SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Preparation and implementation, including reporting and documentation, of a Waste Management Plan for reusing, recycling, salvage or disposal of non-hazardous waste materials generated during demolition and/or new construction (Construction & Demolition (C&D) Waste), to foster material recovery and re-use and to minimize disposal in land fills.

B. Related Sections
   1. Section 01 30 00 Administrative Requirements

1.02 REFERENCES

A. California Integrated Waste management Act of 1989 (AB 939)

B. California Code of Regulations Title 14, Section 18700

1.03 ACTION SUBMITTALS

A. Waste Management Plan (Appendix A): Within 10 calendar days after the Notice to Proceed and prior to any waste removal, submit the following to the Architect for review and approval. Update quarterly. Include:
   1. Materials to be recycled, reused, or salvaged, either onsite or offsite.
   2. Estimates of construction waste quantity (in tons) by type of material. (If waste is measured by volume, give factors for conversion to weight in tons.)
   3. Procedures for recycling/ reuse program.
   4. Permit or license and location of Project waste-disposal areas.
   5. Site plan for placement of waste containers.

B. Waste Management Monthly Progress Report (Appendix B): Summary of waste generated by Project, monthly with Application for Payment. Include:
   1. Firms accepting the recovered or waste materials.
   2. Type and location of accepting facilities (landfill, recovery facility, used materials yard, etc.). If materials are reused or recycled on the Project site, location should be designated as "on-site reuse / recycling".
   3. Type of materials and net weight (tons) of each.
   4. Value of the materials or disposal fee paid.
   5. Attach weigh bills and other documentation confirming amount and disposal location of waste materials.

C. Waste Management Final Compliance Report: Final update of Waste Management Plan to provide summary of total waste generated by Project.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Collection and separation of all construction waste materials generated on-site, reuse or recycling on-site, transportation to approved recyclers or reuse organizations, or transportation to legally designated landfills, for the purpose of recycling salvaging and/or reusing a minimum of 50% of the construction waste generated.

PART 3 - EXECUTION

3.01 IMPLEMENTATION

A. Implement approved Waste Management Plan including collecting, segregating, storing, transporting and documenting each type of waste material generated, recycled or reused, or disposed in landfills.

B. Designate an on-site person to be responsible for instructing workers and overseeing the sorting and recording of waste/recyclable materials.

C. Include waste management and recycling in worker orientation and as an agenda item for regular Project meetings.

D. Recyclable and waste bin areas shall be limited to areas approved on the Waste Management Plan. Keep recycling and waste bins neat and clearly marked to avoid contamination of materials.

3.02 ATTACHMENTS

A. Appendix A: Waste Management Plan

B. Appendix B: Waste Management Monthly Progress Report

END OF SECTION

HMC Architects

APPENDIX A

WASTE MANAGEMENT PLAN

Date: _____

Within 10 calendar days after the Notice to Proceed and prior to any waste removal, the Contractor [Construction Manager] shall submit the following to the Architect for review and approval. Update quarterly.

PROJECT:

OWNER:

CONTRACTOR [CONSTRUCTION MANAGER]

Name:

Address:

Telephone, fax, email:

Material Type (1)	Estimated Tons Re-cycled (2)	Estimated Tons Reused (3)	Estimated Tons Sal-vaged (4)	Estimated Tons Land-filled (5)	Proposed Disposal or Recycling Facili-ty (6)
Total					
Diversion Rate: Columns [(2)+(3)+(4)] / [(2)+(3)+(4)+(5)]					

(1) Provide type of material targeted for recycling, reuse, and/or salvage, either on or off site, and include a category for general waste materials requiring landfill disposal.

(2) through (4) Provide estimated quantities (in tons) of recyclable, reusable, or salvageable waste materials anticipated to be generated.

(5) Provide estimated quantities (in tons) of material to be disposed in landfill.

(6) Provide destination of recycled, salvaged, and disposed materials (i.e. onsite, recycling facility, etc.)

General: Attach proposed Recycling & Waste Bin Location Plan.

Attach name and contact data for each recycling or disposal destination to be used.

APPENDIX B

WASTE MANAGEMENT MONTHLY PROGRESS REPORT

Starting Date _____

Ending Date _____

Contractor [Construction Manager] shall submit this report monthly along with Application for Payment.

PROJECT: OWNER:

CONTRACTOR [CONSTRUCTION MANAGER]

Name:

Address:

Telephone, fax, email:

Material Type (1)	Actual Tons Recycled (2)	Actual Tons Reused (3)	Actual Tons Salvaged (4)	Actual Tons Landfilled (5)	Disposal or Recycling Facility (6)
Total					
Diversion Rate: Columns [(2)+(3)+(4)] / [(2)+(3)+(4)+(5)]					

(1) Provide type of materials recycled, reused, and/or salvaged, either on or off site, and include a category for general waste materials disposed in a landfill.

(2) through (4) Provide quantities (in tons) of recyclable, reusable, or salvageable waste materials generated.

(5) Provide quantities (in tons) of material disposed in landfill.

(6) Provide destination of recycled, salvaged, and disposed materials (i.e. onsite, recycling facility, etc.)

General: Attach name and contact data for each recycling or disposal destination to be used.

SECTION 01 91 13

GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. General requirements that apply to implementation of commissioning without regard to systems, subsystems, and equipment being commissioned.

B. Related Sections
   1. Division 01, General Requirements for specific requirements for commissioning HVAC systems.

1.02 DEFINITIONS

A. BoD: Basis of Design.

B. CxA: Commissioning Authority.

C. OPR: Owner's Project Requirements.

D. Systems, Subsystems, and Equipment: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, and equipment.

E. TAB: Testing, Adjusting, and Balancing.

1.03 COMMISSIONING TEAM

A. Members Appointed by Contractor(s): Individuals, each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions. The commissioning team shall consist of, but not be limited to, representatives of each Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.

B. Members Appointed by Owner:
   1. CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.
   2. Representatives of the facility user and operation and maintenance personnel.
   3. Architect and engineering design professionals.

1.04 OWNER'S RESPONSIBILITIES

A. Provide the OPR documentation to the CxA and each Contractor for use in developing the commissioning plan; systems manual; operation and maintenance training plan; and testing plans and checklists.

B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities including, but not limited to, the following:
   1. Coordination meetings.
   2. Training in operation and maintenance of systems, subsystems, and equipment.
   3. Testing meetings.
   4. Demonstration of operation of systems, subsystems, and equipment.

C. Provide the BoD documents prepared by Architect and approved by Owner, to the CxA and each Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

1.05 CONTRACTOR'S RESPONSIBILITIES

A. Provide utility services required for the commissioning process.

B. Each Contractor shall assign representatives with expertise and authority to act on behalf of the Contractor and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
   1. Participate in design- and construction-phase coordination meetings.
   2. Participate in maintenance orientation and inspection.
   3. Participate in operation and maintenance training sessions.
   4. Participate in final review at acceptance meeting.
   5. Certify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
   6. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
   7. Review and approve final commissioning documentation.

C. Subcontractors shall assign representatives with expertise and authority to act on behalf of subcontractors and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
   1. Participate in design- and construction-phase coordination meetings.
   2. Participate in maintenance orientation and inspection.
   3. Participate in procedures meeting for testing.
   4. Participate in final review at acceptance meeting.
   5. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to CxA for incorporation into the commissioning plan. Update schedule on a weekly basis throughout the construction period.
   6. Provide information to the CxA for developing construction-phase commissioning plan.
   7. Participate in training sessions for Owner's operation and maintenance personnel.

8. Provide updated Project Record Documents to the CxA on a daily basis.
9. Gather and submit operation and maintenance data for systems, subsystems, and equipment to the CxA, as specified in Division 01 Section "Operation and Maintenance Data."
10. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures and participate in testing of installed systems, subsystems, and equipment.

1.06 CxA'S RESPONSIBILITIES

A. Organize and lead the commissioning team.

B. Prepare a construction-phase commissioning plan. Collaborate with each Contractor and with subcontractors to develop test and inspection procedures. Include design changes and scheduled commissioning activities coordinated with overall Project schedule. Identify commissioning team member responsibilities, by name, firm, and trade specialty, for performance of each commissioning task.

C. Review and comment on submittals from each Contractor for compliance with the OPR, BoD, Contract Documents, and construction-phase commissioning plan. Review and comment on performance expectations of systems and equipment and interfaces between systems relating to the OPR and BoD.

D. Convene commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss progress of the commissioning processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The CxA shall prepare and distribute minutes to commissioning team members and attendees within five workdays of the commissioning meeting.

E. At the beginning of the construction phase, conduct an initial construction-phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for operation and maintenance submittals; operation and maintenance training sessions; TAB Work; and Project completion.

F. Observe and inspect construction and report progress and deficiencies. In addition to compliance with the OPR, BoD, and Contract Documents, inspect systems and equipment installation for adequate accessibility for maintenance and component replacement or repair.

G. Prepare Project-specific test and inspection procedures and checklists.

H. Schedule, direct, witness, and document tests, inspections, and systems startup.

I. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.

J. Certify date of acceptance and startup for each item of equipment for start of warranty periods.

K. Review Project Record Documents for accuracy. Request revisions from Contractor to achieve accuracy. Project Record Documents requirements are specified in Division 01 Section "Project Record Documents."

L. Review and comment on operation and maintenance documentation and systems manual outline for compliance with the OPR, BoD, and Contract Documents. Operation and maintenance documentation requirements are specified in Division 01 Section "Operation and Maintenance Data."

M. Prepare operation and maintenance training program and provide qualified instructors to conduct operation and maintenance training. Operation and maintenance training is specified in Division 01 Section "Demonstration and Training."

N. Videotape and edit training sessions.

O. Prepare commissioning reports.

P. Assemble the final commissioning documentation, including the commissioning report and Project Record Documents.

1.07 COMMISSIONING DOCUMENTATION

A. Index of Commissioning Documents: CxA shall prepare an index to include storage location of each document.

B. OPR: A written document, prepared by Owner, that details the functional requirements of Project and expectations of how it will be used and operated. This document includes Project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information.

C. BoD Document: A document, prepared by Architect, that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

D. Commissioning Plan: A document, prepared by CxA, that outlines the schedule, allocation of resources, and documentation requirements of the commissioning process, and shall include, but is not limited to the following:
   1. Plan for delivery and review of submittals, systems manuals, and other documents and reports. Identification of the relationship of these documents to other functions and a detailed description of submittals that are required to support the commissioning processes. Submittal dates shall include the latest date approved submittals must be received without adversely affecting commissioning plan.
   2. Description of the organization, layout, and content of commissioning documentation (including systems manual) and a detailed description of documents to be provided along with identification of responsible parties.
   3. Identification of systems and equipment to be commissioned.
   4. Description of schedules for testing procedures along with identification of parties involved in performing and verifying tests.

5. Identification of items that must be completed before the next operation can proceed.
6. Description of responsibilities of commissioning team members.
7. Description of observations to be made.
8. Description of requirements for operation and maintenance training, including required training materials.
9. Description of expected performance for systems, subsystems, equipment, and controls.
10. Schedule for commissioning activities with specific dates coordinated with overall construction schedule.
11. Identification of installed systems, subsystems, and equipment, including design changes that occurred during the construction phase.
12. Process and schedule for documenting changes on a continuous basis to appear in Project Record Documents.
13. Process and schedule for completing pre-start and startup checklists for systems, subsystems, and equipment to be verified and tested.
14. Step-by-step procedures for testing systems, subsystems, and equipment with descriptions for methods of verifying relevant data, recording the results obtained, and listing parties involved in performing and verifying tests.

E. Test Checklists: CxA, with assistance of Architect, shall develop test checklists for each system, subsystem, or equipment including interfaces and interlocks, and include a separate entry, with space for comments, for each item to be tested. Prepare separate checklists for each mode of operation and provide space to indicate whether the mode under test responded as required. Provide space for testing personnel to sign off on each checklist. Specific checklist content requirements are specified in Division 01, General Requirements for commissioning HVAC systems Each checklist, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:
1. Name and identification code of tested item.
2. Test number.
3. Time and date of test.
4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
5. Dated signatures of the person performing test and of the witness, if applicable.
6. Individuals present for test.
7. Deficiencies.
8. Issue number, if any, generated as the result of test.

F. Certificate of Readiness: Certificate of Readiness shall be signed by each Contractor, Subcontractor(s), Installer(s), and CxA certifying that systems, subsystems, equipment, and associated controls are ready for testing. Completed test checklists signed by the responsible parties shall accompany this certificate.

G. Test and Inspection Reports: CxA shall record test data, observations, and measurements on test checklists. Photographs, forms, and other means appropriate for the application shall be included with data. CxA shall compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.

H. Corrective Action Documents: CxA shall document corrective action taken for systems and equipment that fail tests. Include required modifications to systems and equipment and revisions to test procedures, if any. Retest systems and equipment requiring corrective action and document retest results.

I. Issues Log: CxA shall prepare and maintain an issues log that describes design, installation, and performance issues that are at variance with the OPR, BoD, and Contract Documents. Identify and track issues as they are encountered, documenting the status of unresolved and resolved issues.
   1. Creating an Issues Log Entry:
      a. Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.
      b. Assign a descriptive title of the issue.
      c. Identify date and time of the issue.
      d. Identify test number of test being performed at the time of the observation, if applicable, for cross-reference.
      e. Identify system, subsystem, and equipment to which the issue applies.
      f. Identify location of system, subsystem, and equipment.
      g. Include information that may be helpful in diagnosing or evaluating the issue.
      h. Note recommended corrective action.
      i. Identify commissioning team member responsible for corrective action.
      j. Identify expected date of correction.
      k. Identify person documenting the issue.
   2. Documenting Issue Resolution:
      a. Log date correction is completed or the issue is resolved.
      b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.
      c. Identify changes to the OPR, BoD, or Contract Documents that may require action.
      d. State that correction was completed and system, subsystem, and equipment is ready for retest, if applicable.
      e. Identify person(s) who corrected or resolved the issue.
      f. Identify person(s) documenting the issue resolution.
   3. Issues Log Report: On a periodic basis, but not less than for each commissioning team meeting, CxA shall prepare a written narrative for review of outstanding issues and a status update of the issues log. As a minimum, CxA shall include the following information in the issues log and expand it in the narrative:
      a. Issue number and title.
      b. Date of the identification of the issue.
      c. Name of the commissioning team member assigned responsibility for resolution.
      d. Expected date of correction.

J. Commissioning Report: CxA shall document results of the commissioning process including unresolved issues and performance of systems, subsystems, and equipment. The commissioning report shall indicate whether systems, subsystems, and equipment have been completed and are performing according to the OPR, BoD, and Contract Documents. The commissioning report shall include, but is not limited to, the following:
   1. Lists and explanations of substitutions; compromises; variances in the OPR, BoD, and Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. This report shall be used to evaluate systems, subsystems, and equipment and shall serve as a future reference document during Owner occupancy and operation. It shall describe components and performance that exceed requirements of the OPR, BoD, and Contract Documents and those that do not meet requirements of the OPR, BoD, and Contract Documents. It may also include a recommendation for accepting or rejecting systems, subsystems, and equipment.
   2. OPR and BoD documentation.
   3. Commissioning plan.
   4. Testing plans and reports.
   5. Corrective modification documentation.
   6. Issues log.
   7. Completed test checklists.
   8. Listing of off-season test(s) not performed and a schedule for their completion.

K. Systems Manual: CxA shall gather required information and compile systems manual. Systems manual shall include, but is not limited to, the following:
   1. OPR and BoD, including system narratives, schematics, and changes made throughout the Project.
   2. Project Record Documents as specified in Division 01 Section "Project Record Documents."
   3. Final commissioning plan.
   4. Commissioning report.
   5. Operation and maintenance data as specified in Division 01 Section "Operation and Maintenance Data."

1.08 SUBMITTALS

A. Commissioning Plan Pre-final Submittal: CxA shall submit two hard copies of pre-final commissioning plan. Deliver one copy to each Contractor, one to Owner, and one to Architect. Present submittal in sufficient detail to evaluate data collection and arrangement process. One copy, with review comments, will be returned to the CxA for preparation of the final construction-phase commissioning plan.

B. Commissioning Plan Final Submittal: CxA shall submit two hard copies and two sets of electronically formatted information of final commissioning plan. Deliver one hard copy and one set of discs to Owner, and one copy to Architect. The final submittal must address previous review comments. The final submittal shall include a copy of the pre-final submittal review comments along with a response to each item.

C. Test Checklists and Report Forms: CxA shall submit sample checklists and forms to each Contractor quality-control manager and subcontractors for review and comment. Submit two copies of each checklist and report form.

D. Certificates of Readiness: CxA shall submit Certificates of Readiness.

E. Test and Inspection Reports: CxA shall submit test and inspection reports.

F. Corrective Action Documents: CxA shall submit corrective action documents.

G. Pre-final Commissioning Report Submittal: CxA shall submit two hard copies of the pre-final commissioning report. Include a copy of the preliminary submittal review comments along with CxA's response to each item. CxA shall deliver one copy to Owner and one copy to Architect. One copy, with review comments, will be returned to the CxA for preparation of final submittal.

H. Final Commissioning Report Submittal: CxA shall submit two hard copies and two sets of electronically formatted information of the final commissioning report. CxA shall deliver one hard copy and one set of discs to Owner, and one copy to Architect. The final submittal must address previous review comments and shall include a copy of the pre-final submittal review comments along with a response to each item.

1.09 QUALITY ASSURANCE

A. Instructor Qualifications: Factory-authorized service representatives, experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment.

B. Test Equipment Calibration: Comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated within six months prior to use.

1.010 COORDINATION

A. Coordinating Meetings: CxA shall conduct weekly coordination meetings of the commissioning team to review progress on the commissioning plan, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.

B. Pre-testing Meetings: CxA shall conduct pretest meetings of the commissioning team to review startup reports, pretest inspection results, testing procedures, testing personnel and instrumentation requirements, and manufacturers' authorized service representative services for each system, subsystem, equipment, and component to be tested.

C. Testing Coordination: CxA shall coordinate sequence of testing activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

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

D. Manufacturers' Field Services: CxA shall coordinate services of manufacturers' field services.

PART 2 - PRODUCTS

2.01 NOT USED.

PART 3 - EXECUTION

3.01 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS

A. Training Preparation Conference: Before operation and maintenance training, CxA shall convene a training preparation conference to include Owner's operation and maintenance personnel, each Contractor, and subcontractors

1. Review the OPR and BoD.
2. Review installed systems, subsystems, and equipment.
3. Review instructor qualifications.
4. Review instructional methods and procedures.
5. Review training module outlines and contents.
6. Review course materials (including operation and maintenance manuals).
7. Inspect and discuss locations and other facilities required for instruction.
8. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.
9. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

3.02 TRAINING MODULES: Develop an instruction program that includes individual training modules for each system, subsystem, and equipment as specified in Division 01, General Requirements for Demonstration and Training.

END OF SECTION

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Remove designated building equipment, fixtures, components and utilities to permit installation of new construction.

B. Include Work required to demolish and remove elements of existing construction including partitions, ceilings, flooring, walls, concrete, paving [and sub base], doors, windows and similar elements of existing building construction, all as noted on Drawings or as required to permit installation of new construction. Refer to Cutting and Patching in Section 01 70 00 for differentiation between "Demolition" and "Cutting and Patching".

1.02 REFERENCES

A. CBC - 2010 California Building Code
   1. CBC-19 – CBC Chapter 19, Concrete
   2. CBC-33 – CBC Chapter 33, Safeguards During Construction

B. CCR - California Code of Regulations
   1. CCR-8.4 - Title 8, Subchapter 4, Construction Safety Orders

C. CFC - 2010 California Fire Code (CCR Title 24, Part 9)
   1. CFC-5 – CFC Chapter 5, Fire Fighter Safety Requirements
   2. CFC-9 – CFC Chapter 9, Fire Suppression Systems
   3. CFC-14 – CFC Chapter 14, Fire Safety During Construction and Demolition
   4. CFC-27 – CFC Chapter 27, Hazardous Materials

D. ICRI - International Concrete Repair Institute.

E. NFPA - National Fire Protection Association
   1. NFPA 241- Safeguarding Construction, Alteration and Demolition Operations

F. SCAQMD – South Coast Air Quality Management District
   1. SCAQMD-1403 - Rule 1403, Asbestos Emissions from Demolition / Renovation Activities

1.03 SUBMITTALS

A. Project Record Documents accurately record actual locations of capped utilities.

1.04 EXISTING CONDITIONS

A. Before beginning Work, investigate and verify existence and location of mechanical, drainage, and electrical systems and other construction affecting Work, including underground utilities.
   1. Before construction, survey and record points of connection of utility services.
   2. Locate invert elevation at points of connection to existing sanitary - and storm-sewers, water-service piping, and underground electrical services.
   3. Employ a utility service locator company to locate underground utilities.
   4. Verify Owner's Record Drawings.
   5. Furnish survey of existing utilities.

1.05 HAZARDOUS MATERIALS

A. As required by Rule 1403, Contractor shall file written notification with South Coast Air Quality Management District at least 10 days prior to commencing Work of this Section. Certification of required notifications shall be submitted to Architect under provisions of Division 01, General Requirements.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

3.01 PREPARATION

A. Disconnect, remove and cap designated utility services within demolition areas. Notify Owner 48 hours in advance of any utility shut-down.

B. Protection:
   1. Protect existing items that are not indicated to be altered.
   2. Adequately protect staff and public from harm and accident during demolition operations by the erection of proper barricades, signs, lighting, guard rails or other safety precautions. Conform to Title 8, Subchapter 4, CCR and NFPA 241.
   3. Protective Devices: Install substantial enclosures, weatherproof and dust-proof shields, protective covers, screens and similar devices. Erect and move when necessary to permit use of existing rooms, areas or facilities. Remove entirely when their use is no longer essential. Patch or repair all areas where devices have been removed.

3.02 TEMPORARY MEASURES - LIFE SAFETY

A. Emergency Exits: No enclosure, shield or protective covering shall interfere with use of emergency exits in existing facilities at any time. Rated egress systems shall provide temporary rated egress.

B. Maintain fully charged certified compliant fire extinguishers and water hoses readily available during demolition operations. Test electrical conductors for disconnection prior to removing.

C. Provide temporary, but equivalent, fire alarm, detection or suppression systems when any system is impaired by Work of this Section. Temporary systems shall be inspected and tested monthly or at other more frequent intervals as required by Owner.
   1. Impairment of fire protection systems, Section 1408.6: Impairments to any fire protection system shall be in accordance with Section 901.
   2. Systems out of Service: Per requirement of Section 901.7 through 901.7.6, California Fire Code.

D. Maintain free and unobstructed access to emergency services per Title 19, CFC 503.1; 503.1.1, 503.4; and Appendix D, 1410.1; 1412.1 and when required by Owner.

E. Post NO SMOKING signs in English and Spanish, in number and location as approved by Architect.

F. Reduce flammable and combustible fire load to minimum by daily removal of debris.

G. Instruct construction personnel in fire safety and fire drill policies appropriate for areas where demolition operations occur.

H. Deployment, disposition, administration and implementation of any and all safety measures shall be sole responsibility of Contractor.

3.03 EXECUTION

A. Demolish in orderly and careful manner. Maintain protected egress and access at all times.

B. Except where noted otherwise, immediately remove demolished materials from site and dispose legally. Do not utilize Owner's disposal system.

C. Remove materials to be re-installed or retained in manner to prevent damage. Store and protect until re-installation.

D. Do not burn or bury materials on site.

E. Upon completion of Work, leave areas of Work in clean condition.

3.04 SELECTIVE DEMOLITION, REPAIR AND ALTERATIONS WORK

A. New and existing Work that is cut into, altered, damaged, relocated or reinstalled shall be restored to original conditions. Workmanship and materials to conform to applicable provisions of other applicable Sections of Specifications.

