from the edge of a 10-foot steel straightedge. Areas not conforming to the intent of these Specifications shall be corrected by grinding or measures satisfactory to the Architect.
- D. Broom finish shall be used for concrete walks and exterior slabs where so directed by the Architect. Surfaces to receive broom finish shall first be finished as specified above for steel trowel finish. Immediately after troweling, these surfaces shall be broomed uniformly as directed by the Architect, using a broom with moderately coarse, stiff bristles.
- E. Formed surfaces (finished). All exposed or painted formed surfaces, except where a steel trowel finish is required, shall be smooth and uniform. All form tie holes shall be filled, all honeycomb and other imperfections repaired and all fins removed. Rough spots, stains and hardened mortar shall be removed from all surfaces by rubbing lightly with fine carborundum stone. Water shall be used liberally and rubbing shall be sufficient only to remove defects without changing the surface texture.
- F. Formed surfaces (rough). Repair all honeycomb and fill all form tie and bolt holes in concealed concrete surfaces.
- G. Slab surfaces to receive mud-set tile shall be marked with a grid tamper to provide a suitable surface for bonding.
- H. Salt Finish: Surfaces shall be floated finish prior to application of salt. Coarse salt shall be applied to the required slab. Amount and duration shall be determined by sample. Salt shall then be washed clean from all concrete surfaces. Adjacent broom surfaces to be protected.
- I. Samples. Prior to placing concrete in areas to receive exposed aggregate or sandblasted finishes, the Contractor shall prepare a 30" x 30" sample panel of each of these types of finishes, using the specified materials. Sample panels must be approved by the Architect, and shall match existing columns as closely as possible. The panels prepared by the Contractor shall then be used as standards for the finishes represented and shall be the basis for acceptance or rejection of these finishes.

3.012 PATCHING

Honeycomb, or minor defects, and hole remaining from form ties, bolts or test cores shall be patched. Mixes for use in patches in architectural concrete finishes shall consist of cement mortar and suitable aggregates that will produce patches to match the patched surface. Mortar for concealed patches shall consist of one part Portland cement and three parts fine aggregate. Exposed patch surfaces shall be finished to match the adjoining surface. Holes passing entirely through the wall shall be filled from the inside face with a device that will force the mortar through to the outside face, using a stop held at the outside wall surface to insure complete filling. Holes which do not pass entirely through the wall shall be packed thoroughly full. Concrete surfaces to be patched shall be thoroughly moist, but free of surface water at the time of patching. Patches shall be cured as specified for concrete. Only 100% portland cement materials shall be used for the patching of slabs to receive flooring.

3.013 DEFECTIVE CONCRETE

If any concrete does not fully conform to the provision of these specifications, such work shall be deemed to be defective materials and/or workmanship, and the Contractor shall remove same from the site, at no extra cost to the Owner. When and as direct by the Architect, defective concrete may be cut out and repaired, at no extra cost to the Owner.

3.014 CURING

- A. All concrete surfaces shall be effectively sealed against moisture loss or shall be kept continuously wet for a period of not less than ten (10) days. Forms containing concrete and earth fill against concrete shall be kept continuously moist by sprinkling during this period. Prior to the commencement of each concrete pour, all materials and equipment, including hoses, nozzles, etc., necessary to the curing of that concrete pour, shall be at the job site. Curing operations shall commence immediately after concrete has been placed and shall be continuous for the duration of the curing period.
- B. Floor slabs and textured exterior slabs shall be cured by wet-cure method covering with an approved burlap or membrane kept moist by periodic spraying. Edges of the membrane covering shall be lapped not less than 6 inches and shall be weighted with wind-rows of clean sand. At no time shall the membrane be allowed to dry out during the first 10 days after pouring the slab. Units shall be removed from forms as soon as possible and shall be immediately coated on the under surface and edges. Walks, curbs and smooth exterior slabs may be cured as specified for floor slabs or coated with a suitable manufacturer's instructions, and all thin spots or breaks that occur during the curing period shall be repaired by the application of additional material. Special care shall be taken to avoid coating reinforcing steel, construction joint and expansion joint surfaces with curing compound. Exposed surfaces of construction joints and expansion joints shall be cured by sealing under a building paper or by a wet blanket covering. If weather conditions are severe, and when directed by the Architect, surfaces shall be kept moist with a fine fog spray until protected as specified above.
- C. Curing water, if any shall be led away from buildings and structures, and shall not be permitted to pond within 10 feet of any construction.

3.015 PROTECTION

- A. All finished concrete shall be protected during the course of construction, and any chips, cracks, or other defects that occur during the course of construction to any concrete shall be repaired as may be directed by the Architect.
- B. Surfaces of architectural concrete shall be covered to protect them from spatter during placement of adjoining concrete. Strips of Vis-Queen shall be placed under the edges of exposed aggregate slabs adjacent to other concrete to be placed, and shall then be folded back over the finished surfaces to protect them.

3.016 CLEAN UP

Clean up all exposed concrete surfaces and all adjoining work which has been stained by leaking or spatter of concrete, to meet the approval of the Architect, immediately after each concrete pour.

