Scope of Works for DECEM Building

General:

DECEM bldg. which is located in Palikir area has a requirement to extend the existing building at the back side of the existing building. The work shall be done as per scope of work, specifications and general contract provisions. The general scope of work is to construct and extension building which covers the following area, environmental division office, assistant sect. environmental division, climate change division office, assistant sect. climate change division,(grid 6-8 and grid A-F on general plans). Include any work associated with the areas provided with respect to the plans and specifications submitted. Refer also to the BOQ for the items and scope for the project. A registered and experience contractor on island is required to execute the project.
The contractor shall provide all materials, labor, tools, equipment and all related items needed to complete the project with regards to the scope and specification mentioned. On this project. Qualified contractors are advice to visit the site, verify existing conditions to develop their proposal.

Summary of work

1. GENERAL REQUIREMENTS
- Contractor shall provide all necessary documents needed before, during and after construction of the extension building.
- provide all administrative documents and requirements needed for the project.

2. SITEWORK
- provide necessary work under this section which includes clearing and grubbing, earthwork, excavation and backfilling, compaction in reference with the plans and specifications.

3. CONCRETE WORKS
- provide all necessary work under this section with reference to structural drawings which includes the areas mentioned under the general scope. This includes, foundations, tiebeams, columns, lintel beams, beams, wall footings, slabs and concrete roof slabs.

4. MASONRY
- Provide 6” masonry blocks on the exterior walls of the extension, below grade of the exterior wall, low wall parepet above roof beam, and whereever is necessary. All CHB blocks should all be reinforced and mortar filled and plastered both side based on specification provided. See plans and specifications.

5. METAL
- Furnish all material, needed for this section which includes, rebars, steel fasteners, bolts, anchorage, carbon steel A36, braces, scaffholds and support, shoring jacks, miscelanious metals needed for the construction of the extension.
- provide none structural framing support on drywalls for the interior partitions. (see plans and specs.)
- provide metal ceiling support. (see plan and specs.)
- provide all necessary expansion control.

6. WOOD AND PLASTIC
- Provide necessary work under this section which includes rough carpentry and finish carpentry.

7. THERMAL AND MOISTURE PROTECTIO.
- provide vapor retarders under slab, see plans and specifications
- provide waterproofing on concrete slab, see plans and specification.
- provide joint sealants wherever is necessary.

7. DOORS AND WINDOWS
- Provide doors and windows with reference to the plan and specifications.
- provide all work needed for the installation of doors and windows.
- includes all hardwares for the installation
- includes all glass and glazing for the installation of doors and windows.
- provide 1 access door on hallway for the emergency exit.

8. FINISHES
- Provide all finishes for the extension with reference to the plans and specification. This includes the following:
1. ceramic tiles
2. plaster on masonry walls
3. ceiling materials (see plans and specs.)
4. drywall partitions using gypsum for interior walls.
5. painting
6. joint treatment
7. special coating
- provide all necessary work associated with the finishing works.

9. PLUMBING
- provide all necessary work needed under this section which includes relocation of 2 existing water tanks, all work associated for the relocation.
- all storm water piping and drainage.
- relocation of pipes and meters.

10. ELECTRICAL
- Provide all necessary work under this section with reference to the plans and specification which includes relocation of existing meter and all associated work for the relocation.
- all roughing in electrical works and finishing for electrical work which includes power outlets, lighting, panels and breakers, data and cables, telephones, conduits, raceways, wires, switches, controls, etc.

11. AFTER CONSTRUCTION
- Provide all necessary work after construction like cleaning, site cleaning, rectification of punchlist, turnover, etc.

GENERAL SPECIFICATION

FSM DECEM/NEOC EXPANSION AND REFURBISHMENT IN PALIKIR – Federated States of Micronesia

ARCHITECT: R.S.ROQUE ARCHITECTS

R.S.ROQUE ARCHITECTS *| P.O. Box 6, Kolonia Pohnpei, FSM 96941*

Contents

SECTION 01010 SUMMARY OF WORK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Work covered by the Contract Documents.

2. Contractor's use of the premises.

3. Occupancy requirements.

B. Related Documents:

1. The Contract Documents, as defined within this Section, apply to the work. Additional requirements and information necessary to complete the work may be found in other Documents.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Provide and pay for all labor, materials, services, equipment, permits, fees, licenses, taxes, and other items necessary for the execution, installation and completion of all work indicated in the Contract Documents.