B. Cutting Equipment: Jack-hammers and vibratory cutting equipment may be utilized under following conditions:

1. Approval by Owner.
2. Time of day and duration of Work on each given day shall be coordinated with Project Inspector and Owner. Minimum of 24 hours advance notice required.
3. Compressors shall be well muffled.
4. Every consideration shall be exercised toward comfort of staff and public. Excessive noise or vibrations will constitute just cause for immediate stoppage of Work.

C. Cutting:
1. Conform to Provisions of Division 01, General Requirements.
2. Concrete: Cut with saws or other approved method, but do not overcut openings. Reinforcing bars, except where bonded into new concrete, shall be cut off and ends painted with bituminous paint before being enclosed.
3. Structural Members: Cut only when authorized by Architect and approved by Structural engineer of Record, and County. Agency approvals shall be obtained by Architect, not by Contractor.

D. Removal of Existing Floor Finishes:
1. Remove existing floor covering materials in areas indicated.
2. Sandblast concrete floor surfaces (or submit alternate method to Architect for approval) to remove remaining adhesive, mortar, paint and similar materials which will affect bond of new floor coverings. International Concrete Repair Institute, ICRI Concrete Surface Profile CSP #3.
3. Patch voids with non-shrink grout.
4. Grind high spots and fill low spots to provide an even surfaced substrate for specified new floor covering materials. Leveling materials shall be compatible with mortars and adhesives required to install finish floors. Floors shall not vary more than 1/4 inch in 10 feet as determined with straightedge.

E. Modular Materials
1. Resilient tile (VCT), ceramic tile, quarry tile, or similar materials: Remove to joint line without leaving damaged or defective units where joining new construction. After flooring removal, clean substrates to remove setting materials and adhesives.
2. Wall Removal: Remove tiles, setting materials, bonding or adhesive, metal lath, board materials to joint line or support line on stud. Verify stud to receive new construction.

F. Patching, Repairing and Finishing:
1. Concrete: Edges of existing concrete shall be kept damp for 24 hours and scrubbed with Neat Portland Cement grout just before new concrete is placed. In lieu thereof, an approved epoxy concrete adhesive may be used. Finish shall match existing adjoining Work.
2. Unless otherwise approved concrete shall match strength of existing concrete or be minimum 2,500 psi concrete for patching slabs on grade. Strength of concrete for patching structural members or deck fill shall be determined by Architect. Where cut edges are to remain exposed, finish edges with cement mortar at least 3/4 inch thick, applied over epoxy adhesive and finished to match adjoining surfaces.

3. Concrete mix for patching shall comply with Section 1905A.3, California Building Code.
4. Plaster: Dampen edges of existing plaster. Plaster patching shall be of type, thickness and finish to match existing Work.
5. At Removed Flooring Materials: trowel with patching compound, cement based at all areas, leave level, smooth ready to receive new flooring finish materials. At contractor's option install cement-base self-leveling underlayment at no cost to the Owner.
6. At removed casework and equipment: repair and patch surfaces with like materials and to match adjacent surfaces. Leave surfaces in acceptable condition as determined by the Architect to received new finishes.

G. Asphalt Paving: remove AC paving including sub-base where indicated in drawings and disposed in legal dumpsites, crushing operations on site and re-use of pulverized AC not permitted.
1. Remove AC striping, lettering and markings by wet sandblasting machine with sufficient sand, water, and air capacity to completely remove existing striping, or markings. Machine shall meet all requirements of air pollution control district having jurisdiction. Conform to Section 310-5.6.3 Standard Specifications for Public Works Construction.

H. Removal of concrete flatwork: remove concrete paving (panel) to the nearest expansion joint or contraction joint and provide matching concrete surface to abut to new work at same finish levels unless noted otherwise.

I. Doors and Windows: Remove units in manner to minimize damage to framing supports and finishes. Remove or cut associated anchorage to permit new installation. When walls are to remain in place disassemble units carefully to prevent damage to wall.

J. Painting: Areas to be repainted or patched shall be prepared and finished as specified in Section 09 90 00, Painting. Where painting of existing surfaces is scheduled, paint manufacturer's standard specification for interior or exterior maintenance painting may be utilized, when approved by Architect for each surface application.

K. Holes required through existing stud wall, concrete or masonry construction to accommodate new electrical conduits and piping and ductwork shall be provided as specified in Division 22. Plumbing; Division 23, Heating Ventilation and Air Conditioning; and Division 26, Electrical.

L. Holes required through concrete or masonry Work required for structural purposes shall be neatly drilled as required to accommodate specific items. Coring shall be performed with approval of Architect and in accordance with details on Drawings.
1. Approval of details by County is required. Agency approvals shall be obtained by Architect, not by Contractor.

M. Work shall be fully coordinated to ensure proper sequence, limits, methods and time of performance. Arrange Work so as to impose a minimum of hardship on present operation of facilities.

N. Remove such existing ceilings, floors, walls, finish materials or equipment as required to complete Work. Restore such surfaces to their original condition after Work is completed.

O. Provide adequate ventilation during all operations to prevent accumulation of dust, fumes, vapors or gases.

P. Miscellaneous Removal Items: Items not specifically mentioned shall be removed as indicated on drawings.

Q. Miscellaneous Work: Items not specifically mentioned shall be repaired, patched or finished like new Work or to match existing adjoining surfaces as approved. Surfaces damaged shall be restored to original condition.

3.05 SALVAGE AND DISPOSAL

A. Salvage: Offer Owner first right of refusal for removed materials that may have residual value. Remove items designated by the Owner to be salvaged with care. Clean, wrap or crate for storage and handling, and deliver to Owner as directed.

B. Disposal: Removed material, other than items directed to be salvaged or indicated to be reused, become Contractor's property upon removal, and shall be removed from site. Debris shall be picked up and disposed of, off site, by Contractor promptly and continuously as Work progresses, and not allowed to accumulate. Sprinkle the debris to prevent dust nuisance. Secure and pay for required hauling permits and pay dumping fees and charges. Contractor shall make every reasonable effort to divert debris to recycling or reuse facilities.

END OF SECTION

SECTION 03 30 00

CONCRETE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Cast-in-place concrete.

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

C. Formwork, shoring, bracing and anchorage.

D. Concrete reinforcement and accessories.

E. Concrete for curbs, gutter, sidewalks, stairs and ramps and other site-related concrete is specified in Section 32 13 13.

F. Related Sections
1. Section 02520 Site Concrete Work
2. Section 03 35 35 Concrete Sealer.
3. Section 32 13 13 Concrete Paving

1.02 REFERENCES

A. CBC - 2007 California Building Code
1. CBC Chapter 11B, Accessibility to Public Buildings, Public Accommodations, Commercial Facilities and Publicly Funded Housing
2. Chapter 17, Structural Testing and Special Inspections
3. CBC-19 - CBC Chapter 19, Concrete

B. ADA – Americans with Disabilities Act of 1990
1. [ADA/UFAS] [ADA/Standards] – ADA Title II Regulations and the [Uniform Federal Accessibility Standards (UFAS)] [DOJ/Standards for Accessible Design as directed by District])

2. ADA Standards – ADA Title III Regulations and their referenced DOJ Standards for Accessible Design.

C. CACRM - California Access Compliance Reference Manual latest updates based on the 2010 California Building Code.

D. ACI 301 - Structural Concrete for Buildings.

E. ACI 302.1R - Guide for Concrete Floor and Slab Construction.

F. ACI 318-2005 - Building Code Requirements for Structural Concrete and Commentary

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

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

I. ASTM E-1745-96 Water Vapor Retarders Used In Contact with Soil or Granular Fill Under Concrete Slabs.

J. ASTM C33 - Concrete Aggregates.

K. ASTM C94 - Ready-Mixed Concrete.

L. ASTM C150 - Portland Cement.

M. ASTM C171 - Sheet Materials for Curing Concrete.

N. ASTM C856 - Practice for Petrographic Examination of Hardened Concrete.

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

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

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

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

S. ASTM C1028 Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.

T. CSS - Caltrans Standard Specifications, Latest Edition.

U. SSPWC - Standard Specifications for Public Works Construction, Latest Edition.

1.03 SUBMITTALS

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

B. Design mix for each concrete mix.

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

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

1.04 QUALITY ASSURANCE

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

1.05 REGULATORY REQUIREMENTS

A. Conform to Chapter 19, California Building Code.

1.06 TESTS

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

PART 2 - PRODUCTS

2.01 FORM MATERIALS

A. Materials shall conform to CBC, Section 1906.

B. Plywood for Forms: medium density overlay APA, MDO PLYFORM APA, unless indicated otherwise.
   a. For concrete scheduled for coated, smooth-form finish, use high density overlay HDO PLYFORM
   b. For concrete scheduled for exposed, rough-form surface, use PS-1, Group 1, exterior plywood.
   c. For concealed surfaces, use, PS-1Class I, Exterior, APA PLYFORM B-B.

C. Lumber for Forms: Douglas Fir species; construction grade with grade stamp clearly visible. Furnish surfaced one face and one edge, where required for smooth form finish.

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

2.02 REINFORCING

A. Reinforcing Steel: ASTM A615, deformed billet steel bars, in grades as follows, and conforming to CBC-19, Section 1903.
   1. For No.4 and larger bars, use 60 ksi yield grade.
   2. For ties and stirrups, and No. 3 and smaller bars, use 40 ksi yield grade.
   3. For welded bars, use ASTM A706 60 ksi yield grade.

B. Welding Electrodes: low hydrogen grade E90XX for Grade 60 [E70XX for Grade 40].

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

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I or II, Portland Cement Type, conforming to Section 1903, CBC.

B. Aggregates: Per CBC1903.3.
1. Aggregates for Stone Concrete: ASTM C33 and CBC

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

2.04 ACCESSORIES

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

B. Under-Slab Vapor Barrier: ASTM D751, D1593, D5199, 60 mil HDPE Geomembrane. Furnish with lap sealing tape, prefabricated flashing boots, and other accessories recommended by barrier manufacturer for each condition. Refer to Converse Consultants Sub-Slab Membrane Detail Figure 2."

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

D. Combination Hardener, and Sealer: ASHFORD FORMULA by Curecrete Chemical Co., Springville, UT, or equal as approved in accordance with Division 01, General Requirements for substitutions, at exposed concrete floors.

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

F. Corners: Chamfered type; maximum possible lengths.

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

2.05 CURING MATERIALS

A. Water: Clean and drinkable.

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

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

2.06 CONCRETE MIX

A. Mix and deliver concrete in accordance Sections 1905, and 1905.3, 2007 CBC and ACI 318 Sections 5.2 and 5.3.
   1. Design Mix: ACI Section 5.3, ingredients and proportions for design mix selected by a Testing Laboratory certified by a registered civil engineer licensed in California.
   2. Do not exceed 0.50 water-cement ratio by weight for floor slabs and for other concrete.

B. Select proportions for concrete in accordance with the approved design mix.
   1. Required Strength: As scheduled.
   2. Grout mix, coarse: 1:3:2 Portland cement, to sand, to pea gravel, minimum 4,000 psi at 28 days.

C. Provide concrete to the following criteria:

Element	Min. 28 day Strength psi	Max. Slump	Max. Size Aggregate	
Grade Beams and Foundations	3,000	4 inch	1 inch	Normal wt. Concrete
Slabs	4,000	4 inch	1 inch	Normal wt. Concrete
Other	3,000	4 inch	1 inch	Normal wt. Concrete

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

2.07 GRANULAR FILL

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

B. Granular fill for under slab: compactable manufactured sand from rock-crushing operations with particle sizes ranging from No. 4 through the No. 200 sieve, reference ACI 302.1R.

2.08 SEPARATE FLOOR TOPPINGS

A. Prior to placing floor topping, roughen substrate concrete surface and remove deleterious material. Broom and vacuum clean.

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

C. Apply bonding agent to substrate in accordance with manufacturer's instructions.

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

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

2.09 JOINT DEVICES AND FILLER MATERIALS

A. Expansion Joint Filler - ASTM D1751: Close cell bituminous saturated fiberboard, 1/2 inch thick; FIBER EXPANSION JOINT manufactured by American Highway Technology, Kankakee, IL, W. R. Meadows, or approved equal.

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

C. Sealant: Non-sagging or self-leveling at flatwork, as specified in section 07 92 00.

D. Primer: As recommended by sealant manufacturer.

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

F. Joint Backing: Round, closed cell polyethylene or butyl rubber backer rod; oversized 30 to 50 percent larger than joint width.

PART 3 - EXECUTION

3.01 FORMWORK

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

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

C. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of Section 1906, CBC.

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

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

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

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

H. Provide chamfer strips on external corners.

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

3.02 PROTECTION

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

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

3.03 REINFORCEMENT

A. Fabricate reinforcing steel in accordance with ACI 318, Chapter 7.

B. Place supports and secure steel reinforcement against displacement.

C. Reinforcing: Place reinforcing steel as indicated on Drawings and in accordance with ACI 318, Section 7.5.

3.04 PREPARATION

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

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

C. Under Interior Slabs on Grade: Install 4 inches thick Crushed Aggregate Base per Section 200-2.2, SSPWC or Class 2 CCS as capillary break. Over aggregate base install 1 inch of manufactured sand cushion (granular fill). Place 15-mil polyethylene vapor barrier in largest practical sections over sand cushion. Seal all 6-inch lapped seams, penetrations and foundation perimeters using manufacturer-approved tape only and install per manufacturer instructions. Install pipe boots at pipe penetrations. Cover vapor barrier with 3 inches of manufactured sand, compact. Install reinforcement and concrete as scheduled.

3.05 PLACING CONCRETE

A. Place concrete in accordance with Section 1905.9 and 1905.10, CBC. Remove loose dirt from excavations.

B. Notify Architect minimum 24 hours prior to commencement of operations. All excavations, forms and reinforcing shall be inspected and approved by the Architect prior to placement.

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

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

E. Extend joint filler from bottom of slab to within ½ inch of finished slab surface using one-component polyurethane sealant as specified in Section 07 92 00.

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

G. Contraction Joints: Grooved joints only. Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch, place joints at column lines and at 12 ft. o.c. each way, maximum. Remove groover tool marks on exposed concrete surfaces

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

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

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

K. The unconfined vertical drop of concrete shall not be greater than 5 feet. Do not allow concrete to fall free from any height that will cause materials to segregate. Maximum height of free fall permitted in any case: 5 feet. Utilize trunks or additional chutes where doubt occurs. Conform to requirements of CBC Section 1905A.10.

L. Construction Joints: Wash surface of each joint shortly after pouring to expose clean, sound aggregate. Sandblast surface to remove laitance remaining or loose aggregate as approved by the Architect. Conform to Section 1906, CBC. Apply bonding agent in accordance with manufacturer's instructions. Locate joints within the middle third of spans of slabs, beams and girders. Coincide construction joints with contraction, isolation, or expansion joints when possible. Locate where they lease affect the structural integrity of the element under consideration and are compatible with building's appearance.

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

N. Saw cut slabs only when indicated on drawings or as approved by Architect at 20 ft. on center, maximum 400 square feet, within 24 hours after placing concrete. Saw cut joints with power saws equipped with shatterproof abrasive re diamond-rimmed blades, cut 1/8" wide joint into concrete when cutting action will not tear, abrade, or otherwise damage surface. Cut no deeper than 1/4 depth of slab thickness. Fill cuts with non-hardening epoxy. Completely fill cut to surface of slab.

3.06 CONCRETE FINISHING

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

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

C. Install concrete floors and slabs in Levelness and Flatness in accordance with the following:
   1. Tolerances:
      a. Finish floor slabs with tolerances of FF = SOV: 35 and FL = SOV: 25. And FF = MLV: 24 and FL = MLV: 17. (SOV-Specified Overall Value and MLV - Minimum Local Value).

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

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

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

3.07 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads. Conform to Section 1906A.2, California Building Code.
   1. Minimum stripping time for walls and columns: 5 days.
   2. Minimum stripping time for beams and structural slabs: 21 days.

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

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

3.08 FINISH AT EXPOSED VERTICAL SURFACES

A. Rubbed Finish: Apply the following to Smooth-Formed Finished concrete per ACI 301:
   1. Grout-Cleaned Finish (Sack-rubbed finish): Remove fins, rough spots, stains, and hardened mortar by carefully rubbing with a fine abrasive stone to a smooth even surface. Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part Portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
   2. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
   3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part Portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface with slow-speed grinder. In a swirling motion, finish surface with a cork float.

B. Sandblast Finish: Light sandblast, maximum reveal of 1/16 inch. Medium sandblast maximum reveal of 1/4 inch where plywood or other smooth forms have been used, uniformly sand-blasted with sharp quartz sand under sufficient air pressure. Such surfaces shall be thoroughly washed with clear water after sandblasting.

3.09 CURING AND PROTECTION

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

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

C. Cure only as specified herein and in accordance with Section 1905.11, CBC. Membrane curing compound method not permitted for interior cast-in-place concrete slabs.

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

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

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

G. Flooding, sprinkling or ponding not permitted.

3.010 FIELD QUALITY CONTROL

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

B. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 72 hours of finishing.

C. Testing and Inspections in accordance with Division 01.

3.011 PATCHING

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

B. Clean all exposed concrete surfaces and all adjoining work stained by leakage of concrete. Remove all fins, butts and projections by grinding. Patch voids, rock pockets, holes, cracks and similar imperfections by chipping loose concrete and exposing clean, sound aggregate.

C. Patch imperfections as approved and in accordance with ACI 301.
   1. Clean all exposed concrete surfaces and all adjoining work stained by leakage of concrete.
   2. Fill cone form tie recesses with portland cement mortar flush to finish surface.

3.012 DEFECTIVE CONCRETE

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

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

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

3.013 MOISTURE TEST FOR CONCRETE FLOORS

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

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

C. Prior to ordering adhesive applied floor covering materials or coating, conduct Relative Humidity Test Method in accordance with ASTM F 2170 to verify relative humidity and surface pH of concrete floor slabs, the method
   1. Requires drilling holes at diameter not to exceed outside diameter of probe by more than 0.04 inch to depth equal to 40 percent of slab's thickness (elevated structural slab shall be tested at depth equal to 20 percent of slab thickness).
   2. Place probe to full depth of test hole, place cap over probe.
   3. Permit test site to acclimate, or equilibrate, for 72 hours prior to taking relative humidity readings.
   4. Remove cap and press button on the probe to obtain reading.
   5. Relative humidity readings for substrates receiving non-permeable flooring are 75% or lower.
   6. Testing shall require 3 tests in first 1,000 square feet, with one additional test per each additional 1,000 square feet of concrete slab surface.

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

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

F. Install Concrete Slab Vapor Emission Treatment as specified in Section 07 25 00 when moisture emissions exceed 3 pounds per 1,000 square feet in 24 hours as specified herein at the time of installation of floor coverings. Submit results to Architect of testing. In the event the moisture tests indicated moisture levels are less than the maximums allowed and results are acceptable to the Architect, and the Concrete Slab Vapor Emissions Treatment is not required as determined by the Architect, Contractor shall provide the Owner a credit for deleting the work specified in Section 07 25 00.

END OF SECTION

SECTION 03 35 00

CONCRETE FLOOR FINISHING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Finishing slabs on grade.

B. Surface treatment with concrete combination hardener/sealer at all exposed concrete floors.

C. Related Sections:
1. Section 03 30 00, Cast-In-Place Concrete.

1.02 REFERENCES

A. ACI 117-90, ACI 302.1R and ASTM E1155 - Determining Floor Flatness and Floor Levelness using the F Number System.

B. Local AQMD Air Quality Management District.

C. ASTM D 2047 - Static Coefficient of Friction.

1.03 SUBMITTALS

A. Product Data: Provide data on finishing agents, product characteristics, compatibility and limitations.

B. Manufacturer's Installation Instructions: Indicate criteria for preparation and application.

C. Certify that product meets AQMD, Local Regulations.

1.04 DELIVERY AND STORAGE

A. Deliver and store materials in manufacturer's packaging including application instructions.

PART 2 - PRODUCTS

2.01 FINISHES

A. Combination Hardener and Sealer:
1. ASHFORD FORMULA by Curecrete Chemical Co., Springville, UT; SHUR-SEAL by Paul M. Wolff Co, Orange, CA; Chemprobe CT Densifier 201 by Tnemec Company; LIQUI-HARD by W.R, Meadows. Remove all curing compounds before installation.
2. Finished Floor Minimum Coefficient of Friction: 0.6, ASTM D 2047.

B. Or equal as approved in accordance with Division 01, General Requirements for substitutions.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify site conditions.

B. Verify that floor surfaces are acceptable to receive Work of this Section.

C. Commencement of Work means acceptance of existing conditions.

D. Remove all curing compounds before installation.

3.02 FLOOR FINISHING

A. Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces.

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

C. Finish concrete floor surfaces in accordance with ACI 302.1R.
   1. Finish floor slabs with highway straightedge with tolerances of FF = SOV: 35 and FL = SOV: 25. And FF = MLV: 24 and FL = MLV: 17. (SOV-Specified Overall Value and MLV - Minimum Local Value).
   2. At [Gym and] Treated Exposed Floors: Bull float floor slab with highway straightedge with tolerances of FF = SOV: 45 and FL = SOV: 35. And FF = MLV: 30 and FL = MLV: 24.

D. Wood float surfaces which will receive quarry tile, ceramic tile or pavers with full bed setting system.

E. Steel trowel surfaces that will receive carpeting, resilient flooring, thinset ceramic tile, floor sealer or elastomeric coatings, minimum of two trowelings.
   1. Surfaces scheduled to receive elastomeric coatings: Fine-hair broom surface.

F. Steel trowel surfaces scheduled to be exposed.

G. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains.

3.03 FLOOR SURFACE TREATMENT

A. Apply combination hardener and sealer to interior concrete slab surfaces as scheduled in accordance with manufacturer's instructions. Apply minimum two coats after first coat is dry and acceptable to manufacturer.
   1. Apply hardener sealer per manufacturer's instructions immediately following the finishing operations and as soon as surface is firm enough to walk on.
   2. Keep the entire surface wet with hardener and sealer for 30 minutes.
   3. Lightly mist the surface with water when hardener sealer begins to dry and becomes slippery,
   4. As hardener-sealer begins to dry into the surface and becomes slippery underfoot, flush the surface with water and squeegee surface totally dry to remove any excess material.

3.04 FIELD QUALITY CONTROL TESTING

A. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 72 hours of finishing.

3.05 PROTECTION

A. Protect treated concrete surfaces from damage by construction activities with durable temporary coverings offering floor protection until acceptance by the Architect. Damaged to floor finishes shall be repaired by the Contractor at no cost to the Owner.

END OF SECTION

SECTION 04 22 00

CONCRETE MASONRY UNITS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Division 01 Specification Sections, Drawings, General Conditions, Supplementary General Conditions, and Special Conditions apply to this section.

1.02 SUMMARY

A. Section Includes:
1. Concrete masonry units (CMU).
2. Mortar and grout.
3. Reinforcing steel.
4. Control joint materials.
5. Masonry joint reinforcement.
6. Ties and anchors.
7. Embedded flashing.
8. Miscellaneous masonry accessories.

1.03 SUBMITTALS

A. Certificates of compliance with respective ASTM standards shall be submitted on all products specified herein.
1. Concrete masonry units.
2. Spec Mix preblended mortar: Include test report or batch data for verification of proportions of materials.
3. Grout: Include mix design for verification of proportions of materials.
4. Steel reinforcing bars.
5. Preformed control joint gaskets.