*****END OF SECTION*****

SECTION 03320
CONCRETE SEALERS

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 DESCRIPTION

- A. Work included: Seal, harden or color concrete surfaces where indicated on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Concrete floor sealer/hardener/densifier shall react with concrete surfaces to produce a dense, hydrophobic, insoluble, moisture barrier to seal out contaminants, while hardening and densifying concrete surface.
- C. Related work:
 - 1. Documents affecting work of this Section included, but are not necessarily limited to, Special Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 03300: Cast-In-Place Concrete
 - 3. Section 03345: Concrete Finishing

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use an applicator currently approved in writing by the manufacturer of the specified product.

1.04 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.05 SUBMITTALS

- A. In accordance with Article 5 of the General Conditions, Project Manual Section 00700.
- B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Sufficient technical data to prove compliance with the specified requirements.
 - 2. Evidence satisfactory to the Architect that the proposed applicator is currently approved by the manufacturer of the specified product.

1.06 JOB CONDITIONS

- A. Ensure concrete has been cured a minimum of 3-days, is free of curing compounds and other sealers, and is free of laitance, grease, oil, and contaminants.
- B. Protect adjacent surfaces/areas from damage due to over-spray

1.07 EXTENDED WARRANTY

Warranty sealed concrete floors to be free of dusting from abrasion for a period of 10-years from date of Substantial Completion. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 -- PRODUCTS

2.01 SEALER

- A. Wherever the Drawing indicates concrete with sealer, the surface shall be treated with ready-to-apply clear sealing compound. Where a sealer is used in conjunction with a hardener with color, use only a product recommended by the manufacturer of the hardener as accepted by the Architect.
- B. Comply with ASTM C 309, Type I, Class B.
- C. Acceptable products:
 - 1. Curcrete Chemical Company Inc. (Springville, Utah) "Ashford Formula".
 - 2. "Industrial Concrete Sealer" by Burke Company, San Mateo, California, (213) 724-6690.
 - 3. "Sealtight Intex" by W.R. Meadows, Inc., Benica, California, (714) 759-5006.
 - 4. "Lithothane Concrete Sealer" by L.M. Scofield Company, Los Angeles, California, (213) 723-5285.

2.02 HARDENER

- A. Wherever the Drawings indicate concrete with hardener, the surface shall be treated with a non-metallic dust-on floor hardener.
- B. Acceptable products:
 - 1. "Non-metallic Floor Hardener" by Burke Company.
 - 2. "Mastercron" by Master Builders, Inc., Anaheim, California, (714) 978-6961.
 - 3. "Lithochrome" by L.M. Scofield.

2.03 HARDENER WITH COLORS

- A. Wherever the Drawings indicate colored concrete floor hardener, the surface shall be treated with a non-metallic dust-on hardener in colors selected by the Architect.
- B. Acceptable products:
 - 1. "Lithochrome Color Hardener" by L.M. Scofield Company.
 - 2. "Colorcron" by Master Builders, Inc.

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which the work of this Section will be performed.
- B. Correct conditions detrimental to timely and proper completion of the Work.
- C. Do not proceed until unsatisfactory conditions are corrected.
- D. Beginning of installation means acceptance of conditions.

3.02 APPLICATION OF SEALER

- A. Preparation:
 - 1. On freshly finished concrete surfaces, no additional surface preparation is required.

2. On areas where forms are recently removed, remove all form oil and breaking compound residue to assure penetration of the product in to the pores of the material to be treated.
 3. On existing concrete, vertical surfaces, and masonry surfaces:
 - a. Sweep all areas to be treated, using a fine bristle broom, or hose off with water and let dry to remove all surface dust and dirt.
 - b. Free the surface from all contaminants which would inhibit penetration of the product into the pores of the material to be treated.
 - c. Remove all curing, sealing, and coating agents by use of chemical or mechanical means as necessary.
 - d. If acid is used to remove surface coatings, flush the surface with water sufficiently to remove all acid and acid residue.
 4. When applying near windows, mask the glass.
 5. Avoid contact with plant life, glass, aluminum, and other finished surfaces. Where contact occurs, immediately wipe a damp cloth or flush with water.
 6. Avoid contact with asphaltic concrete.
- B. Application:
1. On freshly finished surfaces, spray the product with a low pressure sprayer immediately following the finishing operation.
 - a. To assure proper curing, apply the product to the entire surface as soon as the surface is firm enough to walk on, and before checking and temperature cracking begins.
 - b. Keep the entire surface wet for 30 minutes by brooming excess product on to the dry spots, or by re-spraying the dry spots immediately.
 - c. As the product begins to dry into the surface and becomes slippery underfoot, lightly sprinkle the surface with water to aid penetration and to bring alkali to the surface.
 - d. As the product again begins to dry into the surface and become slippery underfoot, flush the surface with water and squeegee the surface totally dry, removing all excess product and alkali or other impurities brought to the surface.
 2. On broom-finished surfaces, no flushing is required, but squeegee or broom the excess product from surface after 30 to 40 minutes.
 3. On cured concrete surfaces, saturate the surface with the specified product.
 - a. If dry spots appear, broom excess material onto the dry spots or re-spray them immediately.
 - b. Keep the entire surface wet with the product for 30 minutes.
 - c. If, after 30 to 40 minutes, the majority of the product has not been absorbed into the surface, broom or squeegee the excess product from low spots and puddles so it will be absorbed into the surface, or remove such excess product from the surface.
 - d. If, after 30 to 40 minutes, the majority of the product is still on the surface, wait until the surface becomes slippery underfoot and then flush the entire surface with clear water and squeegee completely dry. If no water is available, squeegee the excess product from the surface after 30 minutes so that the surface is completely dry.