B. The work involves the construction of FSM DECEM/NEOC EXPANSION AND REFURBISHMENT IN PALIKIR. Work includes, but is not limited to, demolition, earthwork, site utilities, site improvements. Work also includes concrete foundations, slabs-on-grade, concrete, cast-in-place concrete roof, roof membrane, thermal and sound insulation, concrete masonry unit walls, non-structural metal framing, carpentry, gypsum board walls and ceilings, ceramic tile, resilient flooring, acoustical ceilings, windows, glazing, hollow metal doors and frames, door hardware, cabinetry and fixtures, painting, , electrical, ventilation and air conditioning, complete and ready for use.

C. Coordination: The work of this Contract includes coordination of the entire work of the Project, from the beginning of activity through project close-out and the warranty periods.

D. Drawings: Preparation of "As-Built" Drawings showing the location of all new work.

E. The work and appurtenances shall be all in strict accordance with the Contract Documents, except only those items specifically shown, noted, or specified as not in

the Contract (NIC), or OFCI, or those materials designated as OFCI.

F. Summary of References: Work of the Contract can be summarized by reference to the Contract, General Conditions, Supplementary Conditions, Special Provisions, Labor Standards Provisions, Specifications Sections as listed in the Table of Contents bound

herewith, Drawings, Addenda and Modifications to the Contract Documents issued subsequent to the initial printing of these Specifications, and including, but not necessarily limited, to printed matter referenced by any of the above.

1.3 CONTRACTOR'S USE OF PREMISES

A. During construction, the Contractor shall have full use of the Project Site and to the immediate area for construction operations. Contractor shall minimize disruption to the public and to activities in and around adjacent roads, streets, buildings and other facilities.

B. The Contractor must limit use of the premises to construction activities only in the areas indicated:

1. Confine operations to areas within the Contract limits indicated. Portions of the Site beyond the areas in which construction operations are permitted are not to be disturbed or used.

2. Keep driveways and entrances serving the public and adjacent buildings and properties clear and useable at all times. Do not use these areas for parking or storage of materials unless approved, in writing, by the Owner's representative.

3. Schedule deliveries to minimize time and space required for storage of materials and equipment on the Project Site.

4. Provide temporary fencing, barricades, signage, traffic control and personnel necessary for public safety.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01450 QUALITY CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Owner representatives quality assurance (QA).

2. Contractors quality control (QC).

3. Quality control procedures.

4. Testing and inspection laboratory services.

5. Contractors field inspection and testing.

6. Contractors reports.

7. Contractors testing and inspection reports.

8. Non-compliance check-off list.

9. Completion and inspection of work.

B. Related Documents: The Contract Documents, as defined in Section 01010 - Summary of Work, apply to the work of this Section. Additional requirements and information necessary to complete the work of this Section may be found in other Documents.

1.2 REFERENCES

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

1. ASTM C 802 - Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods for Construction Materials.

2. ASTM C 1077 - Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

3. ASTM C 1093 - Practice for Accreditation of Testing Agencies for Masonry.

4. ASTM D 3740 - Practice for Minimum Requirements for Agencies Engaged in Testing and / or Inspection of Soil and Rock as Used in Engineering Design and Construction.

5. ASTM D 4561 - Practice for Quality Control Systems for Organizations Producing and Applying Bituminous Paving Materials.

6. ASTM E 329 - Specification for Agencies Engaged in Construction Inspection and / or Testing.

7. ASTM E 543 - Specification for Agencies Performing Nondestructive Testing.

8. ASTM E 699 - Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.

1.3 SUBMITTALS

A. Contractors Quality Control Plan. Indicate the following:

1. Procedures for reviewing coordination drawings, Shop Drawings, certificates, certifications and other submittals.

2. Testing and Inspection Schedule, keyed to the Construction Schedule, indicating tests and inspections to be performed, names of persons responsible for the inspection and testing for each segment of the work, including preparatory, initial and follow-up.

3. Proposed forms to be used including Contractor's Daily Report, Contractor=s Test and Inspection Report, and Non-Compliance Check-Off List.

B. Independent Testing and Inspection Laboratory. Submit the following:

1. Name.

2. Address.

3. Telephone number.

4. Name of full-time registered Engineer.

1.4 OWNER REPRESENTATIVES QUALITY ASSURANCE

A. The Owners representative will inspect the quality of work being installed, review and verify the accuracy of changes in the work, receive and distribute the Contractors submittals, determine compliance with the Contract Documents and preside at progress and coordination meetings.