B. Samples for Verification: For each type and color of the following:
1. Exposed concrete masonry units.
2. Mortar, for color selection or confirmation.

1.04 QUALITY ASSURANCE

A. Preconstruction Testing.
1. Owner will select a qualified independent testing agency to perform preconstruction testing indicated below. Payment for these services will be made by Owner.

2. The compressive strength of masonry shall be determined based on strength of the unit and type of mortar specified (Unit Strength Method) per CBC Table 2105.2.2.1.2 (ACI 530.1/ASCE 6/TMS 602 Table 2).
   a. Concrete Masonry Units: Test per ASTM C 140.
   b. Grout: Test per ASTM C 1019.
3. Mortar and grout tests: At beginning of work, sample mortar and grout on three successive working days per CBC Section 2105A.5.

B. Sample Panels: Construct an approximate long by panel for representation of completed masonry, joint tooling, design details, and workmanship. Comply with requirements in Division 01 Section "Quality Requirements" for mockups.
1. The following shall be installed in the sample panel:
   a.
   b.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination",

1.05 DELIVERY, STORAGE, AND HANDLING

A. All materials of this section shall be protected to maintain quality and physical requirements.

B. All masonry units shall be stored on the jobsite so that they are protected from rain, stored off-ground and kept clean from contamination. Prevent units from being otherwise wetted.

C. Store Spec Mix preblended mortar mix in manufacturer's original, unopened, undamaged containers with identification labels intact, covered and protected from weather, or in a Spec Mix dispensing silo.

1.06 FIELD CONDITIONS

A. Securely cover tops of all unsheltered walls and partially completed walls when work is not in progress.

B. Cold-weather procedures when ambient temperature falls below 40°F (4°C) or the temperature of masonry units is below 40°F (4°C):
1. Wet or frozen units shall not be laid.
2. Implement cold weather construction procedures in accordance with IBC Section 2104.3.

C. Hot-weather procedures when ambient temperature exceeds 100°F (38°C), or exceeds 90°F(32°C) with a wind velocity greater than 8 mph:
1. Implement hot weather construction procedures in accordance with IBC Section 2104.4.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Concrete masonry units.
   1. Angelus Block Co., Inc.
      a. Sun Valley, CA (818) 767-8576
      b. Orange, CA (714) 637-8594
      c. Fontana, CA (909) 350-0244
      d. Gardena, CA (310) 323-8841
      e. Oxnard, CA (805) 485-1137
      f. Indio, CA (760) 347-3245

B. Preblended mortar.
   1. Spec Mix Preblended Mortar Mix, by E-Z Mix, Inc.

2.02 MASONRY PERFORMANCE REQUIREMENTS

A. Provide materials to achieve the net compressive strength of concrete unit masonry equal to or greater than 1500 psi f'_m.

B. Provide materials to achieve the net compressive strength of concrete unit masonry equal to or greater than the f'_m as indicated .

2.03 CONCRETE MASONRY UNITS

A. Concrete Masonry Units: ASTM C 90.
   1. Weight Classification: Medium weight unless otherwise indicated.
   2. Color(s) and texture(s):
      a. Grey

2.04 MORTAR AND GROUT MATERIALS

A. Spec Mix Masonry Mortar preblended factory mix: ASTM C 270, proportions.
   1. Portland cement: ASTM C 150
   2. Hydrated lime: ASTM C 207
   3. Aggregate for mortar: ASTM C 144.

B. Grout:
   1. Portland cement: ASTM C 150
   2. Aggregate: ASTM C 404.
   3. Fly ash: ASTM C 618.

C. Water: Potable.

D. Admixtures:
   1. The use of admixtures shall not be permitted except as specified herein, or as approved by the Architect or Engineer of Record and the Building Official.
   2. PRE-MIX Products Grout Additive manufactured by E-Z Mix, Inc. Use per manufacturer's specifications.

2.05 REINFORCEMENT

A. Steel Reinforcing Bars: ASTM A 615, Grade 60.

B. Masonry Joint Reinforcement: ASTM A 951.
   1. Masonry joint reinforcement used in exterior walls shall be hot-dipped galvanized.

2.06 TIES AND ANCHORS

A. Metal ties and anchors shall meet the requirements of CBC Section 2103.13.

2.07 MISCELLANEOUS MASONRY ACCESSORIES

A. PVC Preformed Control-Joint Gaskets: per ASTM D 2287, Type PVC.

B. Rubber Preformed Control-Joint Gaskets: per ASTM D 2000, Designation M2AA-805.

2.08 MORTAR AND GROUT MIXES

A. Type S Spec Mix Preblended, Dry Mortar Mix.
   1. Complies with ASTM C 270 Proportion Specification.
   2. Natural gray color.

B. Grout for Unit Masonry: per ASTM C 476.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to the start of masonry installation, verify all conditions pertinent to the performance of work in this Section are acceptable.
   1. Foundation shall be level and at correct grade such that the initial bed joint shall not be less than 1/4 inch nor more than 3/4 inch.
   2. Verify that reinforcing dowels are properly placed.

B. Masonry work shall not proceed until unsatisfactory conditions have been corrected or cleared by the governing authority.

3.02 INSTALLATION

A. Cut units as required to fit; use motor-driven masonry saw. Install cut units with cut surfaces edges concealed as much as possible.

B. Lay dry units only, unless otherwise approved.

C. Select and arrange units for exposed masonry to produce a uniform blend of colors and textures.
   1. Mix units from several pallets or cubes as they are placed.

D. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602.

3.03 LAYING MASONRY WALLS

A. All masonry shall be laid true, level, plumb, and in accordance with the drawings.

B. Masonry shall be laid in running bond unless otherwise indicated.

C. Exposed masonry shall be laid in unless otherwise indicated.

D. Concealed masonry with shall be laid in running bond unless otherwise indicated.

E. Install built-in items specified in this and other Sections as work progresses. Solid grout all spaces around built-in items unless otherwise noted on the drawings.

3.04 MORTAR BEDDING AND JOINTING

A. Lay hollow units with head and bed joints filled with mortar for the thickness of the face shell..

B. Lay solid units with full head and bed joints. Do not fill head joints by slushing with mortar. Bed joints shall not be furrowed deep enough to produce voids.

C. All mortar joints on exposed walls shall be concave, unless otherwise indicated, and struck to produce a dense, slightly concave surface well bonded to the surface of the masonry unit.

D. Cut joints flush for masonry walls to receive plaster, unless otherwise indicated.

E. Thickness of bed joints shall not exceed 5/8 inch.

3.05 MASONRY JOINT REINFORCEMENT

A. Embed joint reinforcement with minimum 5/8 inch cover to exposed face, and 1/2 inch elsewhere.

3.06 CONTROL AND EXPANSION JOINTS

A. Construct control joints as detailed in the drawings as masonry progresses.
   1. Install preformed control-joint gaskets designed to fit standard sash block.

3.07 INSTALLATION OF REINFORCING STEEL

A. Place reinforcement as detailed on the drawings.
   1. Maintain clear distances between reinforcement and masonry, and maintain placement tolerances in compliance with requirements in ACI 530.1/ASCE 6/TMS 602.

3.08 GROUTING

A. Comply with grout placement requirements in ACI 530.1/ASCE 6/TMS 602.

3.09 FIELD QUALITY CONTROL

A. Inspection tasks and frequency shall be performed in accordance with the Statement of Special Inspections.

B. Unless indicated otherwise, perform one set of tests for each 5000 sq. ft. of wall area or portion thereof.

C. Concrete Masonry Units: test per ASTM C 140.

D. Grout: Test per ASTM C 1019.

E. Prism Test: For each type of construction indicated, construct and test three prisms per ASTM C 1314 at 28 days.

F. Masonry Core Test: Core and test per CBC Section 2105.4 from locations selected by the Design Professional.

G. Mortar and grout tests: Sample mortar and grout at minimum one-week intervals per CBC Section 2105.5.

3.010 POINTING, AND CLEANING

A. Point and tool holes in mortar joints to produce a uniform, tight joint.

B. During construction, minimize any mortar or grout stains on the wall. Immediately remove any staining or soiling that occurs.
   1. For precision or textured units, except as noted below, clean masonry by dry brushing before tooling joints.
   2. For burnished concrete masonry units, immediately remove any green mortar smears or soiling with a damp sponge

C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

   1. Clean exposed cmu walls with a light sandblast. All non-masonry work near the area to be sandblasted shall be covered or protected before the sandblasting starts. Care shall be taken to avoid contamination to areas that are not to be sandblasted.
      a. Glazed, burnished, or pre-finished masonry units, shall be protected from sandblast operations.

D. At completion of masonry work, remove all scaffolding and equipment used during construction, and remove all debris, refuse, and surplus masonry material from the site.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Structural steel framing members.
   1. Galvanized at exterior exposed structural steel.
   2. Shop-primed at concealed and at painted steel.

B. Related Sections
   1. Section 05 05 14, Hot-Dip Galvanizing
   2. Section 09 90 00, Painting

1.02 REFERENCES

A. AISC - American Institute of Steel Construction
   1. AISC Manual – AISC Manual of Steel Construction, 13th Edition
   2. AISC S323 - Quality Criteria and Inspection Standards

B. ASTM - American Society for Testing and Materials
   1. ASTM A36 - Structural Steel
   2. ASTM A53 - Hot Dipped, Zinc-Coated Welded and Seamless Steel Pipe
   3. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality
   4. ASTM A123 - Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products
   5. ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware
   6. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners
   7. ASTM A325 - High Strength Bolts for Structural Steel Joints
   8. ASTM A500 - Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes
   9. ASTM A572 - Grade 50 - Structural Steel
   10. ASTM A780 - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
   11. ASTM C1107 - Packaged Dry, Hydraulic Cement Grout (Non-Shrink)

C. AWS - American Welding Society
   1. AWS A2.4 - Standard Symbols for Welding, Brazing and Non Destructive Examination
   2. AWS A5.1 – Carbon Steel Electrodes for Shielded Metal Arc-Welding
   3. AWS A5.5 – Low Alloy Steel Electrodes for Shielded Metal Arc-Welding
   4. AWS B2.1 – Welding Procedure and Performance Qualification
   5. AWS D1.1 – Structural Welding Code, Steel
   6. AWS D1.2 – Structural Welding Code, Aluminum
   7. AWS D1.3 – Structural Welding Code, Sheet Steel
   8. AWS D1.6 - Structural Welding Code, Stainless Steel
   9. AWS D1.8 – Structural Welding Code, Seismic Supplement

D. SSPC - Steel Structures Painting Council.

E. CBC - California Building Code 2010, Chapter 22.

F. ASTM A108 - Standard Specification for Steel Bars, Carbon, Cold-Finish, Standard Quality.

G. ASTM A992 - Steel for Structural Shapes For Use in Building Framing

H. ASTM F1554 - Standard Specifications for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

1.03 SUBMITTALS

A. Shop Drawings:
   1. Indicate profiles, sizes, spacing and locations of structural members, connections, openings, attachments and fasteners.
   2. Indicate cambers.
   3. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

B. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.

C. Mill Test Reports: showing structural strength, destructive and non-destructive test analysis and identification.

D. All certified welders employed on the work have been AWS qualified within the previous 12 months, in accordance with AWS-WHB-1.

E. Fabricator's and erector's qualifications.

F. Submit written welding procedures to Owner's testing agency for all welding on project. Procedures shall be in accordance with AWS pre-qualified welds. For welds not pre-qualified by AWS, provide project-specific procedures qualified by testing in accordance with AWS D1.1 to match actual materials, conditions, and orientations.

1.04 QUALITY ASSURANCE

A. Qualifications
   1. Fabricator: Company specializing in performing structural steel work minimum five years experience. Qualified fabricator who participates in the AISC Quality Certification Program and its designation as AISC-Certified Plant, Category Sbd Conventional steel building structures or Category Cbd for complex steel building structures.
   2. Erector: Company specializing in performing structural steel work with minimum five years experience.
   3. Erector: AISC Certified Erectors for Category for steel and erection required.
   4. AWS Certified welders.

B. Fabricate structural steel members and perform work in accordance with AISC-M015L.

C. Perform welding in accordance with AWS D1.1 and California Building Code Section 2205.1.

D. Galvanized Structural Steel Coating applicator: Company specializing in hot-dip galvanizing after fabrication and following the procedures in the *Quality Assurance Manual* of the American Galvanizers Association.

1.05 FIELD MEASUREMENTS

A. Verify field measurements.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Structural Steel Members: W-Shape Sections use ASTM A992 or ASTM A572 Grade 50 steel, as indicated on Structural Drawings.

B. Channels, Angles, Plates, Bars, M-Shapes and S-Shapes: ASTM A36.

C. Structural Tubing; ASTM A500, Grade B.

D. Pipe: ASTM A53, Type E or S, Grade B, Schedule 40.

E. Shear Stud Connectors: ASTM A108, Grade 1015 forged steel, headed, uncoated, granular flux filled shear connector or anchor studs by Nelson Stud Welding Division of TRW, Lorain, OH, or equal as approved in accordance with Division 01 for substitutions.

F. Bolts, Nuts and Washers: ASTM A307 galvanized to ASTM A153 for galvanized members, American National Course Threaded Series.

G. Anchor Bolts, Pins and Rods: ASTM F1554.

H. Welding Materials: AWS A5.1, E70XX, type and procedures required by electrode manufacturer for materials being welded.

I. Non-Shrink Grout: ASTM C1107, high performance, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 5,000 psi in 24 hours and 8,000 psi in 7 days; of consistency suitable for application and a 30 minute working time.

J. In-Shop Primer: Series L69 Hi Build Epoxoline II, Red color Low VOC epoxy, air dried, by Tnemec or equal as approved in accordance with Division 01 for Substitutions. Manufacturer's standard primer for unpainted steel permanently enclosed in walls and above finished ceilings.

K. Touch-Up Material for Galvanized Steel: ASTM D520 Type III High Purity Grade zinc dust, ready mixed, zinc-rich galvanizing compound 95% metallic zinc. Galvilite by ZRC Products Company, Marshfield, MA. Zinc Rich Galvanize 1141 for Primer and Brite Galvanize 1142 for exposed, by Aervoe-Pacific Company, Inc. or equal as approved in accordance with Division 01 for substitutions.

2.02 FINISH

A. Prepare structural component surfaces in accordance with SSPC SP-3 Power Tool Cleaning for embedded. Apply primer by brush or spray, minimum dry film thickness 3.0 mils.

B. Shop prime structural steel members. DO NOT prime surfaces that will be fireproofed, field welded, in contact with concrete or high strength bolted.
   1. Clean surfaces to be primed, remove mill scale, grease, dirt and foreign matter. Two coats required for parts in contact but inaccessible for painting after erection.
   2. Apply primer by brush or spray, minimum dry film thickness 3.0 mils. Thoroughly work into joints, angles and open spaces. Allow primer to dry and harden prior to handling for delivery to the site.
   3. Clean contact surfaces immediately prior to assembly, leave unpainted.
   4. Coat machined surfaces with approved removable coating to prevent corrosion.
   5. After erection, clean field welds, field bolts and abraded portions and apply one additional brush spot coat using same paint material.
   6. All surfaces scheduled to receive sprayed-applied fireproofing shall be free of lubricants, oils, paint or other matter that will impair adhesion of fireproofing.

C. Galvanize exposed exterior structural steel members per Section 05 05 14 where indicated to minimum Coating Grade 80 (1.9 oz/sq. ft.) in accordance with ASTM A123.

D. All exterior steel exposed to weather conditions shall be shop galvanized or primed painted. Field painted in accordance with Section 09 90 00 Painting, High Performance Coatings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.
   1. Report discrepancies between drawings and field dimensions to Architect before commencing work.

B. Beginning of installation means erector accepts existing conditions and surfaces underlying or adjacent to work of this section.

3.02 FABRICATION

A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.

B. Camber structural steel members where indicated.

C. Identify high-strength structural steel according to ASTM A6 and maintain markings until steel has been erected.

D. Mark and match-mark materials for field assembly.

E. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.

F. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.

G. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.

3.03 ERECTION

A. Allow for erection loads and stresses, and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of permanent bracing. Provide bracing for dead and live loads and wind loads. Keep bracing in place until required to maintain safe conditions.

B. Contractor shall be responsible for correcting detailing and fabrication errors and for correct fitting of all members and components.

C. Field weld components and shear studs indicated on structural drawings.

D. Do not field cut or alter structural members without approval of Architect.

E. When approved, perform cutting, punching, drilling and tapping to accommodate work. Obtain accurate data as indicated on shop and erection drawings.

F. After erection, prime welds, abrasions and surfaces not shop primed except surfaces to be in contact with concrete.

G. Grout under base plates with the specified non-shrink grout.

H. Provide anchor bolts with templates and diagrams. Contractor shall be responsible for proper location and installation of bolts. Correct deficiencies or errors.

3.04 ERECTION TOLERANCES

A. Conform to AISC S325.

B. Maintain erection tolerances of architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.05 BOLTS

A. Allowable hole sizes: 1/16 inch larger than bolt size.

B. Thoroughly clean area under bolt head, nut and washer.

3.06 PUNCHING AND DRILLING

A. Punch material 1/16 inch larger than nominal diameter of bolt, wherever thickness of metal is equal to or less than the diameter of the bolt plus 1/8 inch.

B. Drill or sub-punch and ream where metal is equal to or more than the diameter of the bolt plus 1/8 inch. Make diameter for sub-punched and sub-drilled holes 1/16 inch larger than nominal diameter of bolt.

C. Precisely locate holes to ensure passage of bolt through assembled materials without drifting. Enlarge holes when necessary to receive bolts by reaming, flame cutting to enlarge holes is not acceptable. Poorly matched holes will be rejected.

3.07 WELDING

1. Conform to AWS D1.1 and CBC Chapter 22, Section 2205.1.

B. Perform welding by direct electric arc process. Use operators certified within preceding 12 month period as per AWS "Standard Qualification Procedure."

C. Chip welds to remove slag. Use wire brush to demonstrate uniformity of section, smoothness of welded metal, freedom from undercuts, overlays or feather edges and freedom from porosity and clinkers.

D. Visually inspect edges and ends of fillets and butt joint welds for indication of good fusion and penetration into base metal. Grind smooth all exposed welds.

E. Use of cutting torch will be allowed where metal being cut does not carry stress during the operations, and provided no stresses will be transmitted through a flame-cut surface. Make gas cuts smooth and regular in contour.

F. To determine effective width of members subjected to gas cutting, deduct 1/8 inch from width of gas cut edges. Make radius of gas cut fillets as large as practicable, but in no case less than one inch. Gas cutting to align bolt is not permitted.

3.08 CLEANING AND STRAIGHTENING

A. Before fabrication, thoroughly wire-brush material clean of scale and rust. Straighten by methods that will not injure materials.

B. After punching or working, remove twists or bends before parts are assembled. Make finished members free from twists, bends and open joints when erected.

C. Touch-Up Material for Galvanized Steel: Ready mixed, zinc-rich galvanizing compound, ASTM A780 - A2. Repair Using Paints Containing Zinc Dust, minimum thickness 5 mils.

3.09 FITTING

A. Closely fit members, finished true to line and in precise position required to allow accurate erection and proper joining in the field.

B. Drilling to enlarge unfair holes will not be allowed. Light drifting to draw parts together will be permitted. Do not heat rolled sections, except for minor details.

3.010 QUALITY CONTROL

A. Required testing shall be performed under provisions of Division 01 and California Building Code Section.

B. All complete penetration welds shall be subject to Ultrasonic Testing, as per AWS D1.1. All defective welds shall be repaired and retested with ultrasonic equipment at the Contractor's expense.

3.011 HANDLING

A. Both in shop and in field, transport, handle and erect to preclude damage or overstressing of any component.

3.012 FINISH

A. For exposed steel, field paint per Section 09 90 00 Painting with High Performance Coatings.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated ferrous metal items, galvanized and prime painted.

B. Related Sections
   1. Section 09 90 00, Painting

1.02 REFERENCES

A. American Society of Mechanical Engineers (ASME)
   1. ASME B18 Fasteners

B. American Society for Testing and Materials (ASTM)
   1. ASTM A36/A36M Carbon Structural Steel
   2. ASTM A48/A48M Gray Iron Castings
   3. ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless
   4. ASTM A123 Zinc (Hot-Dip Galvanized) on Coatings on Iron and Steel Products
   5. ASTM A153 Zinc Coating (Hot-Dip) on Iron and Steel Hardware
   6. ASTM A283/A 283M Low and Intermediate Tensile Strength Carbon Steel Plates
   7. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
   8. ASTM A325 - Structural Bolts, Steel, Heat Treated, 120/105ksi Minimum Tensile Strength
   9. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes
   10. ASTM A513 - Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
   11. ASTM A563 - Carbon and Alloy Steel Nuts
   12. ASTM A588 - High-Strength Low-Alloy Structural Steel, up to 50 ksi [345 MPa] Minimum Yield Point, with Atmospheric Corrosion Resistance
   13. ASTM A606 - Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance
   14. ASTM A653/A 653M Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
   15. ASTM A780 - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
   16. ASTM A786/A 786M Rolled Steel Floor Plates
   17. ASTM A992 Structural Steel Shapes
   18. ASTM B633 - Electrodeposited Coatings of Zinc on Iron and Steel
   19. ASTM C1107 - Packaged Dry Hydraulic - Cement Grout (Non-Shrink)
   20. ASTM F1554 - Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

C. American Welding Society (AWS)
   1. AWS A2.4 - Standard Symbols for Welding, Brazing and Non Destructive Examination
   2. AWS A5.1 - Carbon Steel Covered Arc-Welding Electrodes

D. ASCE/SEI 7 – American Society of Civil Engineers, Structural Engineers Institute, ASCE Standard.

E. California Code of Regulations (CCR)
   1. Title 8, Chapter 3.2
   2. Title 8, Division 1, Subchapter 7, Group 1, Article 4, Section 3277, Fixed Ladders
   3. Cal/OSHA, Subchapter 4 Construction Safety Orders
   4. Title 24, Part 2, 2010 California Building Code (CBC), Chapter 22.
   5. Title 12, California Fire Code Chapter 26 Welding and Other Hot Work.

F. National Ornamental and Miscellaneous Metals Association (NOMMA)
   1. NOMMA Guidelines – Guideline 1 Joint Finishes

G. Steel Structures Painting Council (SSPC)
   1. SSPC SP-2 - Steel Preparation

1.03 SUBMITTALS

A. Shop Drawings. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories. Include erection drawings, elevations and details where applicable. Indicate welded connections using standard AWS A2.4 Welding Symbols. Indicate net weld lengths.

B. Welder Certifications.

C. Manufacturer's Certificates certifying welders employed on the work have been AWS qualified within the previous 12 months, in accordance with AWS-WHB-1.

D. Written Welding Procedure Specification (WPS)

1.04 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following
   1. AWS D1.1, Structural Welding Code--Steel.
   2. AWS D1.3, Structural Welding Code--Sheet Steel.
   3. AWS Certified welders.

B. Coating applicator - Galvanized Metal Fabrications: Company specializing in hot-dip galvanizing after fabrication and following the procedures in the *Quality Assurance Manual* of the American Galvanizers Association.

1.05 FIELD MEASUREMENTS

A. Verify field measurements.

PART 2 - PRODUCTS

2.01 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.02 FERROUS METALS

A. Steel Sections: ASTM A992 for W-Shape sections and ASTM A36 for all other members.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Bending or cold-formed steel ASTM A283, Grade C.