3.03 APPLICATION OF HARDENER

Apply the hardener after the surface of the concrete has reached the stage where no excess moisture shows, but while still plastic.

1. Hardener shall be applied at the rate of 40 pounds per 100 square feet of surface for the initial application.
2. Hardener shall be evenly distributed and thoroughly floated into the surface mortar with a wood float. 20 pounds of additional hardener shall be applied over each uniform color and texture.
3. All hardener and/or colored concrete floors shall be cured and protected with concrete curing paper or plastic until just prior to final cleaning.
4. Before applying curing paper or plastic, interior floors treated with colored hardener shall be given a heavy protective coat of colored wax left unpolished, and then immediately covered with the paper. If wax is not applied within two (2) hours after final troweling, the concrete shall be sprayed with a fine water mist and kept continuously moist until wax is applied, unless spraying is not recommended by the manufacturer of the hardener.
5. Cleaning and finishing: After all other work including plastering and painting has been completed, the curing paper shall be removed and waxed floors cleaned of protective wax coating. Clean all floors to remove dirt, stains or blemishes, and repair and restore damaged floors to their original condition. The hardener manufacturer's recommendations, directions, and recommended materials and methods shall be used for the protective wax coating, cleaning and finishing work.

*****END OF SECTION*****

SECTION 03345
CONCRETE FINISHING

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 DESCRIPTION

Work included: Provide finishes on cast-in-place concrete as called for on the Drawings, as specified herein, and as needed for a complete and proper installation.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Except as may be modified herein or otherwise directed by the Architect, comply with ACI 301, "Specifications for Structural Concrete for Buildings".

1.04 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.05 SUBMITTALS

- A. In accordance with Article 5 of the General Conditions, Project Manual Section 00700.

Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

- 1. Materials list of items proposed to be provided under this Section;
- 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
- 3. Manufacturer's recommended installation procedures which, when accepted by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.06 PRODUCT HANDLING

Comply with pertinent provisions of Division 1.

PART 2 -- PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Carefully study the Drawings and these Specifications, and determine the location, extent, and type of required concrete finishes.
 - 2. As required for the Work, provide the following materials, or equals accepted in advance by the Architect.
- B. Liquid bonding agent: "Weld-Crete," manufactured by the Larsen Products Corporation.
- C. Curing and protection paper:

1. Comply with ASTM C171, Type 1, regular.
 2. Accepted products:
 - a) "Sisalkraft, Seekure 896";
 - b) Equal non-staining products faced with polyethylene film.
- D. Slip-resistant abrasive aggregate:
1. Provide aluminum oxide grains, uniformly graded, screen size 12-13, 14-36 or 16-30.
 2. Acceptable product:
 - a) Emerchrome Floor Hardener by L.M. Scofield Company.
 - b) Frictex H by Sonneborn.
 - c) or approved equal.

2.02 OTHER MATERIALS

Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Correct conditions detrimental to timely and proper completion of the Work.
- C. Do not proceed until unsatisfactory conditions are corrected.
- D. Beginning of installation means acceptance of conditions.

3.02 FINISHING OF FORMED SURFACES

- A. General:
 1. After removal of forms, give exposed concrete surfaces the finish specified below.
 2. Revise the finish as needed to secure the acceptance of the Architect.
- B. Rubbed finish:
 1. Do not start cleaning operations until all contiguous surfaces to be cleaned are completed and accessible.
 2. Do not permit cleaning as the work progresses.
 3. Mix one part portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having the consistency of thick paint.
 4. Substitute white portland cement for part of the gray portland cement as required to produce a color matching the color of surrounding concrete, as determined by a trial patch.
 5. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout, and apply the grout uniformly with brushes or spray gun.
 6. Immediately after applying the grout, scrub the surface vigorously with a cork float or stone to coat the surface and fill all air bubbles and holes.

7. While the grout is still plastic, remove all excess grout by working the surfaces with a rubber float, sack, or other means.
8. After the surface whites from drying (above 30 minutes at normal temperatures), rub vigorously with clean burlap.
9. Keep the surface damp for at least 36 hours after final rubbing.

3.03 FINISHING SLABS

A. Definition of finishing tolerances:

1. "Class A": True plane within 1/8" in ten feet as determined by a ten foot straightedge placed anywhere on the slab in any direction.
2. "Class B": True plane within 1/4" in ten feet as determined by a ten foot straightedge placed anywhere on the slab in any direction.

B. Scratched finish: For surfaces scheduled to receive bond-applied cementitious applications.

1. After the concrete has been placed, consolidated, struck off, and leveled to a Class B tolerance, roughen the surface with stiff brushes or rakes before the final set.

C. Floated finish: For surfaces intended to receive roofing.

1. After the concrete has been placed, consolidated, struck off, and leveled, do not work the concrete further until ready for floating.
2. Begin floating when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.
3. During or after the first floating, check the planeness of the surface with a ten foot straightedge applied at not less than two different angles.
4. Cut down high spots and fill low spots, and produce a surface with a Class B tolerance throughout.
5. Refloat the slab immediately to a uniform sandy texture.