B. The Owners representative will arrange for factory tests when needed; at the Contractors cost.

C. Owners Field Inspection: The Owner representative will perform inspections of the work for quality assurance (QA).

1.5 CONTRACTORS QUALITY CONTROL REPRESENTATIVE

A. Qualifications for Contractors Quality Control Representative: Minimum five (5) years construction quality control or construction management experience on work similar to the work of this Contract.

1.6 CONTRACTORS QUALITY CONTROL

A. The Contractor is responsible for the overall quality of the work performed by the Contractor and subcontractors working under this Contract. The quality of any part of the work must not be less than that required by the Contract Documents. If the Owners representative determines that the quality of the work does not conform to the Contract Documents, the Owners representative will notify the Contractor, in writing. The Contractor must correct the identified deficiencies and advise the Owners representative of the corrective action taken within 7 days of the date of notification.

B. Monitor quality control over the Contractors staff, subcontractors, suppliers, manufacturer's, products, services, site conditions and workmanship.

C. Comply fully with the manufacturer's published instructions, including each step in the sequence of installation.

D. Should the manufacturer's published instructions conflict with the Contract Documents, request clarification from the Owners representative before proceeding.

E. Comply with the specified standards as a minimum quality for the work, except where more stringent tolerances, codes or specified requirements indicate higher standards or more precise workmanship.

F. Perform the work by persons who are thoroughly qualified and trained in their respective trade to produce workmanship of the specified quality.

G. Secure products in place with positive anchorage devices, designed and sized to withstand wind and seismic loads, stress, vibration, physical distortion and disfigurement.

H. Perform tests required by governing authorities and utility agencies having jurisdiction.

I. Contractors Field Inspection: The Contractor or his authorized representative(s) shall inspect all work under this Contract for quality control (QC).

1.7 QUALITY CONTROL TESTING:

A. Field tests made at, or in the vicinity of the Project Site in connection with the actual construction, including but not limited to, concrete batch plants, asphalt batch plants and similar establishments directly involved in the construction process.

1. Field Tests by the Contractor: The Contractor shall perform all field testing specifically required of him in the Contract Specifications and all field tests required by AApplicable Publications@ referenced in the Contract Specifications. The cost of testing shall be borne by the Contractor. The Contractor shall furnish all equipment, instruments, qualified personnel and facilities necessary to perform all tests required by the Contract Documents. The required testing services shall be performed by the Contractor or acquired by the Contractor through a qualified commercial testing laboratory. If a commercial testing laboratory is retained to perform tests under this Contract, all test reports shall be certified by the laboratory.

Test reports shall include the acceptable value for each specification item, actual test results obtained, methods used, and a statement that the product, equipment or system conforms or does not conform to the Specifications requirements.

2. Field Tests by Owner: Field tests conducted by the Owner will be made as necessary to assure quality or as otherwise provided herein.

B. Factory tests made at the point of manufacture of various products shipped to the Project Site as a unit.

C. Certified tests made by approved testing agencies on material and / or equipment to be incorporated into the Project under the Contract. These tests are those performed by Factory Mutual, Underwriters Laboratories, Inc., and others.

1. Manufacturers Certified Tests: Certified tests on materials to be incorporated into the work will be acceptable, provided they are performed by the manufacturer or by Owners representative approved agencies or laboratories, show that the materials conform to the Specifications, and that tests and certifications meet the requirements of the paragraph entitled AQuality Assurance@ below.

1.8 TESTING AND INSPECTION LABORATORY SERVICES

A. Selection and Payment:

1. Employment and payment for services of an Independent Testing and Inspection Laboratory to perform specified testing and inspection shall be by the Contractor.

2. Owner Approval of Laboratories: All laboratory work performed under this Contract shall be done by a Laboratory approved by the Owners representative, whether the laboratory is employed by the Contractor or by others, or is owned and operated by the Contractor. The basis of approval includes the following:

a. Laboratories performing work in connection with concrete, steel and bituminous material must conform to American Society for Testing and Materials (ASTM) E 329.

b. Laboratories performing work <u>not</u> in connection with concrete, steel and bituminous materials must conform to Sections 3 and 4 of ASTM E 329.

3. Employment of Independent Testing and Inspection Laboratory in no way relieves the Contractor of his obligation to perform work in accordance with the requirements of the Contract Documents.