D. Steel Round Structural Tubing ASTM A500, Grade C, minimum yield strength, 46 ksi.

E. Pipe ASTM A53, Grade B, Type E or S, Schedule 40, galvanized where indicated.

F. Cast Iron ASTM A48/A48M, Class 30, unless another class is indicated or required by structural loads.

G. Cast steel ASTM A27, Grade 65-35.

H. Square and rectangular steel tubing structural, carbon steel conforming to ASTM A500 or ASTM A36.

I. Mechanical Tubing: ASTM A 513 hot- or cold-rolled carbon steel for non-structural tubing, electric welded tubing.

J. Chain Grade 80 High Strength, 5/16 inch diameter, alloy steel, welded Chain, for lifting.

K. Weathering Steel: ASTM A588 or A606, Type 4, hot-rolled, as-rolled condition.

L. Galvanized Steel Sheet: ASTM A653

2.03 FASTENERS

A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563 and ANSI B18.2.1; and, where indicated, flat washers and ASTM A325 as indicated on drawings.

C. High Strength Bolts ASTM A325.

D. Anchor Bolts ASTM F1554, Grade 36.

E. Machine Screws ASME B18.6.3.

F. Lag Bolts ASME B18.2.1.

G. Wood Screws Flat head, carbon steel, ASME B18.6.1.

H. Plain Washers Round, carbon steel, ASME B18.22.1.

I. Lock Washers Helical, spring type, carbon steel, ASME B18.21.1.

J. Threaded rods, steel yokes and plates.

K. Self-drilling, self-tapping screws, ASTM C954, galvanized, minimum #10 unless noted otherwise on drawings. By Buildex/Tomarco or equal.

L. Anchorage Devices, Drilled Expansion Anchors Minimum 5/8-inch diameter with 3 inch embedment unless noted otherwise on drawings. Allowable shear and tension values as permitted in ICC-ES, ESR-1917 Hilti Kwik Bolt TZ Concrete Anchor or Hilti Kwik Bolt 3, ESR-1385 for masonry anchors, by Hilti Inc., Tulsa, OK.

2.04 MISCELLANEOUS MATERIALS

A. Shop Primer fabricator's rust inhibitive primer suitable for finish scheduled in Section 09 90 00.

B. Galvanizing Repair Primer: Touch-Up products for Galvanized Surfaces Ready mixed Zinc rich galvanizing compound, 95% zinc, MIL-P-21035, SSPC Paint 20, or MPI #18.
   1. Finish: ZRC Products Company, Marshfield, MA or equal. Primer for repaired galvanized to receive a painting finish.

C. Zinc-Based Solders/Alloys: Solder Zinc Alloy for Repair ASTM A780 Annex A1; Welco Gal-Viz self-fluxing solder alloy, Galvalloy, Galvabar or equal, ASTM A780, paragraph A1. Repair Using Zinc-Based Alloys.

D. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
   1. Welding Materials: AWS A5.1, E70XX for Grade 40, E90XX for Grade 60, type and procedures required by electrode manufacturer for materials being welded.

E. Grout ASTM C1107, Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 8,000 psi at 7 days; of consistency suitable for application and a 30 minute working time.

2.05 FABRICATION

A. Fit and shop assemble in largest practical sections for delivery to site.

B. Ease exposed edges to small uniform radius.

C. Fabricate items with joints tightly fitted and secured.

D. Welded Joints. Seal joined members by continuous welds. Dress welded joints, leaving no burrs, or sharp or abrasive corners, edges or surfaces.
   1. Where exposed to view in finished spaces, dress welds in accordance with NOMMA Guidelines for Finish 1.
   2. Where exposed to view in utility spaces, dress welds in accordance with NOMMA Guidelines for Finish 2.

3. Where concealed, dress welds in accordance with NOMMA Guidelines for Finish 3.

E. Exposed Mechanically Fastened Joints. Make exposed, mechanically fastened joints hairline-tight, flush, butt joints. Secure with flush-mount, countersunk, screws or bolts; unobtrusively located; consistent with design of component, except where specifically indicated otherwise.

F. Provide components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as related metal fabrication, unless expressly indicated otherwise.

2.06 FINISHES

A. Steel and Iron

1. Clean surfaces of rust, scale, grease and foreign matter prior to finishing. Prepare in accordance with SSPC SP-2.
2. Galvanize steel items to zinc coating thickness in accordance with ASTM A123, minimum Coating Grade 80 (1.9 oz/sq. ft.). Surfaces shall be free of icicles, spangles and puddling. Provide venting holes at all enclosed sections, "V" notch, and drilled holes are acceptable. Locate to prevent rainwater from entering enclosed sections at exterior galvanized items. For sheet steel items, galvanize per ASTM A653 G60 Coating Designation.
3. Galvanized items to be painted: Do not use quenching solutions or treatments immediately after galvanizing. Refer to individual sections for galvanized items to be painted and to Section 09 90 00.
4. Do not prime surfaces in direct contact with concrete or where field welding is required.
5. For painted surfaces, prime items with two coats in accordance with requirements of primer specified herein.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Do not begin installation until unsatisfactory conditions are corrected. Beginning installation means acceptance of existing conditions including the preparatory work of others, if any.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Allow for erection loads and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components indicated on shop drawings.
   1. Weld joints using shielded metallic electric arc (SMAW) method. Use coated welded rods, not fluxed, or type recommended by manufacturer for use with parent metal. Use only certified welders for structural construction.
   2. Grinding: Grind welds on surfaces subject to traffic or contact to smooth flush joints.
   3. Peening: Remove flux and weld spatter as necessary to eliminate unsightly conditions and grind off sharp projections.
   4. Permanently Concealed Welds: No treatment required other than preparation for painting or galvanizing.

D. Perform field welding in accordance with AWS standards and procedures for metal alloy welded.

E. Obtain Architect approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions and surfaces not shop primed except surfaces to be in contact with concrete.

G. Repair of Galvanized Surfaces to be Painted: Ready mixed, zinc-rich galvanizing primer, ASTM A780 - A2. Repair Using Primer Containing Zinc Dust, minimum thickness 5 mils.

H. Repair of Exposed Galvanized Surfaces. ASTM A782 Annex A1, apply Gal-Viz while metal is still hot. Tin surface with Gal-Viz with wire brush. Do not direct flame on alloy. Minimum thickness, 5 mils.

3.04 ERECTION TOLERANCE

A. Maximum Variation From Plumb 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment 1/4 inch.

3.05 FINISHES

A. Paint with Gloss Polyurethane High Performance Coatings in Special Coatings per Section 09 90 00, Painting unless indicated otherwise.

3.06 SCHEDULE

A. Schedule is list of principal items only. Refer to Drawing details for items not specifically scheduled.

B. Fasteners: Provide fasteners and connectors of approved types, whether indicated or not.

C. Interior Vertical Access Ladder: minimum 16 inch ID wide tread surface on rungs.
   1. Side Rails: 3/8 inch by 2 inch steel bar.
   2. Rungs: 3/4-inch diameter solid steel rod spaced 12 inches on center vertically with knurled or skid-resistant surface.

3. Mounting Brackets: 3/8-inch thick L-bent plate 8-1/2-inches by 3-inch legs, 4-inches deep, fabricated to provide 7 inches clearance from wall surface. Furnish steel wall backing plates, brackets, and anchors required for 48 inches, maximum on center spacing.
4. Safety Post: Bilco LadderUP Safety Post Model LU-2, hot-dip galvanized steel construction, telescoping tubular section with automatic lock when extended. Upward and downward movement controlled by stainless special alloy steel spring balancing mechanism. Secure to ladder rungs with manufacturer's fasteners.

D. Exterior Vertical Access Ladder Steel 16 inches ID wide minimum. Galvanized Steel, rungs of 3/4-inch diameter solid rod steel spaced 12 inches on center; install 7 inches from wall surface, rungs to have knurled or skid-resistant surface; mount with 3/8 inch thick bent plate 8-1/2-inches by 3-inch legs, 4-inches deep, fabricated to provide 7-inches clearance from wall surface. Furnish steel wall backing plates, brackets, and anchors required for 48-inches, maximum on center spacing, galvanized and painted steel front and side panels 1/8 inch thick, with front panel hinged and u-bolt and slot for security padlock, min. height 8 feet. Attach side panels with 3 welded clip angles each side bolted to wall and welded to ladder.
   1. Cage for Ladder over 20 feet 1/4 by 2 inch hoops at 4 feet on centers, 7-3/16 by 1-1/2 inch vertical bars, solid riveted. Per Title 8, CCR, Construction Safety Orders.
   2. Parapet railing at exterior access ladders 42 inches above top rung, extending 24 inches horizontally and return to roof. Space between railings 24 inches.

E. Bumper Posts and Guard Rails As detailed; galvanized finish.

F. Door Frames for Overhead Door Openings and Wall Openings Channel sections; galvanized finish.

G. Steel Backing Plates 1/4 inch thick x widths and lengths required to support wall bumper, plumbing fixture hanger, equipment and as detailed. Cope studs and weld plates flush to surface with continuous welds.

H. Steel Corner Guards Provide steel angle corner guards as detailed minimum 3 by 3 inches by 1/4 inch thick, complete with weld-on anchors. Hot dip galvanized after fabrication.

I. Grates and Frames: Provide all gratings, covers and frames for catch basins, trench and storm drains. All Work shall be galvanized cast iron. Provide heavy-duty traffic trench type gratings, covers and frames in all traffic areas; manufactured by Alhambra Foundry Co., Alhambra, CA, McKinley Iron Works, Fort Worth, TX, or Neenah Foundry Co., Neenah, WI, Barry Pattern and Foundry Co, Inc, or equal as approved in accordance with Division 01, General Requirements for substitutions.
   1. Gratings in traffic areas shall be narrow slot type, with openings not greater than 1/2 inch with direction of slots placed perpendicular to direction of traffic.
   2. Covers shall be provided with recessed bolt attachment to frame.

J. Miscellaneous Framing and Supports, Trash Enclosures, Equipment Screens, Equipment Enclosures, vehicle gates.
   1. Provide steel framing or aluminum framing if indicate, and panels and supports as indicated in Drawings and as necessary to complete Work.
   2. Fabricate units from structural-steel shapes, plates, sheet metal and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
      a. Hinges Heavy-duty weld-on I type. Minimum 3 per leaf rated at 1000 lbs. each hinge.
   3. Enclosures and Gates:
      a. Gate Infill Panels for Enclosures, Sheet metal, 1-1/2 inches deep 36 inch panels, 18 gauge, G90 galvanized coated steel ASTM A653. Box Rib by BHP Steel Building Products or equal. Paint per Section 09 90 00.

K. Weathering Steel Wall Panels
   1. 1/4 inch weathering steel, installed at exterior walls as detailed.

L. Corrugated Galvanized Soffits
   1. 0.050 inch (18 ga) G90 galvanized steel sheet, corrugation to match Architect's sample, installed at exterior soffits as detailed.

END OF SECTION

SECTION 05 52 00
HANDRAILS AND RAILINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes
   1. Steel tubing railings, handrails, balusters and posts.
   2. Brackets and fittings.

B. Related Sections
   1. Section 09 90 00, Painting.

1.02 REFERENCES

A. ASTM - American Society for Testing and Materials
   1. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
   2. ASTM A153 - Zinc coating (Hot-Dip) on Iron and Steel Hardware
   3. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
   4. ASTM A780 - Repair of Damage and Uncoated Areas of Hot-Dip Galvanized Coatings.
   5. ASTM C1107 - Packaged Dry, Hydraulic - Cement Grout (Non-Shrink)

B. AWS - American Welding Society
   1. AWS A2.4 - Standard Symbols for Welding, Brazing and Non Destructive Examination
   2. AWS A5.1 – Carbon Steel Electrodes for Shielded Metal Arc-Welding
   3. AWS B2.1 – Welding Procedure and Performance Qualification
   4. AWS D1.1 – Structural Welding Code, Steel

C. CBC – 2010California Building Code
   1. CBC 11 – CBC Chapter 11B, Accessibility for Public Buildings, Public Accommodations, Commercial Facilities and Publicly Funded Housing
   2. CBC-16 – CBC Chapter 16A, Structural Requirements.

D. CFC - California Fire Code
   1. CFC-26 – CFC Chapter 26, Welding and Other Hot Work

E. MPI - Master Painters Institute Approved Products List
   1. 18 - Primer, Zinc Rich, Organic.
   2. 19 - Primer, Zinc Rich, Inorganic

F. NOMMA - National Ornamental & Miscellaneous Metals Association
   1. NOMMA Guidelines – Guideline 1, Joint Finishes

G. SSPC - The Society for Protective Coatings
   1. Paint 20 - Zinc-Rich Coating (Type 1 Inorganic and Type II Organic)

1.03 DESIGN REQUIREMENTS

A. Balcony railings and guardrails:
   1. In exit facilities serving an occupant load of greater than 50, assemblies shall be capable of resisting a lateral load of 50 pounds per linear foot applied horizontally at right angles to the top rail.
   2. In facilities other than exit facilities, assemblies shall be capable of resisting a lateral load of 20 pounds per square foot applied horizontally at right angles to the top rail.
   3. Components consisting of intermediate rails, panel fillers and their connections shall be capable of withstanding a load of 50 pounds per square foot ($1.2kN/m^2$) applied horizontally at right angles over the entire tributary area, including openings and spaces between rails.

1.04 SUBMITTALS

A. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners and accessories.

B. Samples: Submit three samples of handrail and each component.

C. Welder's Certificates: Welders shall be Project certified in accordance with AWS D1. 1-02.

1.05 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:
   1. AWS D1.1, Structural Welding Code--Steel. Certified Welders required.

1.06 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 - PRODUCTS

2.01 STEEL RAILING SYSTEM AND MATERIALS

A. Railings, Handrails Balusters Posts: 1-1/2 x 1-1/2 inch square structural tubing, 0.145 inch wall thickness, ASTM A 500, Grade B, welded joints; Posts: 2 x 2 inch square, 3/16 inch wall thickness, weld steel caps; unless indicated otherwise. Tensile strength: 58k psi.

B. Fittings: Elbows, T-shapes, wall brackets, escutcheons, caps: steel, finish to match rails.
   1. Wall Rail Brackets: Round top to accept tube rail, size to allow 1-1/2 inch clearance from rail to wall.
   2. Universal Weld Bracket by Wagner Companies to match railing material.

C. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing. Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.

D. Sleeve: Pipe ASTM A53, Grade B, Type E or S, Schedule 40, galvanized. Contractor's option: "EZ Sleeve" Model EZ 4012 by R & W Wagner, 12" H, 7/16" thick plastic tapered tube.

E. Nonshrink Grout:
1. Cement Based Grout: ASTM C1107, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 4,000 psi in 24 hours and 8,000 psi in 7 days; of consistency for application and a 30 minute working time. 1107 Advantage Grout by Dayton Superior, Miamisburg, OH; Sonogrout 10K by BASF; Super Por-Rok Anchoring Cement by Novex Systems International, Clifton, NJ; or equal.

F. Touch-Up for Galvanized Surfaces: SSPC - Paint 20, Mil-P-21035, or MPI #18 or #19, Ready mixed zinc-rich cold galvanizing compound, 95% zinc rich, Galvilite by ZRC Products Company, Marshfield, MA. or equal.

2.02 FABRICATION

A. Fabricate handrails and railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble handrails and railings in shop to greatest extent possible to minimize field splicing and assembly.
1. Corners: Standard flush weld pipe ells, welded and ground smooth.

C. Fabricate components with joints tightly fitted and secured.

D. Welded Joints. Seal joined members by continuous welds. Dress welded joints, ground smooth, leaving no burrs, or sharp or abrasive corners, edges or surfaces.
1. Where exposed to view dress welds in accordance with NOMMA Guidelines for Finish 1.

E. Exposed Mechanically Fastened Joints. Make exposed, mechanically fastened joints hairline-tight, flush, butt joints. Secure with flush-mount, countersunk, screws or bolts; unobtrusively located; consistent with design of component, except where specifically indicated otherwise.

F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

G. Accurately form components to each other and to building structure.

H. Hot-dip Galvanized
   1. In accordance with ASTM A 123 Grade 85, minimum 2.0 oz. per square foot for steel and iron products; ASTM A 153 for steel and iron hardware.
   2. One piece in greatest extent possible for fabricated assemblies in accordance with ASTM A 123. Field welding of galvanized main components not permitted.
   3. Surfaces shall be free of icicles, spangles and puddling. Provide venting holes at all enclosed sections, "V" notch and drilled holes are acceptable. Locate to prevent rainwater from entering section at exterior galvanized items. See drawings and schedules for extent of steel items to be provided with a galvanized finish.
   4. Galvanized items to be painted: Do not use quenching solutions or treatments immediately after galvanizing. Refer to individual sections for galvanized items to be painted and to Section 09 90 00.

I. Finish
   1. Galvanized coating thickness in accordance with ASTM A123, Grade 85.
   2. Touch-up coat at abraded areas and field welds. Leave surface suitable for work of Section 09 90 00.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive Work.

B. Beginning of installation means erector accepts existing conditions.

3.02 PREPARATION

A. Clean and strip steel items to bare metal where site welding is required.

3.03 INSTALLATION

A. Provide concrete footings 6" diameter, 12" deep under each post. Set vertical supports in galvanized steel sleeves with specified non-shrink grout. Option for EZ Sleeve, set before or immediately after concrete is poured. Install in precise location where railings will occur. Fill with non-shrink grout. Slope grout to drain at each post.

B. Install components plumb and level, accurately fitted, free from distortion or defects.

C. Provide anchors, plates or angles required for connecting railings to structure. Anchor railing to structure.
   1. Field welds shall be dressed and ground smooth, to match shop welds, leaving no sharp or abrasive corner edges or surfaces.
   2. Gripping surfaces (top or sides) shall be uninterrupted by newel posts, other construction elements or obstructions. Edges shall have minimum radius of 1/8".
   3. Field weld anchors as indicated on shop drawings.
   4. Ends shall return smoothly to floor, wall, or post as indicated on Drawings.

D. Conceal bolts and screws. Where not concealed, use flush countersunk fastenings.

E. Repair surfaces in conformance with ASTM D520, touch up welds and chipped surfaces with specified galvanizing compound prior to painting, minimum thickness 5 mils.

3.04 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/16 inch in 3 feet.

3.05 FINISHES

A. Finish: per Section 09 90 00 Painting.

3.06 SCHEDULE

A. As detailed and located in drawings.

B. Guardrails

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Rough carpentry.

1.02 REFERENCES

A. ASTM D4601 - Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.

B. Chapters 7 and 23, 2010 CBC.

C. DOC PS 1-07 - Department of Commerce Product Standard, U. S. Product Standard for Construction and Industrial Plywood.

D. DOC PS 20-05 - Department of Commerce Product Standard, American Softwood Lumber Standards.

E. DOC PS 2-04 - Department of Commerce Product Standard, U. S. Product Standard for Construction, Performance Standard for Wood-Based Structural-Use Panels.

F. ANSI A135.4-1995 - Basic Hardboard.

G. WWPA - Western Lumber Grading Rules 88, Latest Edition, by Western Wood Products Association.

H. APA - American Plywood Association Design/Construction Guide (Engineered Wood Association).

I. AQMD - Local Air Quality Management District Regulations.

J. AWPA C1, C2, C3, C9, C27 - American Wood Preservers Association - Manual of Recommended Practice.

K. AWPA C20-02 - American Wood Preservers Association Standards, Structural Lumber – Fire-Retardant Treatment by Pressure Process.

L. WCLIB - West Coast Lumber Inspection Bureau Standard Grading Rules No. 17.

M. ASTM E84 - Surface Burning Characteristics of Building Materials.

N. Title 8 - California Code of Regulations, Construction Safety Orders.

O. ICC –ESR – International Code Council Evaluation Service, Inc. Evaluation Service Reports.

P. RIS – Redwood Inspection Service, Standard Specifications for Grades of California Redwood Lumber, 1997.

1.03 SUBMITTALS

A. Product data and current ICC Evaluation Service Reports for framing anchors.

1.04 QUALITY ASSURANCE

A. Rough Carpentry Lumber: Visible grade stamp on all products required.

B. Grade Stamp: Association under whose rules it was graded, or official grade mark of other recognized grading agencies using grading rules, equivalent to WWPA or WCLIB.

C. Nailing guns and nail operators shall be approved in accordance with Title 8 Construction Safety Orders.

1.05 DELIVERY, STORAGE AND HANDLING

A. Do not deliver rough carpentry items until site conditions are adequate to receive the Work. Protect items from weather while in transit.

B. Store lumber and plywood at the site under cover or otherwise protected against exposure to weather, raise above ground and out of contact with damp or wet surfaces. Stack lumber and plywood and provide for air circulation within and around stacks and under temporary covers. For pressure treated lumber and plywood, provide spacers between courses to permit air circulation.

1.06 PROJECT CONDITIONS

A. Cooperate with other trades in coordinating their Work with the Work of this Section. Provide wood grounds, blocking and nailer where indicated or as required for Work of other trades.

PART 2 - PRODUCTS

2.01 ROUGH CARPENTRY MATERIALS

A. Lumber: Graded in accordance with WWPA or WCLIB; maximum moisture content of 19 percent at time of loading. Provide Douglas Fir Larch for structural and framing lumber, surfaced four sides to standards of the grading association unless otherwise indicated on Drawings, use the following grades:
   1. Joists, rafters, beams, lintels, horizontal framing, posts, studs and vertical framing: No. 1 unless otherwise indicated or noted on drawings.
   2. Non-bearing studs and plates, non-structural furring, concealed blocking, stripping and miscellaneous nailers and backing: No. 2 unless noted otherwise in the structural drawings.
   3. Structural Drawings take precedence for lumber grades.

4. All lumber in contact with concrete shall be pressure treated.

B. Exterior Trellis Construction: Dimension Lumber and Timber per DOC PS 20. Species: Douglas-fir larch Select Structural, WCLIC. Provide material hand-selected for uniformity of appearance and free from characteristics, on exposed surfaces and edges that would impair finish appearance, including decay, honeycomb, knot-holes, shakes, splits, torn grain, and wane.
   1. Provide timber framing complying with requirements, according to grading rules of grading agency indicated.
   2. For exposed lumber and timber to receive a stained or natural finish omit grade stamp and provide Certificates of Grade compliance issued by grading agency.

C. Plywood: Section 2303.1.4 CBC, Douglas Fir 1 Group Species, PS 1, APA Structural I Rated Sheathing. Bond Classification: Exterior. Thickness as indicated, span rating sized for spacing.
   1. For natural finished plywood: Panel Grade N veneer on face and B on back side.
   2. For painted finish: APA Sanded Plywood Panels, A-C Group 1, Exterior, sanded face, touch sanded back side.
   3. Thickness: As indicated on Drawings.

D. Roof Plywood Decking: requiring FM 1-90 Wind and Fire Classification. Section 2304.7.2 CBC, Douglas Fir 1 Group Species, PS 1, APA Structural I Rated Sheathing. Bond Classification: Exposure 1, B-C Veneer Grade, sanded 1 side. Thickness as indicated, span rating sized for spacing.

E. Preservative (Pressure) Treated Lumber: Section 2303.1.8 Conform to AWPA Manual of Recommended Practice, kiln dry after treatment. Use preservative complying with AWPA C2 lumber and C9 plywood, latest edition. Products NOT containing arsenic or chromium. Conform to AQMD, Local Regulations.
   1. Douglas Fir Larch, used as required by Section 2303, CBC, shall conform to the following:
      a. Lumber shall be WWPA or WCLIB grade stamped.
      b. Lumber shall be No. 1 grade or better unless indicated otherwise on Drawings.

F. Waterproof Membrane: ASTM D4601; Type II, asphalt saturated glass felt.

G. Plywood Backing Panels
   1. Telephone and Electrical Equipment, fixed equipment, cabinets, grab bars, door stops and plates: DOC PS 1, Exposure 1, APA A-C, sanded, Veneer Grade, fire-retardant treated, in thickness indicated or, if not indicated, not less than 5/8 inch nominal thickness. Installed "A" side out for paint finish.