D. Troweled finish:

1. Provide a floated finish as described above, followed by a power troweling and then a hand troweling which is relatively free from defects, but which still may show some trowel marks.
 - a. Monolithic Trowel Finish: For all floor surfaces not otherwise specified. Steel trowel and retrowel to smooth surface. After concrete has set enough to ring true, retrowel to a burnished impervious finish, free of trowel marks or other blemishes.
 - b. Steel Float Finish: for all slabs to receive resilient tile, waterproof membrane, or carpeting. Same as monolithic finish except omit burnish retroweling.
 - c. Fine Swirl Finish (when shown on the Drawings): Prepare same as steel float finish. When ready, perform such finishing operations as necessary to produce Architect-selected fine textured, non-slip finish. Construct sample panel for Architect's acceptance prior to placement. Sample panel shall consist of tooled edges and have a tooled joint within field of panel.
2. Provide a finished surface essentially free from trowel marks, uniform in texture and appearance, and in a plane of Class A tolerance.

- E. Broom finish: For slabs to receive thin set tiles, apply steel float finish followed by very fine broom finish. For surfaces to receive mortar setting beds and for exterior concrete driveway ramps, curbs and gutters, spandrels, etc.
 - 1. Provide a finished surface uniform in texture and appearance, and in a plane of Class A tolerance. Roughen surface with coarse broom.
- F. Rock Salt finish: Exterior walkways and pavings except where non-slip finish is specified.
 - 1. Provide a floated finish as described above.
 - 2. While the surface is still plastic, broadcast rock salt into the surface and embed uniformly into the surface by light tamping.
 - 3. Float the surface until it has been brought to a true plane with Class B tolerance.
 - 4. After the concrete has completely set, flood the surface with water to dissolve the rock salt, using a fine bristle brush as necessary to remove the salt.
 - 5. Provide a sample panel at the site of the proposed finish and receive the acceptance of the Architect of that finish prior to placing of the paving.
- G. Non-slip finish: For exterior platforms, steps, and landings; and Interior and exterior pedestrian ramps.
 - 1. Provide a floated finish as described above.
 - 2. While the surface is still plastic, broadcast abrasive aggregate as specified in Paragraph 2.01.F above and work into the surface according to the manufacturer's recommendations.
 - 3. Complete finishing surface as described above for a troweled finish, and as recommended by the aggregate manufacturer.

3.04 CURING AND PROTECTION

- A. Beginning immediately after placement, protect concrete from premature drying, excessively hot and cold temperatures, and mechanical injury.
- B. Preservation of moisture:
 - 1. Unless otherwise directed by the Architect, apply one of the following procedures to concrete not in contact with forms, immediately after completion of placement and finishing.
 - a. Ponding or continuous sprinkling;
 - b. Application of absorptive mats or fabric kept continuously wet;
 - c. Application of sand kept continuously wet;
 - d. Continuous application of steam (not exceeding 150° F) or mist spray;
 - e. Application of waterproof sheet materials specified in Part 2 of this Section;
 - f. Application of other moisture-retaining covering as accepted by the Architect.
 - g. Where forms are exposed to the sun, minimize moisture loss by keeping the forms wet until they can be removed safely.
 - 2. Cure concrete by preserving moisture as specified above for at least ten days.
- C. Temperature, wind, and humidity:
 - 1. Cold weather:

- a) When the mean daily temperature outdoors is less than 40° F, maintain the temperature of the concrete between 50° F and 70° F for the required curing period.
 - b) When necessary, provide proper and adequate heating system capable of maintaining the required heat without injury due to concentration of heat.
 - c) Do not use combustion heaters during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.
2. Hot weather: When necessary, provide wind breaks, fog spraying, shading, sprinkling, ponding, or wet covering with a light colored material, applying as quickly as concrete hardening and finishing operations will allow.
 3. Rate of temperature change: Keep the temperature of the air immediately adjacent to the concrete during and immediately following the curing period as uniform as possible and not exceeding a change of 5° F in any one hour period, or 50° F in any 24 hour period.
- D. Protection from mechanical injury:
- During the curing period, protect the concrete from damaging mechanical disturbances such as heavy shock, load stresses, and excessive vibration.
1. Protect finished concrete surfaces from damage from construction equipment, materials, and methods, by application of curing procedures, and by rain and running water.
 2. Do not load self-supporting structures in such a way as to over stress the concrete.

*****END OF SECTION*****

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SECTION 04100
MORTAR AND GROUT

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 SCOPE OF WORK

Work included in this Section:

1. Mortar and grout for masonry.

1.03 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.04 SUBMITTALS

In accordance with Article 5 of the General Conditions, Project Manual Section 00700.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site.
- B. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperatures to minimum 40° F prior to, during, and 48 hours after completion of masonry work.
- B. Protect construction from direct exposure to wind and sun when erected in ambient air temperature of 99° F in the shade, with relative humidity less than 50%.

1.07 MIX TESTS

- A. Testing of Mortar Mix: in accordance with ASTM C780. Test mortar mix for compressive strength. Refer to structural drawings for required strength.
- B. Testing of Grout Mix: in accordance with ASTM C1019. Test grout mix for compressive strength. Refer to structural drawings for required strength.