B. Quality Assurance:

1. Comply with the requirements of ASTM C 802, ASTM C 1077, ASTM C 1093, ASTM D 3740, ASTM D 4561, ASTM E 329, ASTM E 543, ASTM E 699 and ASTM E 1691.

2. Laboratory Staff: Maintain a full-time registered Engineer on staff to review the services provided.

3. Testing Equipment: Calibrated at reasonable intervals with devices of and accuracy traceable to either National Bureau of Standards or accepted values of natural physical constraints.

C. Laboratory Responsibilities:

1. Test samples of mixes submitted by the Contractor.

2. Provide qualified personnel at the Project Site. Cooperate with the Owner=s representative and the Contractor in the performance of services.

3. Perform the specified sampling, testing and inspection of products in accordance with the specified standards.

4. Determine compliance of the materials and mixes with requirements of the Contract Documents.

5. Promptly notify the Contractors Quality Control Representative and the Owner=s representative of observed irregularities or non-conformance of work or products.

6. Perform additional tests as required by the Owners representative.

1.9 CONTRACTORS FIELD INSPECTION AND TESTING

A. Contractor: Test and inspect the work provided under this Contract to ensure that the work is in compliance with the Contract requirements. Required tests and inspections are indicated in the individual Specifications Sections.

B. Preparatory Inspection: Performed prior to beginning the work and prior to beginning each segment of work and includes:

1. Review of Contract requirements.

2. Review of Shop Drawings and other submittal data after approval and return.

3. Examination to assure that the materials and equipment conform to the Contract requirements.

4. Examination to assure that the required preliminary or preparatory work is complete.

C. Initial Inspection: Performed when a representative portion of each segment of the work has been completed, and includes:

1. Performance of the required tests.

2. Quality of the workmanship.

3. Review for omissions and dimensional errors.

4. Examination of products used, connections and supports.

5. Approval or rejection of the inspected segment of work.

D. Follow-Up Inspections: Performed daily and more frequently, as necessary, to ensure that non-complying work has been corrected.

E. Testing and Inspection: Perform testing and inspection in accordance with requirements of the individual Specifications Sections.

1.10 CONTRACTOR'S WEEKLY REPORTS

A. Submit weekly reports to the Owners representative for days that work was performed. Include the following information:

1. Contractors name and address.

2. Job reference and information.

3. Date, weather, minimum and maximum temperatures, rainfall and other pertinent weather conditions.

4. Daily workforce of the Contractor and subcontractors, by trade.

5. Description of the work started, on-going work, and work completed by each subcontractor.

6. Coordination implemented between the various trades.

7. Approval of substrates received from various trades.

8. Non-conforming and unsatisfactory items to be corrected.

9. Remarks.

1.11 CONTRACTOR'S TESTING AND INSPECTION REPORTS

A. Prepare and submit a written report of each test and inspection, signed by the Contractors Quality Control Representative performing the inspection, within two (2) days after the day the inspection was made.

B. Include the following on the written inspection reports:

1. Cover sheet prominently identifying that the inspection "CONFORMS" or "DOES NOT CONFORM" to the Contract Documents.

2. Date of the inspection and date of the report.

3. Project name, location, solicitation number and Contractor.

4. Names and titles of individuals making the inspection.

5. Description of the Contract requirements for inspection by referencing the

Specifications Section.

6. Description of the inspection made, interpretation of the inspection results, and notification of significant conditions at the time of the inspection.
7. Requirements for follow-up inspections.

1.12 NON-COMPLIANCE CHECK-OFF LIST

A. Maintain Check-Off List of work that does not comply with the Contract Documents, stating specifically what is non-complying, date the faulty work was originally discovered and the date the work was corrected. There is no requirement to report deficiencies corrected the same day the deficiency was discovered. Submit a copy of the Non-Compliance Check-Off List of non-complying work items on a weekly basis for review at the next Progress / Coordination Meeting.

1.13 COMPLETION AND INSPECTION OF WORK

A. Prior to final acceptance by the Owners representative, submit a certification signed by the Contractor stating that all work has been inspected and that all work, except as specifically noted, is complete and in compliance with the Contract Documents.