H. Impact Resistance Plywood
   1. Manufactured by Olympic Panel Products; Product: Tempered Plyron or equal.
   2. Constructed of tempered hardboard laminated to Douglas Fir/Hemlock plywood.
   3. Thickness: 1/2 [5/8] [3/4] inch by 4 by 8 feet panels.
   4. Meets APA PS 1-07 requirements.

I. Nails, Spikes and Staples: Section 2304.9, Galvanized for exterior applications, high humidity locations and treated wood; plain finish for other interior locations; size and type to suit application. Comply with Table 2304.9.1. Use common nails only.

J. Bolts, Nuts, Washers, Lags, Pins and Screws: Section 2304.9 CBC, sized to suit application, galvanized for exterior locations, high humidity locations and treated wood, plain finish for other interior locations. Full diameter body bolts only per ASME B18.2.1(.2) or B18.2.6 for structural applications.

K. Fasteners: Expansion type or powder actuated type for anchorage to solid masonry or concrete. Refer to Division 01, General Requirements for acceptable types and required testing.

L. Stock Framing Connectors: Section 2304.9 CBC types indicated on Drawings, galvanized, with nails fully driven in all holes in each face of connector. Conform to the following.
   1. Manufacturers: Simpson Strong Tie Co., Inc., San Leandro, CA, United Steel Products, Montgomery, MN. or equal as approved in accordance with Division 01 General Requirements for Substitutions.
   2. ICC Listed.

M. Non-Stock Framing Connectors: Conform to details.

N. Nonshrink Grout: ASTM C1107, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 5,000 psi in 24 hours and 8,000 psi in 7 days; of consistency for application and a 30 minute working time. Acceptable Manufacturers: Dayton Superior, Miamisburg, OH; Sonneborn, Shakopee, MN; Novex Systems International, Clifton NJ, or equal.

2.02 PRE-MANUFACTURED SHEAR PANELS

A. Manufacturer
   1. Simpson Strong-Tie Company Inc. Pleasanton, CA; Product, Strong Frame.

B. Seismic Loads per 2010 California Building Code.

PART 3 - EXECUTION

3.01 FRAMING, FURRING AND STRIPPING

A. Erect wood framing, furring, stripping and nailing members true to lines and levels. Do not deviate from true alignment more than 1/4 inch in 10 feet, non-cumulative.

B. Construct members of continuous pieces of longest possible lengths.

C. Construct and erect required headers and lintels.

D. Double wall framing members at openings over 100 square inches. Space short members above and below openings in same manner as for walls.

E. Provide double joist headers at joist ends and around openings unless otherwise indicated on Drawings. Bridge joists and rafters to conform Section 2304 CBC and as noted on plans. For pre-manufactured joists, provide bridging in accordance with manufacturer's recommendations.

F. Construct walls with studs of size and spacing indicated, 16 inches on center unless otherwise indicated on drawings. Install single sill member at bottom and double plate at top. Stagger upper and lower members of double plate with joints not less that 4 feet o.c. or as indicated on Drawings. Where sill or any wood member contacts concrete or masonry, install preservative-treated lumber.

G. Provide one row of solid blocking not less than 2 inch nominal thickness and same width of stud at ceiling and floor lines and at spacing not to exceed 8 feet on center vertically. Fit snugly and attach with not less than two 16d nails.

H. Install 3 studs at corners.

I. Conform to Section 2308.9.8, CBC, where pipes penetrate sills or plates.

J. Cutting and Notching: Conform to Section 2308.9.10, CBC.

K. Bored Holes: Conform to Section 2308.9.11, CBC.

L. Conform to Section 717, California Building Code for fire blocks and draft stops. Fire blocks and stops at 10-feet intervals and at ceiling level.

M. Fire-Retardant Wood: Ripping and milling are not permissible. Cross cutting to length, drilling holes, joining cuts and light sanding are permissible. It is not necessary to field treat cut ends to maintain flame spread rating. All cuts on plywood are considered end cuts and is permissible to be cut.

3.02 PLYWOOD SHEATHING

A. Thickness as indicated on the Drawings, minimum thickness 15/32 inch.

B. Boundary Nailing: Not less than 3/8 inch from edge, spaced not more than 6 inches on center, unless noted otherwise on Drawings.

C. Blocking: Panel edges shall bear on framing members or solid blocking.

D. Minimum Size Vertical Panel: 16 inches wide.

E. Minimum Size Horizontal Panel: 24 inches wide.

F. Oriented Strand Board is permitted for shear panels.

3.03 FOUNDATION FRAMING, PLATES, SILLS AND SLEEPERS

A. Preservative treated wood required. Set wood sills on a bead of continuous butyl sealant on both sides of sill.

B. End Clearance for Lumber Entering Concrete: 1/2 inch minimum.

3.04 HORIZONTAL FRAMING

A. Bearing: 1-1/2 inch minimum on wood or metal, 3 inches on masonry. Lay framing members with crown up. Members with knots at bottom not permitted.

B. Lateral Support: Use solid blocking, cross bridging or other approved means.

C. Lap joists a minimum of 3 inches when framed from opposite sides of a beam. Do not run joists continuous beyond one span unless indicated otherwise on Drawings.

D. Openings: Double joists required for trimmer and headers for openings 4 ft. or larger unless indicated otherwise on Drawings.

E. Provide ties, purlins and blocking in conformance with Section 2316, CBC.

F. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

3.05 TRELLIS INSTALLATION

A. Trellis, Post, Beams and Rafter shall be level, plumb and true and shall rest on brackets of a bearing point free from racking.

3.06 INSTALLATION OF BACKBOARDS

A. Provide backing panels as indicated on Drawings to support telephone and electrical equipment, fixed equipment, cabinets, grab bars, door stops and plates. Fasten securely to framing. Ensure that backing panels are installed with good side out (whose face side is free of blemishes) side by side, no mix of sides allowed.

B. Install to extent indicated on the drawings or as required for electrical or communication system installation.

C. Install with sheet metal screws, No.10 minimum, at 12 inches on center minimum. Drywall screws will not be permitted.

D. Prime paint exposed faces. Do not cover manufacturer's trade stamps indicating fire treatment.

E. Final finish per Section 09 90 00, Painting.

END OF SECTION

SECTION 06 18 13

GLUE LAMINATED BEAMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Glue laminated wood beams.

1.02 REFERENCES

A. ANSI/AITC - American Institute of Timber Construction - A190.1 - Structural Glued Laminated Timber and AITC 117 Standard Specification for Structural Glued Laminated Timber Softwood Species.

B. AITC - American Institute of Timber Construction AITC 109 Standard Specification for Preservative Treatment of Structural Glued Laminated Timber.

C. ASTM D3737 - Establishing Stresses for Structural Glued Laminated Timber.

D. AWPA C28 – American Wood Preservers' Association, Standard for Preservative Treatment by Pressure Process of Glue Laminated Members and Laminations before Gluing.

E. PS 56 - Structural Glued Laminated Timber.

F. Chapter 23 California Building Code, National Design Specifications Part V and California Amendments 2303.1.3.1.

1.03 SUBMITTALS

A. Shop drawings indicating framing sizes and cambers.

B. Product data.

C. Samples: Full width and depth, 24 inches long, showing the range of variation to be expected in appearance of structural glued-laminated timber.

1.04 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacture of glue laminated structural units with five years minimum experience, and certified by the AITC.

B. Mock-up: field finishes
1. Provide finished sample of glue-laminated beam units for approval.
2. Units will establish a minimum standard of quality for this Work.
3. Approved units may be used as part of the Work.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and protect members in accordance with AITC requirements for load wrapped material.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Standard Structures, Inc., Santa Rosa, CA.

B. American Laminators, Drain, OR.

C. Calvert Co., Inc., Vancouver, WA.

2.02 MATERIALS

A. Materials, Manufacture and Quality Control: Conform to Product Standard PS 56, "Structural Glued Laminated Timber".

B. Lumber: Conform to Standard Grading rules for Western Lumber, March 1998, published by Western Wood Products Association and West Coast Lumber Inspection Bureau.
   1. Species: Alaska Cedar.
   2. Lay-up: either balanced or unbalanced.

C. Adhesives: wet-use type, melamine, phenol, resorcinol or phenol-resorcinol types.

D. Laminating Combinations: Meet the requirements of Product Standard PS 56; provide allowable stress values of 2000 psi in bending (Fb).

E. Service Temperature Maximum: Less than 150 degrees F maximum.

F. Waterproof Sealer:
   1. Exceeds federal specification TT-C-555B for resistance to wind-driven rain and ASTM D-4446 for waterproofing wood.
   2. Acceptable products or equal.
      a. Thompson's WaterSeal Clear Multi-Surface Waterproofer

2.03 FABRICATION

A. AITC A190.1, ASTM D3737, and the following requirements:
   1. End joints in adjacent laminations: Separated by a minimum of 6 inches. Plain scarf end joints: Slope not steeper than 1:10. Strength reducing defects such as wane not be permitted in an end joint. Finger Joints: Cut in wood which is free of knots and local grain deviation. The sum of the sizes of all knots which appear in the beveled surface of a scarf shall not exceed 1/4 the nominal width of lamination when laminations are 1-1/2 inches in thickness, and shall be reduced in proportion to the thickness of laminations to 1/8" the width of laminations when laminations are 5/8 inch or less in thickness.
   2. The moisture content of lumber in a single package of laminations at the time of gluing: Less than 16 percent. The range of moisture content of various laminations assembled into a single member shall not exceed 5 percentage points if any piece in the assembly exceeds 12 percent.
   3. Adhesive: "Wet-Use" type only.
   4. Preservative Treatment: For Architectural and Premium Grade, not affecting appearance, oil borne Type C, AITC 109, Table 1. Oxine copper in a light petroleum solvent or similar products approved by the glue-lam manufacturer, listed in AWAP C28, EPA approved and California VOC compliant.

B. Workmanship
   1. Fabrication: In accordance with the best practices with adequate plant and equipment and under supervision of properly qualified personnel.
   2. Gluing surfaces of laminations including edge and end joints: Plane surfaces, machine-surfaced smooth, and except for minor local occurrences, free of raised grain, torn grain, skips, burns, glazing, or other deviations from the plane of the surface that might interfere with the contact of sound wood fiber in mating surfaces of the laminations. Gluing surfaces, whether treated or untreated shall at the time of gluing be free from dust or other foreign matter, including any exudation or surface damage which would be detrimental to satisfactory gluing.
   3. At the time of gluing, variations in thickness across the width or along the length of any lamination shall not exceed plus or minus 0.008 inch and cup should not exceed 1/32 inch for each inch of width for lumber nominal 1 inch and less in thickness, and should not exceed 1/164 inch for each inch of width for lumber over nominal 1-inch thickness, but in no event shall cup and warp exceed that which will be straightened out by pressure in gluing.
   4. Clamping Methods: Such that the pressure is as uniform as practical over the whole area. Nailing in lieu of clamping for pressure is not permitted. Clamping may start at any point but shall progress to an end or ends. Gluing Pressure: Such as to assure close contact of the surfaces and provide a uniformly thin glue line, but not less than 100 lbs. psi. Maintain pressure until the adhesive has set. Clamping time and curing process shall be in accordance with adhesive manufacturer's recommendations.
      Finishing: Seal all end grain at place of fabrication after ends have been finally trimmed.

a. Immediately after end cutting each member to final length, and after wood preservative treatment, apply a saturation coat of end sealer to ends and other cross-cut surfaces, keeping surfaces flood coated for not less than 10 minutes.
b. After fabrication and sanding of each unit, and after end cut sealing, apply a heavy saturation coat of penetrating sealer on surfaces of each unit.

2.04 COMBINATION AND APPEARANCE GRADE

A. Combination 24F-V8 Cantilever span and 24F-V4 Simple span in conformance with AITC 117-2004.
1. Douglas Fir species throughout.

B. Appearance of Members: Architectural Grade all sides where exposed, Industrial Grade surfaced where concealed.

C. Units shall be fabricated for wet use.

2.06 FACTORY FINISH

A. Wiped Stain Finish: Manufacturer's standard, dry-appearance, penetrating acrylic stain and sealer: oven dried and resistant to mildew and fungus.
1. Provide color matching Architect's sample.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that supports are ready to receive glue-laminated beams.

B. Verify sufficient end bearing area.

C. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Coordinate placement of bearing and support items.

3.03 ERECTION

A. Set structural members level and plumb in correct positions.

B. Provide temporary bracing and anchorage to hold members in place until permanently secured.

C. Fit members together accurately without trimming, cutting, or any other unauthorized modification.

D. Where beams penetrates through exterior walls apply waterproof sealer as recommended by manufacturer.

3.04 FIELD FINISHES

A. Stain and Seal finish per Section 09 90 00 Painting.

3.05 TOLERANCES

A. Framing Members: 1/2 inch maximum from true position.

END OF SECTION

SECTION 06 40 00

ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes
1. Plastic-Laminate-Clad Architectural Cabinets
2. Plastic-Laminate-Faced Countertops
3. Solid Surfacing Countertops
4. Special Countertops
5. Hardwood Plywood Paneling
6. Hardware and Accessories
7. Factory Finishing

B. Related Requirements
1. Division 03 requirements for anchorage to concrete or masonry structures
2. Division 06 requirements for backing in wood stud framed walls
3. Division 09 Section "Schedules for Finishes"
4. Division 22 requirements for Plumbing
5. Division 26 requirements for Electrical work

1.02 REFERENCES

A. AHA – American Hardboard Association
1. A135.4 – Basic Hardboard

B. ANSI – American National Standards Institute
BHMA – Building Hardware Manufacturers Association
HPVA – Hardwood Plywood & Veneer Association
IAPMO – International Association of Plumbing and Mechanical Officials
NEMA – National Electrical Manufacturers Association
NPA –National Particleboard Association
NSF International
1. ANSI/BHMA A156.9 – Cabinet Hardware
2. ANSI/BHMA A156.11 – Cabinet Locks
3. ANSI/BHMA A156.18 – Materials and Finishes
4. ANSI A161.2 – Performance Standards for Fabricated High Pressure Decorative Laminate Countertops
5. ANSI/NEMA LD 3 – High-Pressure Decorative Laminates
6. [ANSI/NPA A208.1 – Particleboard]
7. ANSI/NPA A208.2 – Medium Density Fiberboard (MDF) for Interior Applications
8. BHMA Certified Products Directory

9. HP-1 – Standard for Hardwood and Decorative Plywood
10. IAPMO/ANSI Z124.3 – Plastic Lavatories
11. IAPMO/ANSI Z124.6 – Plastic Sinks
12. NSF/ANSI 51 – Food Equipment Materials
13. NSF Certified Products Directory

C. ASCE – American Society of Civil Engineers
SEI – Structural Engineering Institute
1. 7 – Minimum Design Loads for Buildings and Other Structures

D. ASTM International
1. C 97 – Absorption and Bulk Specific Gravity of Dimension Stone
2. C 170 – Compressive Strength of Dimension Stone
3. C 501 – Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser
4. C 880 – Flexural Strength of Dimension Stone]
5. D 570 – Water Absorption of Plastics
6. D 635 – Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
7. D 638 – Tensile Properties of Plastics
8. D 696 – Coefficient of Linear Thermal Expansion of Plastics
9. D 790 – Flexural Properties of Unreinforced and Reinforced Plastics
10. D 1929 – Determining Ignition Temperature of Plastics
11. D 2240 – Rubber Property—Durometer Hardness
12. D 2583 – Indentation Hardness of Rigid Plastics
13. D 3039 – Tensile Properties of Polymer Matrix Composite Materials
14. D 6272 – Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials by Four-Point Bending
15. E 84 – Surface Burning Characteristics of Building Materials
16. E 831 – Linear Thermal Expansion of Solid Materials by Thermo-Mechanical Analysis
17. G 21 – Resistance of Synthetic Polymeric Materials to Fungi

E. AWI – American Woodwork Institute
AWMAC – Architectural Woodwork Manufacturers Association of Canada
WI – Woodwork Institute (formerly WIC – Woodwork Institute of California)
1. AWS – Architectural Woodwork Standards
2. WI Certified Compliance Program

F. ISSFA – International Solid Surface Fabricators Association
1. ISSFA-2 – Classification and Standards for Solid Surfacing Material

G. SCAQMD – South Coast Air Quality Management District
1. Rule 1113 – Architectural Coatings
2. Rule 1168 – Adhesives and Sealants

1.03 SUBMITTALS

A. Product Data: For each type of product indicated

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
   1. Show details full size.
   2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
   3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in casework.
   4. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
   5. Apply WI-certified compliance label to first page of Shop Drawings.

C. Samples
   1. Lumber with or for transparent finish, not less than 5 inches wide by 24 inches long, for each species and cut, finished on 1 side and 1 edge
   2. Veneer leaves representative of and selected from flitches to be used for transparent-finished woodwork
   3. Veneer-faced panel products with or for transparent finish, 8 by 10 inches, for each species and cut. Include at least one face-veneer seam and finish as specified
   4. Plastic laminates, manufacturer's standard sample size, but not less than 5 by 7 inches, for each type, color, pattern, and surface finish, with 1 sample applied to core material and specified edge material applied to 1 edge
   5. Solid surface and special countertop materials, manufacturer's standard sample size, but not less than 6 inches square
   6. Corner pieces as follows: Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches (450 mm) high by 18 inches (450 mm) wide by 6 inches (150 mm) deep.
   7. Exposed cabinet hardware and accessories, one unit for each type
   8. A minimum 1 foot wide by 6 inch deep, full size sample for each type of counter top indicated, including the edge profile and backsplash.

D. Certificates
   1. WI Certified Compliance

E. Test and Evaluation Reports, by an independent testing agency for specified criteria

F. Qualification Statements
   1. Fabricator/installer

1.04 QUALITY ASSURANCE

A. Fabricator/Installer Qualifications
   1. Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of not less than 5 years of successful in-service performance, with at least one project in the past 5 years where the value of the woodwork was within 20 percent of the cost of woodwork for this Project.
   2. Single Source Responsibility: A single manufacturer shall provide and install the work of described in this Section

B. Certifications
   1. Provide Woodwork Institute Certified Compliance
      a. Before delivery to the jobsite the woodwork supplier shall provide a Woodwork Institute Certified Compliance Certificate indicating the casework products being supplied and Certifying that these products fully meet the requirements of the Grade or Grades specified.
      b. Each elevation of casework and each countertop shall bear a Woodwork Institute Certified Compliance Label.
      c. At completion of installation the woodwork installer shall provide a Woodwork Institute Certified Compliance Certificate indicating the products installed, and Certifying that the installation of these products fully meets the requirements of the Grade or Grades specified.

C. Mock-ups: Provide mockups of one base cabinet, one wall hung cabinet, and one countertop. Base cabinet shall have at least one drawer. Mockup shall be of the material and finish to be provided. The Approved Mockup may be incorporated in the project.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Delivery of casework shall be made only when the area of operation is enclosed, all plaster, concrete work, painting, and similar operations that could damage casework are dry and the area broom clean.

B. If casework must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified.

1.06 FIELD CONDITIONS

A. Do not deliver or install casework until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Maintain indoor temperature and humidity within the range recommended by AWS for the location of the project.

PART 2 - PRODUCTS

2.01 GENERAL

A. Performance/Design Criteria: Casework shall comply with AWS requirements for Premium Grade unless noted otherwise, except where more specific or more stringent requirements are specified herein.

B. Casework indicated by 3-digit design numbers on the Drawings, with or without the diamond symbol, refer to the Casework Design Series, AWS Appendix A.

C. Surface Burning Characteristics
   1. Provide cores, adhesives, and surfacing with Flame Spread Index of 75 or less and Smoke Developed Index of 450 or less when tested in accordance with ASTM E 84.
   2. Fire Resistive Casework: Where required by CBC Table 803.5 or Title 19 CCR Section 3.11, or other locations as indicated on the Drawings, provide cores, adhesives, and surfacing with Flame Spread Index of 25 or less and Smoke Developed Index of 450 or less when tested in accordance with ASTM E 84.
      a. Exception: Wood veneers or other surfacing material less than 0.036 inch (0.9 mm) thick.

D. Provide U shaped wire pulls or equally accessible pull hardware at all accessible casework, in accordance with CBC Section 1125B.4.

2.02 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS AND COUNTERTOPS

A. Materials
   1. General: Provide materials that comply with requirements of AWS quality standard for each type of casework and quality grade specified, unless otherwise indicated.
   2. Lumber shall be in accordance with the AWS Grade specified for the product being fabricated. Moisture Content shall be 6% to 12% for boards up to 2-inch nominal thickness, and shall not exceed 19% for thicker pieces.
   3. Core shall be MDF meeting the requirements of AWS, and as follows:
      a. ANSI/NPA A208.2, Grade 130; binder shall contain no urea formaldehyde.
   4. Hardboard: AHA A135.4
   5. High-Pressure Decorative Laminate (HPDL): All plastic laminates shall meet the requirements of ANSI/NEMA LD 3 and ANSI A161.2 for high-pressure decorative laminates. Design, colors, surface finish and texture, and locations shall be as scheduled in Section 09 06 00. Plastic laminate types and nominal minimum thicknesses for casework components shall be as follows:
      a. Grade HGS for exposed horizontal surfaces not requiring post-forming
      b. Grade VGS for exposed vertical surfaces of casework components not requiring post-forming
      c. Grade HGP for exposed horizontal surfaces where post forming is required
      d. Grade VGP for exposed vertical surfaces where post-forming is required

e. Grade CLS for semi-exposed surfaces
f. Grade BKL for concealed surfaces

6. Edge Banding: 3 mm PVC
7. Adhesives
   a. Use Type 1 water proof adhesives that do not contain added urea formaldehyde.
   b. VOC Content: Adhesives shall comply with the following limits when calculated according to SCAQMD Rule 1168:
      1) Wood Glues: Not more than 30 g/L
      2) Contact Adhesive: Not more than 80 g/L

2.03 SOLID SURFACE COUNTERTOPS

A. Manufacturers
1. Products of the following manufacturer form the basis of design and quality intended:
   a. Aristech Acrylics LLC ("Avonite"), Florence, KY
   b. E. I. du Pont de Nemours and Company ("Corian"), Wilmington, DE
   c. Formica Corporation, Cincinnati, OH
   d. LG Hausys America, Inc. Surfaces Division ("HI-MACS"), Atlanta, GA
   e. Samsung Chemical USA, Inc ("Staron"), La Mirada, CA
   f. Wilsonart International, Temple, TX
2. Or equal, as approved in accordance with Division 01 requirements for Substitutions

B. Description: Cast material that is a homogeneous filled solid polymer, composed of 100 percent acrylic polymer or a formulation of acrylic and polyester polymers with acrylic content not less than 5 percent and not more than 10 percent, mineral fillers, and pigments; not coated, laminated or of a composite construction; meeting ISSFA-2 and IAPMO/ANSI Z124.3 or IAPMO/ANSI Z124.6 requirements. Material shall have minimum physical and performance properties specified. Superficial damage to a depth of 0.01 inch shall be repairable by sanding or polishing. Material thickness shall be as indicated on the drawings. In no case shall material be less than 1/4 inch in thickness.