PART 2 -- PRODUCTS

2.01 MATERIALS

- A. Portland Cement: ASTM C150, Type I or II (Type I for glass block).
- B. Mortar Aggregate: ASTM C144, standard masonry type.
 1. Provide clean, sharp, well-graded aggregate free from injurious amounts of dust, lumps, shale, alkali, surface coatings, and organic matter complying with UBC Standards.
 2. Not less than 3% shall pass the No. 100 sieve.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Grout "Course": 1 part Portland cement to 2-1/4 parts minimum to 3 parts maximum of damp loose sand to 1/10 part lime putty and 2 parts coarse of maximum 3/8 inch

aggregate with sufficient water to achieve fluid consistency per ASTM C476. Not less than 5% of the sand shall pass No. 100 sieve. Use in grout spaces 2 inches wide or more and in all filled cell construction.

- E. Grout "Fine": 2-1/4 to 3 parts maximum damp, loose sand to 1/2 to 1/4 part lime putty with 1 part Portland cement and sufficient water to achieve fluid consistent per ASTM C476. Not less than 5% of the sand shall pass No. 100 sieve. To be used where shown on Drawings and where grout space is less than 2" in least dimension.
- F. Water: Clean, potable and free from deleterious amounts of acids, alkalis and organic materials.
- G. Lime Putty: Shall be made from pulverized (processed) quick lime or from hydrated lime.

2.02 COLOR

Mortar and Grout Color: Provide pre-ground mineral oxides, non-fading and alkali proof as manufactured by L.M. Scofield or approved equal. The Architect shall select color.

2.03 MORTAR MIXING

- A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270 - Type S.
- B. Add mortar color in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
- C. Do not use anti-freeze compounds to lower the freezing point of mortar. Do not use any admixtures unless specifically accepted in advance by the Architect through the submittal process.
- D. Use mortar within two hours after mixing at temperatures of 80° F, or two-and-one-half hours at temperatures under 50° F.
- E. Mechanically mix in a batch mixer for not less than three minutes, using only sufficient water to produce a mortar that is spreadable and of a workable consistency.
- F. Re-temper mortar with water as required to maintain high plasticity. Do not re-temper mortar after 1-1/2 hours following initial mixing.

2.04 GROUT MIXING

- A. Mix concrete in accordance with ASTM C94.
- B. Add admixtures in accordance with manufacturer's instructions when previously approved. Provide uniformity of mix.
 - a. Waterproofing admixture shall be A.C. Horn's "Hydratite" or approved equal.
 - b. To reduce early water loss and produce expansive action admixture shall be Sika Grout Aid.
- C. Do not use anti-freeze compounds to lower the freezing point of grout.

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Correct conditions detrimental to timely and proper completion of the Work.
- C. Do not proceed until unsatisfactory conditions are corrected.
- D. Beginning of installation means acceptance of conditions.

- E. Request inspection of spaces to be grouted. Do not proceed until all sub-surfaces and spaces are acceptable.

3.02 INSTALLATION

- A. Install mortar and grout to requirements of the specific masonry Sections.
- B. Work grout into masonry cores and cavities to eliminate voids.
- C. Do not displace reinforcement while placing grout.
- D. Remove grout spaces of excess mortar.

*****END OF SECTION*****

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SECTION 04200
REINFORCED UNIT MASONRY SYSTEM

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 SCOPE OF WORK

The work under this section includes furnishing all labor, materials and equipment, and performing all operations in connection with all masonry work, concrete block and glass block, indicated on the Drawings, specified herein, or reasonably required to complete all masonry work. Coordinate with other trades and install all embeds and inserts required.

1.03 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.04 SUBMITTALS

- A. In accordance with Article 5 of the General Conditions, Project Manual Section 00700.
- B. Submit shop drawings indicating bar sizes, spaces, locations, quantities of reinforcement, bending and cutting schedules and spacing devices.
- C. Submit product data on masonry units.

1.05 QUALITY CONTROL

- A. Company specializing in performance of work of this Section for a minimum of 5 years. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Design engineered masonry work under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of California.

1.06 DELIVERY AND STORAGE

All materials shall be delivered, stored and handled so as to prevent the inclusion of foreign materials and/or damage. Packaged materials shall be delivered and stored in original packages until ready for use. Packages or materials showing evidence of damage shall be rejected.

PART 2 -- PRODUCTS

2.01 MASONRY UNITS

- A. Concrete Block shall be hollow concrete masonry units conforming to the requirements for Grade N units, Type I under ASTM Specification C-90.
- B. Masonry Units shall be 8"x8"x16" nominal as manufactured by Orco Block Co. or approved equal (909) 849-7891.
 - 1. Block types, sizes, and patterns as indicated on the drawings.

2.02 MORTAR AND GROUT

- A. Mortar shall be as specified in Section 04100 and shall develop a compressive strength of not less than 750 lbs. per square inch at seven (7) days or less than 1800 pounds per

square inch at twenty-eight (28) days or as specified on the Structural Drawings. The total clay content, including that in the sand, shall not exceed 2 percent of the sand content or 6 percent of the cement content.

- B. Grout fill for cells shall consist coarse grade as specified in Section 04100. Minimum grout strength to be 2000 pounds per square inch (psi) unless otherwise specified on the Structural Drawings.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Single wythe joint reinforcement for CMU: Truss type; hot dip galvanized after fabrication cold-drawn steel conforming to ANSI/ASTM A82.
- B. Reinforcing Steel for CMU: Deformed bar billet type, specified in Section 03200; size as shown on Drawings, unprotected finish.
- C. Strap anchors for CMU: Bent Steel shapes as shown on Drawings or required for complete and proper installation of this Work.