C. Performance Criteria

	PROPERTY	REQUIREMENT (min. or max.)	TEST
1.	Tensile Strength	5800 psi (min.)	ASTM D 638
2.	Hardness	55-Barcol Impressor (min.)	ASTM D 2583
3.	Thermal Expansion	.000023 in/in/°F (max.)	ASTM D 696
4.	Boiling water Surface Resistance	No Change	NEMA LD 3-3.05
5.	High Temperature Resistance	No Change	NEMA LD 3-3.06
6.	Impact Resistance (Ball drop)		NEMA LD 3-3.03
	a. 1/4" sheet	36", 1/2 lb ball, no failure	
	b. 1/2" sheet	140", 1/2 lb ball, no failure	
	c. 3/4" sheet	200", 1/2 lb ball, no failure	
7.	Mold & Mildew Growth	No growth	ASTM G 21
8.	Bacteria Growth	No Growth	ASTM G 21

9.	Liquid Absorption (Weight in 24 hrs.)	0.1% max.	ASTM D 570
10.	Flammability		ASTM E 84
	a. Flame Spread	25 max.	
	b. Smoke Developed	30 max	
11.	Sanitation	"Food Contact" approval	NSF 51

D. Finish
1. Pattern and color shall occur, and shall be consistent in appearance, throughout the entire depth (thickness) of the solid polymer material.
2. Exposed finished surfaces and edges shall receive a uniform appearance. Exposed surface finish shall be as scheduled.

E. Accessory Products: Accessory products, as specified below, shall be manufactured by the solid polymer manufacturer or shall be products approved by the solid polymer manufacturer for use with the solid polymer materials being specified.
1. Seam Adhesive: Seam adhesive shall be a two-part adhesive kit to create permanent, inconspicuous, non-porous, hard seams and joints by chemical bond between solid polymer materials and components to create a monolithic appearance of the fabrication. Adhesive shall be approved by the solid polymer manufacturer. Adhesive shall be color-matched to the surfaces being bonded where solid-colored, solid polymer materials are being bonded together. The seam adhesive shall be clear or color matched where particulate patterned, solid polymer materials are being bonded together.
2. Panel Adhesive: Panel adhesive shall be neoprene based panel adhesive meeting TCA Hdbk, Underwriters Laboratories (UL) listed. Use this adhesive to bond solid polymer components to adjacent and underlying substrates.
3. Silicone Sealant: As specified in Section 07 92 00 and approved for use by the solid polymer manufacturer; use sealant to seal all expansion joints between solid polymer components and all joints between solid polymer components and other adjacent surfaces such as walls, floors, ceiling, and plumbing fixtures.
4. Conductive Tape: Manufacturer's standard foil tape, 0.1 mm 4 mils thick, applied around the edges of cut outs containing hot or cold appliances.
5. Insulating Felt Tape: Manufacturer's standard product for use with drop-in food wells used in commercial food service applications to insulate solid polymer surfaces from hot or cold appliances.
6. Heat Reflective Tape: As recommended by the solid polymer manufacturer for use with cutouts for heat sources.
7. Mounting Hardware: Provide mounting hardware, including sink/bowl clips, inserts and fasteners for attachment of undermount sinks and lavatories.

F. Fabrication: Components shall be factory or shop fabricated to sizes and shapes indicated, to the greatest extent practical, in accordance with approved Shop Drawings and manufacturer's requirements. Provide factory cutouts for sinks, lavatories, and plumbing fixtures where indicated on the drawings. Contours and radii shall be routed to template, with edges smooth.
1. Joints and Seams: Form joints and seams between solid polymer components using manufacturer's approved seam adhesive. Joints shall be inconspicuous in appearance and without voids to create a monolithic appearance.

2. Edge Finishing: Rout and finish component edges to a smooth, uniform appearance and finish. Rout all cutouts, then sand all edges smooth.

G. Countertops: Fabricate all solid surfacing, solid polymer counter top components from 1/2 inch thick material unless indicated otherwise. Counter tops shall be complete with 4 inch high backsplash, permanently attached with coved transition, and loose endsplashes unless indicated otherwise. Attach 2 inch wide reinforcing strip of polymer material under each horizontal counter top seam.
1. Permanently attached backsplashes shall be attached with seam adhesive and to form a radiused coved transition from countertop to backsplash.
2. End splashes shall be provided loose for installation at the jobsite after horizontal surfaces to which they are to be attached have been installed

2.04 HARDWARE

A. Wire Pulls: ANSI/BHMA A156.9, B52011, back mounted, 4 inches long and 5/16 inch in diameter

B. Drawer Slides: ANSI/BHMA A156.9, B05091, BHMA Certified
1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides
2. Grade 1HD-100 for drawers up to 8 inches deep by 24 inches wide
3. Grade 1HD-200 for larger and vertical file drawers

C. Frameless Concealed Hinges (European Type): BHMA A 156.9, B01602, 135 degrees of opening, self-closing.

D. Butt Hinges: 2-3/4-inch, 5-knuckle steel hinges made from 0.095-inch-thick metal, semi-concealed hinges for overlay doors: ANSI/BHMA A156.9, B01521

E. Concealed Hinges: LAMP Model RK-50, as manufactured by Sugatsune America Inc, Carson, CA, or approved equal.

F. Catches: Magnetic catches, ANSI/BHMA A156.9, B03141

G. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081

H. Locks: ANSI/BHMA A156.11, E07121 at doors and E07041 at drawers, BHMA Certified
1. Key to match building keying system.
2. Keying: All keyways in same room or area alike
3. BHMA Certified locks are not available for all keyways; non-certified products may be used only as required to coordinate with building keying.

I. Grommets for Cable Passage through Countertops: 2-inch (51-mm) OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.

J. Keyboard and Mouse Tray: Human Scale Model A115, Doug Mockett & Co Model KP1 with KP1A mouse support, or approved equal

K. Wire Management: Doug Mockett & Co WM-2A, Blanton & Moore WMC-4000, or approved equal

L. Support angle brackets for countertops: 18" brackets, steel angle 1/4" thick, 2" legs, mitered and welded, ground smooth, unless noted otherwise on drawings, install at 16" on center.

M. Blind shelf supports: 5 inch long by 7/16 dia. round or hexagonal corrosion resistant steel rods with base plates for screw mounting to wall; provide adequate backing concealed in wall for support of loaded shelves.

N. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for finish number 630, Satin Stainless Steel, unless noted otherwise.

O. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

P. Quartz Surfacing Countertops
1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. CaeserStone USA Inc, Van Nuys, CA
   b. Or equal, as approved in accordance with Division 01 requirements for Substitutions
2. Description: Proprietary blend of natural quartz aggregate and pigments in a polymer matrix
3. Performance Criteria
   a. Surface Burning Characteristics, ASTM E 84
      1) Flame Spread Index: 25 or less
      2) Smoke Developed Index: 450 or less
   b. Water Absorption: 0.05% or less, ASTM C 97
   c. Compressive Strength: Not less than 20,000 psi, ASTM C 170
   d. Flexural Strength: Not less than 5,000 psi, ASTM C 880 or D 790
   e. Abrasion Resistance: Material loss not greater than 225, ASTM C 501
   f. Comply with IAPMO/ANSI Z124.6
   g. NSF/ANSI 51 Certified
4. Fabrication: In accordance with manufacturer's instructions
5. Finishes: As scheduled in Section 09 06 00

2.05 HARDWOOD PLYWOOD PANELING

A. ANSI/HPVA HP-1, sizes and species as indicated, "European style" thin veneer core (9-ply at 1/2" thickness).

2.06 FABRICATION

A. Casework shall be AWS CONSTRUCTION TYPE A, frameless and cabinet and door INTERFACE STYLE 1, overlay, unless indicated otherwise.

B. Exposed Surfaces shall be as scheduled in Section 09 06 00, and meeting the requirements of the AWS for the Grade specified.
   1. All surfaces visible from a seated or standing position, including interior surfaces of open casework, shelving, and casework with glass doors, to sloped tops and to tops up to 72 inches above floor or visible from an upper level, shall be considered Exposed.
   2. Shelving, horizontal surfaces and all surfaces behind sliding Markerboards shall be considered Exposed.

C. Semi-Exposed Surfaces shall be in accordance with AWS requirements, except as otherwise specified herein.
   1. For wood-veneer-faced casework, semi-exposed surfaces shall be in accordance with AWS requirements, except as otherwise specified herein.
   2. For plastic-laminate-clad-casework, semi-exposed surfaces shall be Grade CLS HPDL.

D. Doors, drawer fronts, and false fronts shall be flush overlay unless indicated otherwise.

E. Back Splashes
   1. Back splashes shall be ASSEMBLY 2-Deck mount, manufacturer assembled.
   2. Back splashes shall be cove and shall be 4 inches high unless indicated otherwise.
   3. Back splash tops shall be square with scribe unless indicated otherwise

F. Countertop Edges
   1. Plastic-laminate-clad countertops: HPDL self edge unless indicated otherwise
   2. Solid surface countertops: Waterfall unless indicated otherwise

G. Hardwood Plywood Wall Panel Edges: Edge profile(s) as detailed or, if not detailed, radius equal to thickness of panel; fill voids and checks, resin hardened.

H. Factory Finishing
   1. All wood-veneer-faced items provided in this Section shall be factory finished in accordance with AWS requirements for the Grade specified.
      a. Finish System for wood-veneer-faced cabinets: System - 9, UV Curable, Acrylated Epoxy, Polyester or Urethane; stain to match control samples.
      b. VOC Content: Finishes shall comply with the following limits when calculated according to SCAQMD Rule 1113: 275 g/L.

PART 3 - EXECUTION

3.01 PREPARATION

A. Before installation, condition casework to average prevailing humidity conditions in installation areas.

B. Before installing casework, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

C. Layout markings shall not be made with xylene-based inks, paint, or dyes, or with other solvent-based products that may bleed through finishes.

3.02 INSTALLATION

A. Grade: Install casework to comply with requirements for the same grade specified in Part 2 for fabrication of type of casework involved.

B. Assemble casework and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install casework level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

D. Scribe and cut casework to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor casework to anchors or blocking built in or directly attached to substrates and in accordance to ASCE/SEI 7, Section 13.5, Table 13.5-1. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing screws for exposed fastening, countersunk and filled flush with casework and matching final finish if transparent finish is indicated.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
   1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
   2. Maintain veneer sequence matching of cabinets with transparent finish.
   3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
   1. Align adjacent special countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
   2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
   3. Secure backsplashes to walls with adhesive and calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealers."

H. Hardwood Plywood Paneling: Install at ceilings and walls as detailed.

I. Touch up finishing work specified in this Section after installation of casework. Fill nail holes with matching filler where exposed.

3.03 ADJUSTING AND CLEANING

A. Repair damaged and defective casework, where possible, to eliminate functional and visual defects; where not possible to repair, replace casework. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean casework on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

SECTION 07 01 50

PREPARATION FOR RE-ROOFING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Removal of existing roofing and insulation covering in preparation for a new roof membrane system.

1.02 SYSTEM DESCRIPTION

A. Extent of Roof Area: Remove existing roofing gravel, perimeter flashings, base flashings, counter flashings, vent stack flashings, roofing membrane, insulation, vapor retardant and other materials to fully expose deck.

1.03 PRE-INSTALLATION CONFERENCE

A. Attendance Mandatory at conference required in section specifying new roofing installation.

B. Establish at pre-bid job walk, number of layers to be removed and reconfirm at pre-installation conference.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Do not remove existing roofing membrane when weather conditions threaten the integrity of the building contents or intended continued occupancy.

B. Maintain continuous temporary protection during and prior to installation of new roofing system.

1.05 SCHEDULING

A. Schedule work to coincide with commencement of installation of new roofing system.

B. Remove only existing roofing materials that can be replaced with new materials as the weather will permit.

1.06 COORDINATION

A. Coordinate work with other affected mechanical and electrical work associated with roof penetrations.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Temporary Protection: Sheet polyethylene of thickness sufficient to prevent tearing or damage during use. Provide weights to retain sheeting in position.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing site conditions.

B. Verify that existing roof surface is clear and ready for work of this Section.

3.02 PREPARATION

A. Sweep roof surface clean of loose matter. Remove loose refuse and dispose off site legally.
   1. Free Fall Maximum: 8 ft. Provide enclosed chutes for higher fall.
   2. Provide disposals sufficiently sized to prevent debris from scattering around areas.
   3. Use support systems, intake hoppers, protective liners and durable non-breakable chutes. Max-Access Inc., Houston, TX, Chutes International, White Plains, MD or equal.
   4. Do not use Owner's disposal system.

3.03 MATERIALS REMOVAL

A. Remove metal counter flashings.

B. Scrape roofing gravel from membrane surface.

C. Remove roofing membrane, perimeter base flashings, flashings around roof protrusions, pitch pans and pockets, insulation vents and other material.

D. Cut and lay flat any membrane blisters.

E. Remove insulation and fasteners, cant strips, blocking, and other materials.

F. Remove underlayment.

G. Repair existing wood deck surface to provide smooth working surface for new roof system.

H. Legally dispose of removed materials off-site.

3.04 TEMPORARY PROTECTION

A. Provide temporary protective sheeting over uncovered deck surfaces.

B. Turn sheeting up and over parapets and curbing. Retain sheeting in position with weights.

C. Provide for surface drainage from sheeting to existing drainage facilities.

D. Do not permit traffic over unprotected or repaired deck surface.

END OF SECTION

SECTION 07 21 00

INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Thermal insulation in exterior wall and roof construction.

B. Sound attenuation insulation in interior partition [and above ceiling] construction.

C. Related Requirements:
   1. Energy calculations or prescriptive compliance documents.

1.02 REFERENCES

A. ASTM - American Society for Testing and Materials
   1. ASTM C 165 - Test Method for Measuring Compressive Properties of Thermal Insulations
   2. ASTM C 356 - Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat
   3. ASTM C 612 - Mineral Fiber Block and Board Thermal Insulation
   4. ASTM C 665 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
   5. ASTM C 1104 - Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation
   6. ASTM C 1304 - Test Method for Assessing the Odor Emission of Thermal Insulation Materials
   7. ASTM C 1338 - Test Method for Determining Fungi Resistance of Insulation Materials and Facings
   8. ASTM D 816 - Rubber Cements
   9. ASTM E 84 - Surface Burning Characteristics of Building Materials
   10. ASTM E 96 - Test Methods for Water Vapor Transmission of Materials
   11. ASTM E 136 - Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C

B. CBC - 2010 California Building Code
   1. CBC-7 – CBC Chapter 7, Fire Resistance Rated Construction

C. Title 24 California Code of Regulations Part 6 California Energy Code, Section 118, 2008.

1.03 PERFORMANCE REQUIREMENTS

A. Materials shall provide continuity of thermal barrier at building enclosure elements.

B. Materials shall provide continuity of sound barrier at designated room enclosure elements.

C. Materials shall conform to Section 719, California Building Code and Section 118 California Energy Code.

1.04 SUBMITTALS

A. Product Data: Provide data on product characteristics, performance criteria and methods of installation.

B. Three samples of each material specified minimum 12 inches square. Provide fasteners, clips and other accessories.

C. Certification of Compliance with Section 118 California Energy Code, 2008 and Part 12, Title 24,CCR Standards for Insulating Materials Chapter 12-13, Section 12-13-1555.

1.05 QUALITY ASSURANCE

A. Provide R-value in accordance with Section 143, Table 143-A of 2008 California Energy Code, Title 24 Part 6 California Code of Regulations.

B. Adhesives shall comply with VOC content limits defined by SCAQMD Rule 1168.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.
1. Johns Manville Insulations, Commercial/Industrial Division, Denver, CO.
2. Certainteed Corporation, Valley Forge, PA.
3. Owens - Corning, Toledo, OH.
4. Thermafiber Division of USG Corp., Wabash, IN.

B. Or equal as approved in accordance with Division 01, General Requirements for Substitutions.

2.02 MATERIALS - THERMAL

A. Batt Insulation: ASTM C665, Type III, Class A, Category 1. Preformed, faced, formaldehyde-free glass fiber batt insulation, with tabs, conforming to following:

1.	Thermal Resistance	R-values as noted in energy calculation or prescriptive compliance documents.
2.	Batt Size	As required to fully fill cavity width and height or length.
3.	Thickness	As required to meet specified R-value without compression.

4.	Facing	Faced on one side with flame resistant foil facing.
5.	Flame Spread	Less than 25, ASTM E 84
6.	Smoke Developed Rating	Maximum 50, ASTM E 84
7.	Permeance	0.05 perms, ASTM E 96

2.03 MATERIALS - SOUND

A. Sound Attenuation Insulation: ASTM C665, Type I; preformed glass fiber, formaldehyde-free, "Sound Control Batts", acoustical fiber glass insulation, by Johns Manville or equal. Conforming to the following:

1.	Size	As required to fully fill cavity width and height.
2.	Thickness	3-1/2" for 2 x 4 " walls and 5-1/2" for 2 x 6" walls, minimum.
3.	Facing	unfaced
4.	Flame Spread	Less than 25, ASTM E84
5.	Smoke Developed Rating	Maximum 50
6.	Formaldehyde-free	

2.04 ACCESSORIES

A. Fasteners, type and size to suit application.

B. Tape: Acrylic with Polypropylene backing, Class A, flame spread less than 25, adhering type, 2-1/2 inch wide; No. 8086 CONTRACTOR SHEATHING TAPE, manufactured by 3m Company, St. Paul, MN, or equal as approved in accordance with Division 01, General Requirements for substitutions.

C. Insulation Fasteners: Steel impale spindle and clinch shield on flat metal base with applied adhesive, length to suit insulation thickness, capable of securely and rigidly fastening insulation in place; INSUL-ANCHORS, manufactured by Gemco, Dansville, OH, or equal as approved in accordance with Division 01, General Requirements for substitutions. Self-adhesive base plates are prohibited.

D. Adhesive: Tuff Bond Hanger Adhesive manufactured by Gemco, Dansville, OH, or equal as approved in accordance with Division 01, General Requirements for Substitutions.

E. String wire: Minimum 16 gauge galvanized annealed steel wire.

F. Do not use salvage cut-offs, materials less than space width, or in multiple short lengths to fill-in the gaps.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify site conditions.

B. Verify that substrate and adjacent materials are satisfactorily installed and in place and are ready to receive insulation.

3.02 INSTALLATION

A. Install insulation in accordance with insulation manufacturer's instructions.
   1. Clean tracks prior to installation.

B. Install in cavities designated to receive sound or thermal insulation without gaps or voids. Extend material full height of cavity.

C. Cut insulation to fit tightly at cavities between studs not standard 16 inches on center spacing.

D. Trim insulation neatly to fit spaces.

E. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.

F. Extend thermal materials full height of cavity to structure above and as otherwise required to produce a completely insulated building envelope.

G. Extend sound materials full height of cavity to structure above and as otherwise required to produce a completely sound insulated enclosure.

H. Tape and seal butt ends, lapped flanges, and tears or cuts in foil in thermal batts.

I. Wood Framing: Place foil side of thermal batts toward inside of building by stapling at 6 inches oc.
   1. Batts under wood framing: Staple flanges to wood supports at 4" centers and ensure batt facings form continuous vapor barrier. Provide tightly stretched string wires along center of horizontal or sloping batts where support spacing exceed 16" on centers.
   2. Install batts in exterior walls with vapor barrier facing room.

J. Metal Framing: Place foil side of thermal batts toward inside of building. Place insulation fasteners at 36 inches on centers, vertically in two rows at each stud cavity. Tape and seal tears or cuts in foil.
   1. Batts Under Metal Roof Decks: Install foil-faced flanged-type insulation batts secured with spindle anchors. Staple flanges together at maximum 4" centers and seal joints at abutting vertical surfaces with a pressure-sensitive plastic tape. Provide 16 gauge galvanized string wires under batts wherever necessary to prevent sagging, stretched taut.

K. Install material to preclude slipping from place by use of nails, screws, wires or other approved fastening devices.

L. In wall cavities above ceilings with no finish or finish on one side, retain insulation in place with 16-gauge galvanized annealed wires spaced 12 inches on centers vertically.

M. At roof insulation, provide minimum of 1 inch air space between insulation and roof sheathing.

N. Where tight, congested, difficult or otherwise unforeseen conditions are encountered, employ alternate application methods or materials to effect the intended insulation system. Alternate methods or materials will be approved by Architect.
   1. Position the batt into the cavity and pull the second folded tab across the face of the adjoining framing member staple the tab to the near side of the second framing member while holding the tab in alignment parallel to the deck. Maintain fullest "drape" on each tab to ensure sufficient space above the facing to permit the batt to recover to its full thickness.
   2. In the second module double layer the tab of the next batt against the stapled tab of the first batt, and repeat Steps 1 and 2.
   3. In applications where framing is not present, it may be attached to the underside of steel or wood roofs decks using impaling pins and washers (in which case, adjacent tabs are folded together and stapled for a continuous vapor retarder).]

3.03 INSPECTION

A. Notify Project Inspector before Work is covered. Approval by Project Inspector shall be received before any Work is concealed. Work that has been covered prior to inspection and approval shall be uncovered for inspection and recovered.

END OF SECTION

SECTION 07 25 00

CONCRETE SLAB VAPOR EMISSIONS TESTING AND TREATMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes
   1. Vapor Emission Testing of new and existing concrete slabs
   2. Slab Remediation

B. Related Requirements
   1. Section 01 40 00, Quality Requirements
   2. Section 03 01 32, Concrete Rehabilitation
   3. Section 03 30 00, Cast-In-Place Concrete
   4. Division 09 Sections for floor finishes

1.02 PRICE AND PAYMENT PROCEDURES

A. Testing of all new and existing concrete slabs scheduled to receive new floor covering shall be included in the base bid.

B. Remediation, if required, shall be by Change Order.

1.03 REFERENCE STANDARDS

A. ASTM International (formerly American Society for Testing and Materials)
   1. C 109 – Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
   2. F 710 – Preparing Concrete Floors to Receive Resilient Flooring
   3. F 1869 – Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
   4. F 2170 – Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
   5. F 2420 – Determining Relative Humidity the Surface of Concrete Floor Slabs Using Relative Humidity Probe Measurement and Insulated Hood

1.04 COORDINATION AND SCHEDULING

A. Coordinate acclimatization of spaces and scheduling of tests to comply with all requirements of the floor finish Sections and the floor finish manufacturers' requirements.

1.05 SUBMITTALS

A. Product Data
   1. Test Kit
   2. Slab Treatment System

B. Certificates
   1. Slab Acceptance by manufacturers and installers of all floor finishes
   2. Slab Treatment System manufacturer's certification of installation

C. Test and Evaluation Reports

D. Manufacturers' Instructions

E. Warranty Documentation

1.06 QUALITY ASSURANCE

A. Qualifications
   1. Treatment Manufacturer: Company regularly engaged in the manufacture of concrete slab vapor emission treatments for not less than ten (10) years
   2. Treatment Installer: Manufacturer or company certified by the manufacturer, with not less than five (5) years experience on work of similar scope
   3. Testing Agency: Testing Laboratory as specified in Section 01 40 00

B. Certification
   1. Manufacturer's representative shall be on site during entire process of slab treatment to document and certify the installation.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Test kits shall remain in original sealed packaging until used.

B. Slab treatment materials shall be handled only in accordance with manufacturer's certified installation procedures.

1.08 FIELD CONDITIONS

A. Test sites shall be maintained at the temperature and relative humidity expected during normal use for not less than 48 hours prior to testing.
   1. More stringent requirements may apply, and shall be followed, if specified in floor finish Sections or manufacturers' instructions.

B. Slabs to be tested shall be clean and free of any foreign material; all residual adhesives, curing compounds, sealers, paints, floor coverings, etc. shall be removed.

1.09 WARRANTY

A. Minimum fifteen (15) year, no dollar limit, warranty covering material and labor to replace floor finishes, as well as re-treatment of the slab, if failure due to substrate originated moisture vapor and/or moisture-borne contaminants such as excessive alkalinity.
   1. Warranty shall be third-party insured to minimum $2,000,000.00 (two-million dollars), with the District named as co-insured/loss payee.