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Correct conditions detrimental to timely and proper completion of the Work.
- C. Do not proceed until unsatisfactory conditions are corrected.
- D. Verify items provided by other Sections of work are properly sized and located.
- E. Verify that built-in items are in proper location, and ready for roughing into masonry work.
- F. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied to other Sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.
- C. Preparation. Concrete surface to receive masonry shall be free from all dirt, oil, curling compound, or other deleterious substance. All such surfaces shall be thoroughly washed with water before laying block and shall be in a condition to provide maximum suction at the time the mortar bed is placed.
- D. Verify that Channel and Anchor placement for Glass Block is at all head and jambs.

3.03 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Lay concrete masonry units in running bond. One Course is one unit and one mortar joint and is equal to 8 inches. Form flush mortar joints. Do not use chipped or broken units.

3.04 ENVIRONMENTAL CONDITIONS

- A. Do not place masonry units when air temperature is below 40 degrees F.
- B. Protect masonry from direct exposure to wind and sun. When erected in ambient air temperature of 99 degrees F in the shade, with relative humidity less than 50%.

3.05 PLACING AND BONDING – CMU

A. General:

1. Do not commence installation of the work of this Section until horizontal and vertical alignment of foundation is within 1/2" of plumb and the lines shown on the Drawings.
2. Use masonry saws to cut and fit masonry units.
3. Set units plumb, true to line, and with level courses accurately spaced.
4. Clean the top surface of foundation free from dirt, debris, and laitance, and expose the aggregate prior to start of installing first course of sandblasting or water blasting.
5. Accurately fit the units to plumbing, ducts, openings, and other interfaces, neatly patching all holes.
6. Keep the walls continuously clean, preventing grout and mortar stains. If grout does run over, clean immediately.
7. All bolts embedded in masonry shall be grouted in place with not less than one inch of grout between the bolt and a masonry unit and shall be accurately set with templates.

B. Do not use chipped or broken units. If such units are discovered in the finished wall, the Architect may require their immediate removal and replacement with new units at no additional cost to the Owner.

C. Laying up: Pattern shall be running bond.

1. Place units in mortar with full shoved bed and head joints.
2. Align vertical cells of hollow units to maintain a clear and unobstructed system of flues.
3. Hold racking to an absolute minimum.
4. Provide running bond with vertical joints located at center of masonry units in the alternate course below.
5. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
6. Interlock intersections and external corners.

D. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.

E. Remove excess mortar as Work progresses.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

H. Cut mortar joints flush where resilient base is scheduled. Joints shall be 3/8" thick. Split block joints shall be raked.

I. Isolate masonry partitions from vertical structural framing members with a control joint.

J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.06 REINFORCEMENT AND ANCHORAGES -- CONCRETE UNIT MASONRY

A. Install horizontal joint reinforcement 16 inches unless structural plans note otherwise.

B. Place joint reinforcement continuous in first joint below top of walls.

- C. Lap joint reinforcement ends minimum 40 bar diameters. Install reinforcement in first horizontal course above openings. Extend minimum 24 inches each side of openings.
- D. Support and secure reinforcing bars from displacement. Maintain position with 1/2 inch of dimensioned position. Provide metal accessories to ensure adequate alignment of steel during grout filling operations.
- E. Embed anchors attached to structural steel members. Embed anchorages in every second block joint.
- F. Reinforce joint corners and intersections with strap anchors 16 inches OC.

3.07 GROUTED COMPONENTS

- A. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- B. Place and consolidate grout fill without displacing reinforcing. Solidly fill all cells and courses unless otherwise indicated on the Drawings. Maximum grout lift shall be 24 inches.
- C. Consolidate grout at time of pour by puddling with mechanical vibrator to completely fit all voids and interstices in the masonry work.

3.08 ENGINEERED MASONRY

- A. Lay masonry units with core cells vertically aligned clear of mortar and unobstructed.
- B. Place mortar in masonry unit bed joints back 1/4 inch from edge of unit grout spaces, bevel back and upward. Permit mortar to cure seven (7) days before placing grout.
- C. Reinforce masonry unit cores with reinforcement bars and grout as indicated.
- D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters. Splice reinforcement in accordance with Section 03200. See Drawings for indication of locations where splicing is unacceptable.
- E. Wet masonry unit surfaces in contact with grout just prior to grout placement.
- F. Grout spaces less than 2 inches in width with fine grout using low lift grouting techniques. Grout spaces equal to or greater than 2 inches in width with course grout using high or low lift grouting techniques.
- G. When grouting is stopped for more than one hour, terminate grout 1-1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.
- H. Low Lift Grouting: Place first lift of grout to a height of 16 inches and rod for grout consolidation. Place subsequent lifts in 8-inch increments and rod for grout consolidation.

3.09 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control joints.
- B. Install performed control joint devices in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions. Control joints shall be 12'-0" O.C. maximum.
- C. Size control joint in accordance with Section 07900 for sealant performance.

3.10 BUILT-IN WORK

- A. As work progresses, build in metal doorframes, anchor bolts, plates, and other items furnished by other Sections.
- B. Build in items plumb and level.
- C. Bed anchors of metal doorframes in adjacent mortar joints. Fill frame voids solid with grout. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

D. Do not build in organic materials subject to deterioration.

3.11 DEFECTIVE MASONRY OR MATERIALS

Any masonry materials delivered to the job site that do not conform to the requirements of these Specifications, shall be immediately removed from the work. Completed masonry that does not conform to the requirements of the Drawings and these Specifications shall be deemed defective materials and/or workmanship, and the Contractor shall remove it from the site, at no extra cost to the Owner.

3.12 CURING

All masonry work shall be kept continuously moist until and for not less than three (3) days after grouting. Curing water shall not be permitted to pond around buildings or structures.

3.13 TOLERANCES

- A. Maximum Variation From Alignment of Columns: 1/4 inch.
- B. Maximum Variation From Unit to Adjacent Unit: 1/32 inch.
- C. Maximum Variation From Plane of Wall: 1/4 in. in 10 feet and 1/2 in. in 20 feet or more.
- D. Maximum Variation From Plumb: 1/4 inch per story non-cumulative.
- E. Maximum Variation From Level Coursing: 1/8 inch in 3 feet, 1/4 inch in 10 feet, and 1/2 inch in 30 feet.
- F. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

3.14 CUTTING AND FITTING

- A. Cut and fit for pipes, conduits, sleeves, and grounds. Coordinate with other Sections of work to provide correct size, shape, and location.
- B. Obtain Architect approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.15 CLEANING

- A. Clean surfaces of masonry as required for proper application of the specified finishes.
- B. Concrete Unit Masonry:
 - 1. Use all means necessary to prevent staining of the exposed face by mortar, grout, and other material.
 - 2. Remove mortar and grout stains as the work progresses.
 - 3. Upon completion of the work of this Section, clean all exposed veneer surfaces with a 10% solution of muriatic acid in clear water, using fiber bristle brooms or brushes, followed by thorough rinsing with clear water.
 - 4. In the event ordinary cleaning is not adequate, use a light sandblasting or other means as directed by the Architect, and at no additional cost to the Owner.
 - 5. Replace defective mortar. Match adjacent work.

3.16 TEST & INSPECTIONS

- A. Refer to structural drawings.
- B. Mortar shall be tested as per U.B.C. Standards.
- C. Grout shall be tested as per U.B.C. Standards.

3.17 PROTECTION OF FINISHED WORK

- A. Protect finished installation.

- B. Without damaging completed work, provide protective boards at exposed external corners, which may be damaged by construction activities.

*****END OF SECTION*****

SECTION 04413
GRANITE SURFACING

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 SCOPE

This specification includes fabricated granite components required for the completion of granite work indicated by the contract documents.

1.03 DEFINITION OF TERMS

The definition of terms used in these specifications shall be those published by the National Building Granite Quarries Association, Inc.

1.04 SOURCE OF SUPPLY

All granite shall be obtained from quarries having adequate capacity and facilities to meet the specified requirements. Fabrication shall be by a firm equipped to process the material promptly in accordance with specifications. Evidence to this effect shall be provided by the supplier if required by the Design Professional.

1.05 SAMPLES

Sufficient samples of granite shall be submitted to the Design Professional through the General Contractor.

1. Each sample set shall include three samples.
2. Sample set shall show anticipated range of color, natural variations of grain structure, inclusions and any other visual characteristics to be expected in the final installation.
3. Approved sample set shall establish the standard by which stonework will be judged.

1.06 SHOP DRAWINGS

The granite supplier shall submit: copies of required shop drawings to the Design Professional for approval. These drawings shall show all bedding, bonding, jointing and anchoring details, and the dimensions of each piece of granite. No final sizing or finishing shall be done until the shop drawings for that part of the work have been approved.

1.07 DEFECTIVE WORK

Any piece of granite showing manufacturing flaws upon receipt at the storage yard or building site shall be referred to the Design Professional for determination as to whether it shall be rejected, patched, or redressed for use.

1.08 REFERENCES

ASTM A 123-02: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

ASTM C 97-02: Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.

ASTM C 119-04: Terminology Relating to Dimensions Stone

ASTM C 170-90 (1999): Test Method for Compressive Strength of Dimension stone

ASTM C 615-03: Specification for Granite Dimension Stone

ASTM C 880-98: Test Method for Flexural Strength of Dimensional Stone

1.09 METRIC CONVERSIONS:

The following metric conversions shall apply where English measurements are indicated in the text:

1. 1/16 inch (1.5 mm)
2. 1/8 inch (3 mm)
3. 3/16 inch (5 mm)
4. ¼ inch (6 mm)
5. 5/16 inch (8 mm)
6. 3/8 inch (10 mm)
7. ½ inch (12 mm)
8. 5/8 inch (15 mm)
9. ¾ inch (20 mm)
10. 1 inch (25 mm)
11. 1-1/4 inches (32 mm)
12. 1-1/2 inches (40 mm)
13. 1-5/8 inches (40 mm)
14. 2 inches (50 mm)
15. 3 inches (75 mm)
16. 4 inches (100 mm)
17. 6 inches (150 mm)
18. 8 inches (200 mm)
19. 12 inches (300 mm)

1.010 SUBSTITUTIONS

Substitutions will be considered per Article 5 of the General Conditions, Project Manual Section 00700.

1.11 SUBMITTALS

In accordance with Article 5 of the General Conditions, Project Manual Section 00700.

PART 2 -- MATERIALS

2.01 GRANITE

Granite Standard: Granite shall comply with ASTM C 615, "Standard Specification for Granite Dimension Stone" for material characteristics, physical requirements, and sampling for selection of granite.