PART 2 - PRODUCTS

2.01 ASTM F 1869 Test Kits

A. Manufacturer: Acceptable to Testing Laboratory and Project Inspector

B. Description: Cylindrical plastic dish containing anhydrous calcium chloride, in a heat-sealed bag, and transparent cover

C. Materials: As specified in ASTM Standard

2.02 CONCRETE SLAB VAPOR EMISSIONS TREATMENT

A. Manufacturers
   1. Products of the following manufacturer form the basis of design and quality intended:
      a. Creteseal, Anaheim, CA
   2. Subject to compliance with performance and warranty requirements, similar or equivalent systems from the following manufacturers will be acceptable:
      a. Advanced Moisture Control, Inc., Westminster, CA
      b. Synthetics International, Irvine, CA
   3. Or equal as approved in accordance with Division 01, General Requirements for substitutions.

B. Description: Creteseal CS2000 2-Day System; 3-part system consisting of a penetrating sealer, topical membrane, and cementitious topping.

C. Performance Criteria:
   1. System shall be capable of reducing moisture vapor emission from tested level to not more than 3 lb/1000 ft^2 per 24 h, and pH not less than 7.0 nor more than 9.0.
   2. Surface of floor after application of cementitious topping shall be flat to within 3/16-inch per 10-feet.
   3. Compressive strength of cementitious topping shall not be less than 3000 psi, tested in accordance with ASTM C 109.

D. Materials
   1. Penetrating sealer: Proprietary aqueous silicate solution compliant with SCAQMD VOC limits
   2. Topical membrane: 2-part liquid-applied system compliant with SCAQMD VOC limits and compatible with penetrating sealer
   3. Cementitious topping: Leveling compound as specified in Section 03 30 00, and approved by slab treatment manufacturer

PART 3 - EXECUTION

3.01 EXAMINATION

A. Test new and existing concrete slabs as follows:
   1. ASTM F 710: pH in range 7.0 to 9.0
   2. ASTM F 1869: Moisture vapor emission rate not exceeding 3 lb/1000 ft^2/24 h
      a. In areas with both new and existing slab, test sites shall include both, and at least one test site shall be across the joint between new and existing.
      b. Testing of both new and existing slabs may require more test sites than specified in the Standard; Testing Laboratory shall determine required number of test sites.
   3. ASTM F 2170: Relative humidity not greater than 75%
      a. Test both new and existing slabs.

B. In areas where slabs pass all specified tests, proceed with flooring installation.

C. In areas where slabs fail *any one* of the specified tests, additional testing and/or remediation may be required; immediately notify Architect and District of failure.

D. Proceed with remainder of work of this Section only when directed by District and Architect.

3.02 PREPARATION

A. Concrete surface shall be aggressively shot-blasted to a porous surface acceptable to manufacturer's representative.

B. Mechanically V-groove out all cracks and control joints to a minimum of 1/4-inch width and 5/8-inch depth, and fill with a cementitious or epoxy patch as directed by manufacturer's representative.

3.03 APPLICATION

A. Apply penetrating sealer in strict accordance with manufacturer's requirements.

B. After a minimum of 24 hours, neutralize the concrete surface to achieve pH level specified by the manufacturer.

C. Apply topical membrane in strict accordance with manufacturer's instructions.

D. Not less than 12 hours after application of the membrane, apply cementitious topping.

3.04 FINAL TESTING

A. Perform ASTM C 109, F 710 pH, F 2420 tests after curing of the cementitious topping.
1. ASTM F 2170 test shall NOT be repeated after installation, to preserve integrity of installed system.

END OF SECTION

SECTION 07 46 46

EXTERIOR FIBER CEMENT SIDING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Exterior fiber cement lap siding
   2. Supports, anchors and attachments

1.02 REFERENCES

A. AATCC – American Association of Textile Chemists and Colorists
   1. Test Method 127 Water Resistance: Hydrostatic Pressure Test

B. ASTM International
   1. C 1186 Standard Specification for Flat Fiber-Cement Sheets
   2. D 2244 Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
   3. E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
   4. E 96 Standard Test Methods for Water Vapor Transmission of Materials
   5. E 136 Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C

C. ICC-ES – ICC Evaluation Service, Inc.
   1. AC38 – Acceptance Criteria for Water-Resistive Barriers

1.03 SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer's installation instructions, construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples: For each type, color, texture, and pattern required.
   1. 12-inch-long-by-actual-width sample of siding

C. Test and Evaluation Reports: Demonstrating compliance with specified requirements.

D. Warranty Documentation.

1.04 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Furnish full lengths of siding including related accessories, in a quantity equal to 2 percent of amount installed.

1.05 QUALITY ASSURANCE

A. Manufacturers Qualifications: Company specializing in performing the work of this Section with minimum ten (10) years successful experience.

B. Mock-up
   1. Provide under provisions of Division 01.
   2. Construct one sample panel, 8 feet long 8 feet high, attached to framing as detailed with joints taped.
   3. Mockup may remain as part of the Work.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original unopened packages with manufacturer's name affixed.

B. Handle units to position consistent with their shape and design.

C. Protect edges of units to prevent staining, chipping or spalling of edges.

D. Remove damaged materials.

1.07 WARRANTY

A. Standard form in which manufacturer agrees to repair or replace siding that fail(s) in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including cracking, deforming, and fading.
      b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   2. Fading is defined as loss of color, after cleaning with product recommended by manufacturer, of more than 4 Hunter color-difference units as measured according to ASTM D 2244.

B. Warranty Period: 30-year transferable commencing on date of Substantial Completion.

PART 2 - PRODUCTS

2.01 FIBER-CEMENT SIDING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. James Hardie Building Products Inc, Mission Viejo, CA

2. CertainTeed Corporation, Valley Forge, PA
3. Cemboard, Fontana, CA
4. MaxiTile Inc, Carson, CA
5. Nichiha Fiber Cement, Norcross, GA
6. Or equal as approved in accordance with Division 01 requirements for substitutions

B. Description: ASTM C 1186, Type A, Grade II, fiber-cement board
1. Panels: Lap Siding: Hardiplank - Smooth
a. Weight: 2.3 lbs/ft.
b. Length: 12 feet planks
c. Width: 5-1/4" or 8-1/4"

C. Performance/Design Criteria
1. Noncombustible when tested according to ASTM E 136
2. Flame Spread Index of 25 or less and Smoke Developed Index of 450 or less when tested according to ASTM E 84

D. Finish: Factory primed

2.02 ACCESSORIES

A. Fasteners
1. Blind Nail; 11 ga. roofing nail (0.121 shank x 0.371" HD x 1-1/4" L) galvanized.

B. Patching: Manufacturer's cementitious patching compound.

C. Caulking: As specified in Section 07 92 00

D. Corner and Trims: Manufacturer's standard coordinating with siding.

E. Weather Barrier
1. Polymeric-based water-resistive barrier evaluated in accordance with ICC-ES AC38, and meeting the following additional requirements.
a. AATCC 127: Minimum 0.004
b. ASTM E 84
1) Flame Spread Index: Maximum 25
2) Smoke Developed Index: Maximum 450
c. ASTM E 96
1) Method A: Minimum 23 perms
2) Method B: Minimum 28 perms
d. ASTM E 136: Noncombustible

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify structural frame dimensions.

B. Verify building structure, anchors, devices and openings are ready to receive work of this Section.

3.02 INSTALLATION

A. Weather Barrier: Secure membrane to wood studs with tape or adhesive and immediately apply siding. Lap membrane at joints in shingle manner to prevent water penetration.

B. Install siding without damage to shape or finish. Replace or repair damaged siding. Apply siding with rough sides toward exterior.

C. Install units level and plumb within allowable tolerances.

D. Align and maintain uniform horizontal and vertical joints as installation progresses. Edges shall be applied over solid backing only.

E. Install fasteners in accordance with manufacturer's specifications.

F. Corner boards, full lengths and trim in standard manufacturer's details.

3.03 FINISH

A. Paint finish as specified under Section 09 90 00.

3.04 TOLERANCES

A. Maximum Variation from Plane of Location: 1/4 inch in 10 feet and 3/8 inch in 100 feet.

B. Maximum Offset from True Alignment Between Two Connecting Units: 1/16 inch.

C. Variation in Dimensioning Indicated on Shop Drawings: Plus or minus 1/8 inch.

3.05 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Division 01.

3.06 PROTECTION

A. Protect units from damage after inspection.

END OF SECTION

SECTION 07 52 16

MEMBRANE ROOFING - MODIFIED BITUMEN

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Cleaning deck surface.

B. Rigid Insulation

C. Built-up roofing membrane and base flashings.

D. Cap Sheet surfacing.

E. Traffic pads.

1.02 REFERENCES

A. AWPA T1

B. AWPA U1

C. ASTM C208 - Cellulosic Fiber Insulating Board.

D. ASTM C209 - Methods of Testing Insulating Board.

E. ASTM C1289 - Insulation Board, Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

F. ASTM D41 - Asphalt Primer Used in Roofing Damproofing and Waterproofing.

G. ASTM D312 - Asphalt Used in Roofing.

H. ASTM D451 –Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products.

I. ASTM D2178 - Asphalt Glass (Felt) Used in Roofing and Waterproofing.

J. ASTM D5147 - Sampling and Testing Modified Bituminous Sheet Material.

K. ASTM D4586 - Asphalt - Roof Cement Asbestos-Free.

L. ASTM D4601 - Asphalt-Coated Glass Fiber Base Sheet used in Roofing. Hydroscopic Properties.

M. ASTM D4897 - Specification for Asphalt-Coated Glass-Fiber Venting Base Sheet Used in Roofing.

N. ASTM D6162 - Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.

O. ASTM D6163 - Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.

P. ASTM D6221 – Reinforced Bituminous Flashing Sheets for Roofing and Waterproofing.

Q. ASTM E84 - Surface Burning Characteristics of Building Materials.

R. UL Building Materials Directory, Latest Edition - Fire Hazard Classifications.

S. UL Roofing Materials and Systems Directory, Latest Edition.

T. Chapter 15, California Building Code, 2010.

U. Title 24, Part 12, Chapter 12-13 California Code of Regulations.

V. NRCA - National Roofing Contractor's Association, The NCRA Roofing and Waterproofing Manual - Fifth Edition.

W. AWPA C20 - Structural lumber - Fire-Retardant Treatment by Pressure Process.

X. FMG - Factory Mutual Global, Rating and Loss Prevention Data Sheet 1-28. Wind and Fire Classification.

Y. FM 1-49

Z. Underwriters Laboratories UL 790 - Test Methods for Fire Tests of Roof Coverings.

AA. Underwriters Laboratories UL 580 - Tests for Uplift Resistance of Roof Assemblies.

BB. Underwriters Laboratories UL 1897 - Uplift Tests for Roof Covering Systems.

1.03 SYSTEM DESCRIPTION

A. Membrane Roofing System: Four-ply hot-asphalt applied membrane system. Cap sheet finish surface.

B. Factory Mutual Approved for Class 1A - 90 Fire Hazard and Wind Uplift rating.

1.04 SUBMITTALS

A. Product Data indicating membrane and bitumen materials, base flashing materials and manufacturer's roofing specification.

B. Three samples, 8-1/2 by 11 inches in size illustrating roofing felts.

C. Manufacturer's Specification Number and Installation Instructions.

D. Letter stating roofing contractor is certified to apply manufacturer's product.

E. Submit Roof Inspector's qualifications for approval by the Owner.

1.05 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum ten years experience.

B. Applicator: Company specializing in applying bituminous roofing with minimum Five years experience and approved by manufacturer and to comply with Warranty requirements.

C. Work of this Section shall conform to manufacturer's instructions and California Building Code, Chapter 15.

D. Materials shall be provided by single manufacturer, except as specified herein.

E. Roofing materials shall bear UL Labels.

F. Regulatory Requirements
1. Conform to UL Roofing Materials and Systems Directory for roof assembly fire hazard requirements.
2. Fire Hazard Classification: UL 790, Minimum Class A.
3. Conform to AQMD, local regulations for maximum VOC limits.

G. Pre-installation Conference
1. Convene pre-installation conference 72 hours prior to commencing Work of this Section.
2. Review installation procedures, check roof deck, flashings, drains and related roof accessories and coordinate with related work.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

B. Store products in weather protected environment, clear of ground and moisture.

C. Stand roll materials on end.

D. Store materials so as not to overstress structure.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not apply roofing membrane during inclement weather.

B. Do not apply roofing membrane to damp deck surface.

1.08 COORDINATION

A. Coordinate Work with other trades affecting roof membrane.

B. Coordinate Work of installing associated metal flashings as Work of this Section proceeds.

1.09 WARRANTY

A. Provide under provision of Division 01, General Requirements.

B. Provide Two-year Installer's warranty to maintain roofing, flashings and counter flashings in watertight condition from Date of Certified Completion.

C. Provide manufacturer's Twenty-Year No-Dollar-Limit Guarantee, covering all components of roofing assembly.
   1. Provide manufacturer's written Guarantee that manufacturer will perform inspection of Work at termination of Two-year maintenance guarantee period. Manufacturer's representative and a representative of roofing subcontractor shall attend the inspection. Notify the Owner two weeks in advance of the date of the inspection. Repairs recommended by manufacturer shall be made at no cost to Owner and report of manufacturer's acceptance filed with Owner and Architect.

D. Contractor warrants he has reviewed entire set of Construction Documents and details pertaining to roofing work and are acceptable to Contractor and material manufacturer providing guarantees. No change orders covering cost additions to meet manufacturer's requirements will be accepted. Roofing contractor is responsible to meet manufacturer's requirements that are more stringent than these specifications. Costs to improve existing conditions including curb heights, lead drain flashings, crickets are to be included in the Bid. Compliance with manufacturer's recommendations shall apply only as directed by these specifications. Contractor shall identify those items that apply with material manufacturer.

E. Sheet metal flashing and trim work specified under this Section - Flashings and Accessories and Section 07 62 00 Sheet Metal Flashing and Trim.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Products of following manufacturers form basis for design and quality intended.
   1. Johns Manville, Roofing Systems Group, Denver, CO. UL R10167.
   2. GAF Materials Corporation, Wayne, NJ. UL R1306.
   3. Certainteed Roofing Products Company, Inc., Livermore, CA. UL R11656
   4. MB Technology, Fresno, CA. UL R11080.
   5. U.S. Intec Inc., Port Arthur, TX. UL R9684.
   6. IKO, Wilmington, DE. UL R16377

B. Or equal as approved in accordance with Division 01, General Requirements for substitutions.

2.02 MATERIALS

A. Asphalt - ASTM D312, Types II, III or IV.
1. Type II - Flat Slopes up to 1/2 inch per foot.
2. Type III - Steep Asphalt: Slopes between 1/2 inch and 3 inches per foot
3. Type IV - Special Steep Asphalt: Slopes between 3 inches and 6 inches per foot.

B. Asphalt Glass Fiber Ply Sheet - ASTM D2178, Type VI, 8 lbs. per sq. minimum. GlassPly Premier by Johns Manville or equal.

C. Styrene Butadiene Styrene (SBS) modified bitumen membrane sheet material, ASTM D 6162, 90 lbs. per sq. minimum, Type II, Grade S smooth. DynaPly by Johns Manville or equal.

D. Cap Ply: ASTM D3909, white colored mineral granules weighing minimum of 72 pounds per square.
1. ASTM D3909, GlasKap CR by Johns Manville or equal, for Cool Roofs meeting Title 24, Part 6, California Energy Code Section 118, with an initial thermal emittance greater or equal to 0.75 and minimum initial reflectance of 0.70 when tested in accordance with CRRC-1.

E. Asphalt Roof Cement, Asbestos-Free - ASTM D4586, Type II, Class I.

F. Asphalt Primer - ASTM D41.

G. Cants and Nailers: Preservative treated wood, No. 2 DF-L treated in accordance with AWPA T1 and U1, UC3B, kiln dried after treatment to a maximum moisture content of 19 percent.
1. In accordance with FM 1-49, Recommendation 2.2.5, cants and of material other than wood shall not be used.

H. Roofing Nails: Annular or Spiral Shank, Square head with 1 inch diameter cap.

I. Reinforced Base Flashing - Modified Bitumen: ASTM D6221 Type 1 and ASTM D6162 Polyester/fiberglass mat with SBS Asphalt, white colored mineral granules, weighing minimum of 109 lbs. per square.

J. Traffic Pads: 5/16 inches thick, 32 by 32 inches. Preformed skid-resistant, modified asphalt panels consisting of reinforcement and fillers, ceramic granules. DynaTred Roof Walkway by Johns Manville.

K. Sealants: As specified in Section 07 92 00.

2.03 ROOF INSULATION MATERIALS

A. Fasteners: Solid stainless steel with drill points, Factory Mutual Approved for Class 1 - 90 uplift rating, with lengths sufficient to penetrate deck minimum of 3/4 inch with 3 inch diameter plastic plate.

B. Isocyanurate Roof Insulation: ASTM C1289 Type II, Class I, Grade 2; E'NRG'Y 3 by Johns Manville or equal. Core of Rigid, closed-cell polyisocyanurate foam, faced with a universal black fiberglass reinforced mat. Minimum two layers of 2 inches thick, R-value: 30. Provide tapered units to provide a minimum slope of 1/4 inch per foot to drain at roof slopes, pre-cut miters and crickets and valley slopes.
   1. California Building Code Section 2603.3 and 719.5.
   2. Maximum Flame Spread Index (FSI) of 25, Class A, and Smoke-Developed Index (SDI) of 450 as tested per ASTM E 84.

C. Expanded Perlite Insulation – 3/4 inches thick, homogeneous board of expanded Perlite, binders and fibers, minimum R-value: 2.08. Coat surface to assure adhesion of asphalt membrane materials.
   1. Provide perlite cover board over polyisocyanurate foam insulation.
   2. Provide tapered units where required to provide a minimum slope of 1/4 inch per foot for roof crickets and valley slopes to drains.

D. Isocyanurate Composite Roof Insulation – 2-1/2 inches thick composite board of expanded perlite top surface and core of polyisocyanurate foam with a bottom facer of universal black fiberglass mat, total R-value: 15 minimum.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck is supported and secure.

C. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains, valleys or eaves.

D. Verify deck surfaces are dry and free of water [and ice]. Confirm dry deck by moisture meter with percent moisture maximum as acceptable to material manufacturer.

E. Verify roof openings, curbs, pipes, sleeves, ducts and vents through roof are solidly set and cant strips, nailing strips and reglets are in place.

3.02 ALTERATION, PATCHING AND REPAIRS

A. Where work exposes damaged surfaces, repair and finish, or remove the damaged materials, and provide new, acceptable, matching materials, to make continuous areas and surfaces uniform.

B. Perform new work to comply with applicable requirements of these Specifications.

C. Notwithstanding provisions of this Section, existing roofing under guarantee shall be repaired with roofing system compatible with system under guarantee, and acceptable to Guarantor.

3.03 PREPARATION - WOOD DECK

A. Verify flatness and tight joints of wood decking. Apply sheet metal cover firmly nailed to all gaps.

3.04 PROTECTION

A. Protect building surfaces against damage from roofing work.

B. Maintain maximum fire safety procedures. Including fire extinguisher on roof at all times.

3.05 INSULATION APPLICATION

A. Install insulation boards in accordance with approved shop drawings Factory Mutual I-90 and the NRCA.
   1. INS-1-N/INS-N: Attachment of Insulation to nailable deck.
   2. Provide tapered units as required to obtain minimum roof slope of 1/4 inch per foot.

B. Maximum Gap Permitted: 0.

C. Maximum Elevation Variation Between Boards at Joints: 1/8 inch.

D. Cut and fit tightly to all vertical surfaces.

E. Multiple layers of polyisocyanurate insulation required to achieve R-value rating required. Mechanically fasten bottom layer of insulation to deck with specified fasteners, in pattern conforming to approved fastening pattern, penetrate deck minimum 1 inch. Seat discs with heads flush or below disc's top surface, do not overtighten. Adhere top insulation layer to bottom layer in staggered joint pattern with solid mopping of hot asphalt.

F. Adhere perlite cover board with cold-apply adhesive to polyisocyanurate insulation in off-center pattern.

G. Boards which taper to less than 1/2 inch at one edge shall be similarly mopped to lower surface.

H. Minimum Thickness of Insulation Boards Over Entire roof Deck: 4 inches of polyisocyanurate plus 3/4 inches of perlite cover boards.

3.06 MEMBRANE APPLICATION

A. Firmly attach nailers to deck with galvanized nails or screws at minimum 32 inches on center.

B. Comply with requirements of the NRCA - Roofing and Water Proofing Manual - Fifth Edition specifications for the following built-up roofing membrane systems:
   1. Type 2 - for Rigid Insulation above structural Decks,
      a. MBS (2) -I-M-G(2 sheet) - M: 2 glass plies with 1 SBS ply and 1 SBS mineral-surfaced cap sheet.

C. Base Ply: Apply one 18 inch width base ply at low edge of perimeter. Apply following plies in full widths, lapping each ply 2 inches.

D. Inner Plies: Mop each ply firmly and uniformly with hot asphalt as recommended by manufacturer for each ply system specified.

E. Mop each ply firmly and uniformly into hot asphalt on at a nominal rate of 25 pounds per square each.

F. Cap Sheet: Apply cap sheet NRCA ply system, do not apply cap sheet when wind chill factor is less than 60 degrees F.
   1. Provide accurate, clearly visible thermometers at kettles and at shaded jobsite location.

G. Install traffic pads by setting in hot asphalt at rate of 20 pounds per square. Set pads 2 inches apart.

H. Apply in conformance with applicable portions of California Building Code and in conformance with roofing manufacturer's printed application specifications for indicated conditions. However, where specifications of this Section exceed Code or manufacturer's requirements, specifications herein shall apply.

I. Cut-Offs: At end of each day's roofing installation, protect exposed edge of incomplete work, including ply sheets and insulation. Provide temporary covering of two (2) plies of #15 organic roofing felt set in full moppings of bitumen with joints and edges sealed.

3.07 FLASHINGS AND ACCESSORIES

A. Apply granular surfaced, flexible base flashings to seal membrane at all vertical and edge elements. Utilize NRCA Roofing and Waterproofing Manual – Fifth Edition. Details MB-1 through MB-24S as applicable for various flashing conditions encountered, unless detailed otherwise on drawings.

B. Prime sheet metal items contacting plies with approved primer. Allow to dry before application of roofing.

C. Install prefabricated roofing control or expansion joints in accordance with manufacturer's instructions.

D. Coordinate installation of roof drains, roof vents, sumps and related flashings.

E. Fascias Systems: As manufactured by roofing manufacturer. Fabricate to detail of 20 gauge galvanized sheet. Apply sealant in all crevices.

F. Roof Pipe Penetrations flashings: Provide pre-manufactured flashings for roof pipe penetrations including electrical conduits, mechanical and plumbing lines, per Section 07 62 00.

G. Plumbing Vent Flashing:
1. Slide lead flashing over pipe. Set flange in roof cement on completed roof plies.
2. Install 5-course reinforcement of 4 inch and 6 inch webbing, prime flange and set stripping on mastic to roof surface.
3. Turn down lead flashing 1" for pipes greater than 2" diameter, for pipes 2" diameter or less, cut off lead at top of pipe and install sheet metal Rain Collar and drawband counterflashing per Section 07 62 00 similar to Equipment Support Stand Penetration.
4. If pipe outside diameter is greater than 2 inch, bend lead inside pipe (minimum 1 inch) with pliers or rubber/plastic mallet. Do not use roofing hammer. Defective lead shall be replaced with new 4-pound lead.