GENERAL: All granite shall be of standard architectural grade, free of cracks, seams, or starts, which may impair its structural integrity or function. Color or other visual characteristics indigenous to the particular material and adequately demonstrated in the sampling or mock-up phases will be accepted provided they do not compromise the structural or durability capabilities

of the material. Texture and finish shall be within the range of samples approved by the Design Professional.

Granite: The specifying party shall provide the following information for each different granite or finish required:

1. Granite Variety
2. Location (use or application on the building)
3. Nominal Thickness: (identify the nominal thickness of each application in inches or mm)
4. Finish: (select one of the following)
 - a. Polished
 - b. Honed
 - c. Fine rubbed finishes
 - d. Sawn, 4-cut
 - e. Sawn, 6-cut
 - f. Sawn, 8-cut
 - g. Thermal
 - h. Coarse stippled finish
 - i. Pointed
 - j. Rough cut finish
 - k. Split face

Comment: Commonly available finishes are defined as follows:

Polished: Mirror gloss, with sharp reflections.

Honed: Dull sheen, without reflections.

Fine rubbed: Smooth and free from scratches; no sheen.

Rubbed: Plane surface with occasional slight "trails" or scratches.

Shot ground: Plane surface with pronounced circular markings or trails having no regular pattern.

Thermal: Finish produced by application of high temperature flame to the surface. Large surfaces may have shadow lines caused by overlapping of the torch.

Sand blasted, coarse stippled: Coarse plane surface produced by blasting with an abrasive; coarseness varies with type of preparatory finish and grain structure of the granite.

8-cut: Fine bush-hammered; interrupted parallel markings not over 3/32" apart; a corrugated finish, smoother near arris lines and on small surfaces.

6-cut: Medium bush-hammered finish, similar to but coarser than 8cut, with markings not more than 1/8" apart.

4-cut: Coarse bush-hammered finish with same characteristics as 6cut, but with markings not more than 7/32" apart.

Split Face: Surface resulting from breaking stone along a natural cleavage plane. Surface has projections and depressions; edges are not true.

Rock Face (or Rock Pitch): Similar to split face except face of stone at edge is pitched to achieve trued arris lines, thus creating bolder projections from the plane of the arris lines.

Pointed, Rough Sawn: A rough and uneven surface resulting from splitting, pointing and/or rough sawing the granite.

Comment: SPECIAL FINISHES of many kinds are also offered by members of the Association to meet special design requirements. Information and samples will gladly be supplied upon request.

PART 3 -- FABRICATION

3.01 DIMENSIONAL TOLERANCE (E)

Panel Thickness $\frac{3}{8}$ " or $\frac{1}{2}$ " (10 or 13 mm)	$\pm\frac{1}{32}$ " (± 0.8 mm)
Panel Thickness $\frac{3}{4}$ " to $1\frac{1}{8}$ " (20 to 41 mm)	$\pm\frac{1}{8}$ " (± 3 mm)
Panel Thickness Greater than $1\frac{5}{8}$ " (41 mm)	$\pm\frac{1}{4}$ " (± 6 mm)
Panel Face Dimension	$\pm\frac{1}{16}$ " (± 1.5 mm)
Face variation from rectangular (Maximum out of Square) (non-Cumulative)	$\pm\frac{1}{16}$ " (± 1.5 mm)
Heads/Calibrated Edges	$\pm\frac{1}{16}$ " (± 1.5 mm)
Quirk Miters (width of Nose) up to $\frac{1}{4}$ "	-0; +25% of dim
Quirk Miters (width of Nose) over $\frac{1}{4}$ "	-0, $+\frac{1}{16}$ " (-0, + 1.5 mm)
Location of Back Anchors	$\pm\frac{1}{8}$ " (± 3 mm)
Depth of Back Anchors	-0, $+\frac{1}{16}$ " (-0, + 1.5 mm)
Location of Holes for Precast Anchors	$\pm\frac{1}{4}$ " (± 6 mm)
Hole Depth for precast anchors	$\pm\frac{1}{16}$ " (± 1.5 mm)
Anchor Slots – from face to centerline of Slot:	$\pm\frac{1}{16}$ " (± 1.5 mm)
Anchor Slots – Lateral Placement:	$\pm\frac{1}{4}$ " (± 6 mm)
Anchor Slots – Width:	$\pm\frac{1}{16}$ " (± 1.5 mm)
Anchor Slots – Depth at Maximum:	$\pm\frac{1}{8}$ " (± 3 mm)
Anchor Holes – from face to centerline of Hole:	$\pm\frac{1}{16}$ " (± 1.5 mm)
Anchor Holes – Lateral Placement:	$\pm\frac{1}{8}$ " (± 3 mm)
Anchor Holes – Diameter	$\pm\frac{1}{16}$ " (± 1.5 mm)
Anchor Holes – Depth:	$\pm\frac{1}{8}$ " (± 3 mm)
Anchor Sinkages – Depth:	-0, $+\frac{1}{8}$ " (-0, +3 mm)
Continuous Kerfs – from face to centerline of Kerf	$\pm\frac{1}{16}$ " (± 1.5 mm)
Continuous Kerfs – Maximum Bow in 4'-0" (1.2m):	$\pm\frac{1}{16}$ " (± 1.5 mm)
Continuous Kerfs – Width:	$\pm\frac{1}{16}$ " (± 1.5 mm)