H. Equipment Support Stand – Two Piece Flashing Collar and Rain Collar:
1. Install storm rain collar per Detail NRCA MB-13 and Section 07 62 00.
2. Set flange around projection on completed built-up roof plies. Set in cold process mastic.
3. Stripping: Install 5-course reinforcement of 4 inch and 6 inch webbing and cold process mastic to metal flange and roof surface, prime flange before stripping.
4. Flashing and Rain Collars: Fabricate from 24-gauge galvanized sheet metal per NRCA details. Secure rain collar to flashing collar with stainless steel drawband and apply sealant at top all around.

I. Miscellaneous: Provide miscellaneous flashings as manufactured by roofing manufacturer and required to complete entire project, except for items provided under other Sections. Submit shop drawings showing details for approval and use minimum of 24 gauge galvanized steel.

3.08 TEST CUTS

A. Perform test cuts only when requested by Architect or roofing inspector.

B. Test Cuts: No extra cost to the Owner. Owner will pay for testing samples as specified in Division 01, General Requirements.

C. Cut samples 4 inches by 40 inches at right angles to plies, in areas indicated by Architect for each 2,000 square feet of roof area, or part thereof. One cut shall be taken per building. Test cuts shall be weighed and visually inspected on jobsite by Inspector and then removed for delivery to testing laboratory by Contractor.

D. Repair cut-out area per NRCA. Coat area evenly from which test cut has been taken, bottom and sides with plastic roof cement. Cut roofing plies to fit and set in alternate plies and plastic cement to fill cut-out flush with surrounding roofing.

E. Over cut-out area, apply same number of plies and types of roofing materials as used in roofing specification over repaired cut-out area. Extend first ply 4 inch beyond cut-out on all sides. Extend each succeeding ply 4 inch beyond underlying ply, except that final ply shall be full width of roll, centered over samples. Each ply shall be mopped solidly to underlying plies.

3.09 FIELD QUALITY CONTROL

A. Field inspection and testing shall be performed, full time, by a roofing inspection service. The roofing inspector shall oversee all base, plies, and surfacing to verify compliance to specifications. Roofing inspection services shall be contracted by the General Contractor and costs included in the General Contractor's bid.
   1. The Inspector shall prepare daily reports confirming installation procedures and materials in conformance with the requirements of the Contract Documents. Submit to Owner and Architect for review.

B. Required inspections by the Roofing Manufacturer required to fulfill its obligations under Warrantee provisions.

C. Correct identified defects or irregularities.

3.010 MANUFACTURER'S FIELD SERVICES

A. Provide manufacturer's field services under provisions of Division 01, General Requirements.

B. Request site attendance of roofing or insulation materials manufacturer during installation of Work.

3.011 CLEANING

A. Remove excess bituminous markings from finished surfaces.

B. In areas where finished surfaces are soiled by Work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

C. Repair or replace defaced or disfigured finishes caused by Work of this Section.

3.012 PROTECTION

A. Protect surfaces where traffic must continue over finished roof membrane.

END OF SECTION

SECTION 07 61 00

SHEET METAL ROOFING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pre-coated galvanized steel roofing, underlayment and insulation.

1.02 REFERENCES

A. ASTM D4601 - Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.

B. ASTM A792 - Specification for Steel Sheet, Aluminum - Zinc Alloy Coated by the Hot-Dip Process, General Requirements.

C. Chapters 16A and 15A - California Building Code.

D. NRCA – National Roofing Contractors Association.

E. UL Roofing Materials and Systems Directory Latest Edition.

F. FMG - Factory Mutual Global, Rating Class 1-90 Uplift Resistance. Loss Prevention Data Sheet 1-28. Class 1-90 for Wind and Fire classification.

G. Underwriters Laboratories UL 580 – Tests for Uplift Resistance of Roof Assemblies.

H. Underwriters Laboratories UL 790 – Test Methods for Fire Tests of Roof Coverings.

1.03 SUBMITTALS

A. Shop drawings indicating, material profile, jointing pattern, jointing details, fastening methods and installation details.

B. Three samples of metal roofing illustrating typical standing seam, external corner, internal corner, valley, ridge, junction to vertical dissimilar surface, material and finish.

C. Manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

A. Installer: Company specializing in sheet metal roof installations with ten years experience.

1.05 REGULATORY REQUIREMENTS

A. Conform to UL Roofing Materials and Systems Directory for roof assembly Construction Number requirements:
   1. AEP-SPAN
      a. No. 342A, 1-1/2" High Seam, gypsum board over insulation.

1.06 DELIVERY, STORAGE AND HANDLING

A. Store and protect products.

B. Stack preformed and pre-finished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials during storage that may cause discoloration or staining.

1.07 WARRANTY

A. Provide under Provisions of Division 01, General Requirements.

B. Provide Two-year warranty for weather-tightness.

C. Provide 20-year warranty for degradation of metal finish.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.
   1. AEP-SPAN, Dallas, TX; UL #R9792 / BHP/IMSA Steel Building Products USA, West Sacramento, CA; UL #R9472./VP Buildings (Varco-Pruden), Memphis, TN; UL #R9549.
   2. Butler Manufacturing Co., Kansas City, MO; UL #R8235
   3. Berridge Manufacturing Co., Houston, TX. No. #R12005.
   4. Metal Sales Manufacturing Corporation, Fontana, CA. No. UL #R9697.
   5. Centria Roofing Systems, Moon Township, PA.

B. Or equal as approved in accordance with Division 01, General Requirements for substitutions. Listing in UL Directory is required. Construction Number is required.

2.02 SHEET MATERIALS

A. Pre-Coated Steel: ASTM A792; Uplift Resistance Class 90 rated, minimum 24 gauge core steel, ASTM A653 G90 galvanized, shop pre-coated with 3-coat, min. 70 percent Polyvinylidene Fluoride coating Class A/I Fire Hazard Classification, Section 1504, California Building Code.
   1. AEP-SPAN
      a. 1-1/2" High Seam, 16 inch panels unless indicated otherwise.

2.03 AEP-SPAN

A. Accessories
1. Fasteners: UL 90 clip 14 gauge attached to deck with two stainless steel No. 10 by 1 inch longer than overall thickness of insulation, self drilling, No. 3 Phillips wafer head screws. Minimum 1" through deck.
2. Underlayment: ASTM D 1970, rubberized asphalt coated polyethylene film, 40 mils thick, Ice and Water Shield for slopes less than 4:12, by W.R. Grace & Co., Cambridge, MA, or equal as approved in accordance with Division 01 for substitutions.
3. Sealant: Shop installed sealant at standing seam: Butyl, one component, solvent release type. Sealant shall be shop applied. Continuously filled inside of seam cover to completely seal the top legs of both panels including clip locations, seal both sides of clip.
4. Provide nylon seam end plugs at panel ends.

B. Fabrication
1. Form sections true to shape, accurate in size, square, and free from distortion or defects. Provide panels in full lengths from ridge to eave.
2. Cleats: Interlockable with sheet.
3. Trim and Flashings; Same material as panels.
4. Form pieces in longest practical lengths.
5. Shop Form material with standing seams.
6. Shop Fabricate drip flashing with bottom edge formed outward 1/2 inch and hemmed to form drip.
7. Form sheet metal pans pitch pockets with 3 inch upstand, and 4 inch flanges.
8. Radius panels and seam covers to the curvatures indicated on drawings.

C. Insulation
1. Fasteners: Solid stainless steel with drill points, Factory Mutual approved for 1-90 uplift, with lengths sufficient to penetrate deck minimum of 3/4 inch with 3 inch diameter plastic stress plate.
2. Isocyanurate Roof Insulation (2 layers, upper and lower insulation) - Core of rigid, closed cell polyisocyanurate foam faced with a universal black fiberglass reinforced mat. Insulation shall be able to flex to accommodate radius of curved roofs.

D. Paint finish - Kynar 500 (70% PVDF Fluorocarbon coating) low gloss finish with a 20 year warranty
1. Color: As selected by Architect.

E. Fabrication
1. Form sections true to shape, accurate in size, square, and free from distortion or defects.
2. Clips: Interlockable with sheet.
3. Trim and Flashings; Same material as panels.
4. Form pieces in longest practical lengths.
5. Shop Form material with standing seams and sidelaps.
6. Shop Fabricate drip flashing, valleys, ridges and break shapes as detailed.

7. Form sheet metal pans pitch pockets with 3 inch upstand, and 4 inch flanges, or install cone-type rubber flashing devices, U.V. resistant.
8. Radius panels and seam covers to the curvatures.

2.04 ROOF PENETRATIONS

A. Pipe Penetrations: Master Flash by AEP Span. EPDM sizes to accommodate pipe penetration per manufacturers instructions.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains, valley or eaves.

B. Verify deck is dry. [Verify joints in wood deck are solidly supported and fastened.]

C. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set are in place.

D. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Field measure site conditions prior to fabricating work.

B. Install starter and edge strips, and cleats before starting installation. Space cleats maximum 24 inches on centers along full length of seams.

C. Protect elements surrounding work of this Section from damage or disfigurement.

3.03 INSTALLATION

A. Conform to shop drawing details.

B. Attach clips and bearing plates with manufacture-approved screws to deck over insulation. Spacing of clips to conform to UL requirements for Wind Uplift.

C. Install insulation to conform with NRCA Specifications INS-S for mechanical, to Steel deck. Spacing of fasteners to conform to UL requirements for Wind Uplift.

D. Apply underlayment in single layer laid perpendicular to slope; weather lap edges 2 inches and anchor in place. Asphalt underlayment: Minimize anchorage quantity to prevent friction with roofing panels. Apply Ice Dam underlayment on entire roof on roofs with slope of less than 4:12, weather lap edges 2 inches and other locations as otherwise indicated on drawings.

E. Cleat and seam all joints.

F. Stagger transverse joints of roofing sheets where full-length panels cannot be achieved.

G. Provide formed metal pans for protrusions through roof such as vents, conduit or structural steel hangars. Fill pans watertight with plastic cement.

H. Back paint surfaces in contact with dissimilar materials.

I. Install gutters and support brackets per SMACNA details.

J. Install pipe penetrations in accordance with the manufacturer's specifications and shall retain all roof warranty requirements.

3.04 STANDING SEAM ROOFING

A. Lay sheets with long dimension perpendicular to eaves.

B. Lock cleats into seams.

C. At eaves and gable ends, terminate roofing by installing preformed drip under starter strip. Seal watertight.

D. Finish standing seams 1-1/2 inch high.

E. At eave transitions, install field miter seam cover in accordance with manufacturer's instructions. Attach seam cover to standing seam with one pop rivet above and below bend in seam. Thoroughly seal with specified sealant. Sealant shall completely and continuously fill seam cover to completely seal tops of panel ends.

F. Terminate standing seams at ridge and hips with hip-ridge flashing and "Z" closures. Apply sealant as required to provide watertight condition.

G. Form valleys of sheets as long as practical. Lap joints 6 inches in direction of drainage where necessary. Seal watertight.

H. Extend valley sheet under joggle clips and seal as required.

3.05 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Division 01, General Requirements.

B. Inspection will involve surveillance by manufacturer's representative of work during installation to ascertain compliance with specified requirements.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Parapet Copings and Flashings.
2. Fascias and scuppers.
3. Roof flashings.
4. Reglets and counterflashing over bituminous base flashings.
5. Roof joint cover flashings.
6. Gutters
7. Downspouts and Strainers.
8. Conductor Heads.
9. Gravel Stops.
10. Plumbing Vents.
11. Counterflashings for roof hatches and skylights.
12. Interior Roof Drains.
13. Flashings for electrical conduits, mechanical lines and plumbing water lines roof penetrations.
14. Door drips.
15. Equipment Roof Curbs and Flashing.
16. Equipment support stand penetrations.
17. Closures

1.02 REFERENCES

A. California Building Code 2010, Chapters 14 and 15.

B. American Society for Testing and Materials (ASTM)
1. ASTM A480/A480M- General Requirements for Flat-Rolled Stainless Steel and Heat Resisting Steel Plate, Sheet, and Strip.
2. ASTM A653/A653M-98 - Sheet Steel, Zinc-Coated (Galvanized) or Zinc - Iron Alloy Coated by the Hot-Dip Process
3. ASTM B32 - Solder Metal
4. ASTM B209 – Aluminum and Aluminum-Alloy Sheet and Plate.
5. ASTM B370 - Copper Sheet and Strip for Building Construction
6. ASTM B749 - Lead and Lead Alloy Strip, Sheet and Plate Products
7. ASTM D4601 - Asphalt-Coated Glass Fiber Base Sheet Used in Roofing

C. National Roofing Contractors Association (NRCA)
1. NRCA Manual - Fifth Edition.

D. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
   1. SMACNA Manual - Architectural Sheet Metal Manual, Current Edition

1.03 SUBMITTALS

A. Shop drawings showing material profile, jointing pattern, jointing details, fastening methods and installation details.

B. Product data.

C. Manufacturer's installation instructions.

D. Samples for each type of sheet metal flashing and trim indicated with field-applied color finishes.

1.04 STORAGE AND HANDLING

A. Stack preformed and pre-finished material to prevent twisting, bending, or abrasion and to provide ventilation.

B. Prevent contact with materials during storage that may cause discoloration, staining or damage.

PART 2 - PRODUCTS

2.01 SHEET MATERIALS

A. Galvanized Steel: ASTM A653/A653M-02, G90.

B. Weathering Steel: ASTM A606, Type 4, cold rolled.

C. Lead Sheet: ASTM B-749, L51121 Grade.

2.02 ACCESSORIES

A. Fasteners: round head, galvanized steel with soft neoprene washers at exposed fasteners. Finish exposed fasteners same as flashing metal.

B. Self-Adhesive Flashing: 40 mils, nominal, thickness composite sheet, fabricated with 8-mil polyethylene film backing and 32-mil rubberized asphalt sheet waterproofing.
   1. Acceptable Products: as follows, or equal, approved in accordance with Division 01, General Requirements, for substitutions.
      a. Perm-A-Barrier sheet by Grace Construction Products, Cambridge, MA
      b. Carlisle Coatings and Waterproofing CCW-705T-WF
      c. Henry Company, Blueskin-SA
      d. FortiFlash 40 Recessed Window Flashing by Fortifiber.
   2. Furnish with prefabricated corner pieces, if available from sheet manufacturer. Provide manufacturer's edge and top sealant or mastic, and primers.

C. Underlayment: ASTM D 1970, Rubberized asphalt coated polyethylene film, 40 mils thick, Ice and Water Shield, by W.R. Grace & Co., Cambridge, MA, or equal as approved in accordance with Division 01 for substitutions.

D. Metal Primer: For repair of Galvanized sheet metal, Zinc type, Galvilite by ZRC or equal.

E. Protective Backing Paint: Bituminous.

F. Sealant: Two-component, polyurethane-type specified in Section 07 92 00, Joint Sealers.

G. Solder: ASTM B32; Grade Sn50, flux type and alloy composition as required for use with metals to be soldered. Raw muriatic acid for galvanized steel; rosin for lead; non-corrosive soldering salts for uncoated copper and acid-type flux formulated for soldering stainless steel.

H. Rosin-Sized sheathing paper: Sealtight Red Rosin Paper by W.R. Meadows.

I. Termination Bar: Versa Bar manufactured by Fry Reglet Corp; Mill finished Extruded aluminum (6063 alloy) with radius corners, 10 inches long by 0.100-inch thick.

2.03 PREFABRICATED COMPONENTS

A. Reglets and Counterflashing: Surface-mounted or recessed as indicated on the drawings, galvanized steel, 24 gauge reglet with 26 gauge counterflashing, face and ends covered with plastic tape. SPRINGLOK; manufactured by Fry Reglet Corp., Alhambra, CA, or equal as approved in accordance with Division 01 for Substitutions.

2.04 WALL SHEET METAL FABRICATIONS – WALL FLASHING

A. Openings Flashing in Stud Construction: Fabricate head, sill, jamb and similar opening flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2 inch high end dams. Fabricate from the following material:

1. Weathering Steel: 20 gauge.

2.05 FABRICATION

A. Form sections true to shape, accurate in size, square and free from distortion or defects. Fabricate all components per SMACNA standards unless more stringent conditions are imposed by the Roofing Contractor, in that case the more stringent conditions shall prevail.

B. Fabricate cleats and starter strips of same material as sheet, interlockable with sheet.

C. Form pieces in longest practical lengths.

D. Hem exposed edges on underside 1/2 inch; miter and seam corners.

E. Form material with flat lock seam.

F. Solder lap seams of all non-moving metal joints and seal other metal joints. After soldering, remove flux. Wipe and wash solder joints clean.

G. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

H. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

I. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and break edges.

J. Provide expansion joints for gutters at every 30 feet. Fabricate per SMACNA details.

2.06 FINISH

A. Flashings exposed to view shall be pre-weathered weathering steel.
   1. Pre-weather after forming using water, Ferric Nitrate, or other chemical patina.

B. Shop prepare exposed ferrous metal surfaces, not exposed to view.

C. Back paint concealed metal surfaces with protective backing paint when in contact with copper, redwood or red cedar.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set, cant strips and reglets in place and nailing strips located.

B. Verify membrane termination and base flashings are in place, sealed and secure.

C. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Field measure site conditions prior to fabricating Work.

B. Install starter and edge strips and cleats before starting installation.

C. Install reglets true to lines and levels. For surface-mounted seal top of reglets with sealant.

D. Insert counterflashings into reglets to form tight fit. Seal flashings into reglets with sealant.

E. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Architect.

F. Lock and seal all joints.

G. Apply plastic-cement compound between metal flashings and felt flashings.

H. Fit flashings tight in place. Make corners square, surfaces true and straight in planes and lines accurate to profiles.

I. Seal metal joints watertight.

3.03 INSTALLATION

A. Wall Flashing: Flashing shall be installed in such a manner so as to prevent moisture from entering the wall or to redirect it to the exterior. Flashing shall be installed at the perimeters of exterior door and window assemblies, penetrations and terminations of exterior wall assemblies, exterior wall intersections with roofs, decks, balconies and similar projections and at built-in gutters and similar locations where moisture could enter the wall. Flashings with projecting flanges shall be installed on both sides and the ends of copings, under sills and continuously above projecting trim, Section 1405.3 CBC.

1. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
2. Openings Flashing in Frame Stud Construction: Install continuous head, sill, and similar opening flashings to extend 4 inches beyond wall openings. Install over self-adhesive flashings.
3. Sealants for penetrations: specified in section 07 92 00 Joint Sealers.
4. Submit shop drawings showing details for approval and use minimum of 24 gauge galvanized steel.

B. Parapet Copings and Flashings: Use 20 gauge weathering steel. Provide all copings and caps of the types and shapes indicated on the Drawings. Install Self-Adhesive Flashing (Ice dam) under copings. Build in integral expansion joints allowing for movement of the metal without resulting in distortion of coping or leaks of any kind. All Work shall be watertight.

C. Fascias and Scuppers: Fabricate to detail of 20 gauge weathering sheet. Apply sealant in all crevices. Fabricate scuppers with 6 inch flanges.

D. Roof Flashings: Provide roof flashings as indicated in drawings and required to complete entire project. Submit shop drawings showing details for approval, use minimum of 24 gauge galvanized steel.

E. Reglets and Counterflashings: Minimum 24 gauge as detail in drawings, submit shop drawings.

1. Reglets: For Surface-mounted and imbed applications.
2. Counterflashings: Over bituminous base flashings.
3. Counterflashings: Roof mounted mechanical equipment and vent stacks.
4. Counterflashings: Roof Hatches and Skylights.

F. Gutters: Fabricate to detail of 20 gauge weathering sheet metal. Install an expansion joint every 30 linear feet of gutter; install cover plates over expansion joints. Fabricate gutter without longitudinal seams. Install cradles of 1/4 inch x 1-1/2 inch galvanized steel at 36 inch centers. Gutters shall rest in cradles, but shall not be mechanically fastened to allow for expansion and contraction. Provide urethane coating at inside of gutter.

G. Downspouts and Strainers: Downspouts shall be 20 gauge weathering steel, rectangular unless noted otherwise. Strainers shall be 10 gauge galvanized steel wire basket type. Provide all anchor clips and straps as required for installation. Install a wire basket strainer in all downspouts at gutter level. Rivet and solder flange of downspout to gutters per SMACNA details. Locate downspouts every 30 feet unless otherwise noted on drawing.

1. At steel pipe overflow-drain and interior drain pipe leaders install Downspout Nozzle #1770 by JR Smith, Montgomery, Alabama. Polished bronze with bird screen cast bronze body and flange. Refer to Drawings for pipe sizes and locations of drains and leaders. Minimum pipe size Schedule 40, 4 [6] inches, galvanized.
2. Downspout Filter: FlowGard by KriStar Enterprises, Inc., Santa Rosa, CA. Model FG-DS4, 4" diameter, box size 14 x 29 x 7.5 inches, dual-wall geotextile fabric liner encapsulating absorbent, surface mounted unit. Locate at each pipe drain.

H. Conductor Heads: Provide conductor heads per SMACNA Figure 1-25, Design 1-25F unless Design Number noted otherwise; 2 gauge weathering steel.

I. Plumbing Vents - Vandal Proof: Provide pre-manufactured flashings and counterflashings for plumbing vent penetrations. Flashing, 4 lb lead, seamless, reinforced with steel boot, with 6" flange.

1. Counterflashing: cast iron Vandal Flash Hood with set screw to secure to pipe. Model 1100-5 Series by Elmdor/Stoneman, City of Industry, CA. Install per manufacturer's instructions.

J. Counterflashings for roof hatches and skylights: 24 gauge sheet metal flashing, removable, per NRCA BUR/MB-14.

K. Interior Roof Drains: Provide 4 lbs lead, 30" x 30" flashing at single roof drains, 30" x 48" at drain and overflow drain unit.

L. Roof Pipe Penetrations Flashings: Provide pre-manufactured flashings and counterflashings for pipe penetrations for electrical conduits, mechanical and plumbing lines. Flashing, 4 lb lead, seamless, reinforced with steel boot, with 6" flange, field seal per Section 07 92 00.

1. Counterflashing: Single pipe penetration, cast iron ring with set screw to secure to pipe,. Model 1100-4 Series by Elmdor/Stoneman, City of Industry, CA. Install per manufacturer's instructions.
2. Counterflashing: Multiple pipe penetration, within single pre-manufactured flashing unit: Counterflashing PVC cap, adapter base and compression nut. Compression rings and gasket. Model 915 by Elmdor/Stoneman, City of Industry, CA. Install per manufacturer's instructions.

M. Door Drips: Provide door drips of 20 gauge galvanized sheet metal at heads of all doors and windows in exterior walls where no roof or overhead protection occurs. Extend drips 2 inches beyond jambs, unless otherwise indicated.

N. Equipment Roof Curbs and Flashing: Fabricate equipment roof curbs with 20 gauge galvanized steel, not less than 8" high, with 6" flanges, full welded construction. Provide curb flashings and counterflashings, 24 gauge galvanized sheet metal fully soldered and mitered corners. Lengths, sizes, quantities, and location to completely flash roof equipment curbs.

O. Roof Penetrations: Equipment support stand penetrations; 8" high Flashing Collar flanged 6", overlapped 4" by Rain Collar, 24 gauge components, secured with stainless steel drawband sealed top with polyurethane sealant. Stripping and roofing cement products per Roofing Section. Pitch pockets not permitted.

P. Miscellaneous: Provide miscellaneous flashings as indicated in drawings and required to complete entire project, except for items provided under other Sections. Submit shop drawings showing details for approval and use minimum of 24 gauge galvanized steel.

3.04 FINISH

A. Paint primed metal flashings with high performance paints in accordance with Section 09 90 00, for Special Coatings.

END OF SECTION