B. Record Documents: By Contractors Quality Control Representative. Ensure that "Record Documents" required by Section 01780 - Closeout Submittals, are marked to show any deviations made during construction and are kept current on a daily basis. Upon completion of the work, certify the accuracy of the "Record Documents" and submit to the Owner=s representative.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Temporary Utilities
B. Sanitary Facilities
C. Temporary Controls
D. Contractor's Camp Site
E. Barriers
F. Protection
G. Cleaning During Construction
H. Removal

1.02 RELATED REQUIREMENTS

A. Section 01560 - Environmental protection
B. Section 01700 - Contract Closeout: Final cleaning.

1.03 TEMPORARY UTILITIES

A. ELECTRICITY

1. Pohnpei State Electrical Utility lines are located on the site. Obtain construction managers approval prior to any temporary connection or distribution. Contractor shall provide and pay for all electrical power costs associated with camp and construction activities for the project with the exception of the Owners filed office.
2. Contractor may furnish motor generator sets and suitable distribution system.
3. Provide service required for construction operations and equipment testing, with branch wiring and distribution boxes located to allow service and lighting by means of construction type power cords.

B. Water: When Contractor pipes water from a stream source or well, piping must follow along right-of-way of road until intersecting camp access road, then follow along access road to camp site. Construct storage tanks and treatment facilities when required on the contractor's

campsite.

C. Lighting: Provide lighting for construction operations. Permanent lighting may be used during construction. Maintain lighting and make routine repairs.

D. Ventilation: Provide as required to maintain specified conditions for construction operations, to protect materials and finishes from damage due to temperature or humidity. Provide ventilation of enclosed areas to cure materials, to disperse humidity, and to prevent accumulations of dust, fumes, vapors or gases.

1.04 SANITARY FACILITIES

A. Provide and maintain required sanitary facilities and enclosures conforming to local public health rules and regulations.

1.05 TEMPORARY CONTROLS

A. Unexploded ordinance: Systematic sweeping has not been performed. Take appropriate measures and precautions. Should old unexploded ordinance be unearthed, leave the ordinance undisturbed and report in immediately to the Construction Manager, who will contract an Ordinance Disposal Team for safe removal. Inform all employees of these safety precautions.

B. Traffic: Great caution is urged when operating construction equipment along roads or near villages in order that accidents involving local pedestrians can be averted.

C. Explosives: Blasting or use of explosives is not permitted.

D. Radio Transmitter Restrictions: To preclude accidental actuation of sensitive electronic equipment, conform to the restrictions and procedures for the use of radio transmitting equipment as delineated by the Contracting Officer. Under no circumstances shall transmitters be used without prior approval of the Construction Manager.

E. Storm Protection: Should warnings or winds of gale force or stronger be issued, take every practicable precaution to minimize danger to persons, to the work, and to adjacent property. These precautions include closing openings, removing loose materials, tools and

equipment from exposed locations, and removing or securing scaffolding and other temporary work.

1.06 BARRIERS

A. Provide and maintain barriers and warning signs are required to maintain public safety at construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

B. Trenches and Excavations: Provide adequate barriers and protection at trenches and excavations. Cover excavations under roadways for safety and to permit passage of traffic. Backfill pipeline trenches as soon as possible to minimize danger. Not more than 300 LF of trench may be left open at any time.

C. Provide barriers around trees and plants, which may be designated to remain.

1.07 PROTECTION

A. Provide protection of installed products to prevent damage from subsequent operations. Remove when no longer needed, prior to completion of work.
B. Control traffic to prevent damage to components and surfaces.
C. Provide coverings to protect finished surfaces from damage.

1. Cover projections, corners, jamb sills, soffits etc. in areas subject to traffic.
2. Protect finished floors subject to foot traffic with heavy paper, sheet goods, or other materials secured in place.

a. For movement of heavy products, lay planking or similar materials in place.
b. For storage of products, lay tight wood sheathing in place.

D. Waterproofed and roofing surfaces.

1. Prohibit use of surfaces for traffic of any kind, and for storage of any products.
2. When access is necessary obtain recommendations of installer

for protection of surface.

E. Dewatering: Keep excavated pits and trenches free of rain and ground infiltrated water at all times, unless waived by Construction Manager.

1.08 CLEANING DURING CONSTRUCTION

A. Control accumulation of waste materials and rubbish. Periodically dispose of waste off-site.

B. Clean interior areas prior to start of finish work. Maintain areas free of dust and other contaminants during finishing operations.

1.10 REMOVAL

A. Remove temporary materials, equipment, services, barriers and construction when no longer required prior to substantial completion inspection.

B. Clean and repair damage caused by temporary installation or use of temporary facilities.

1. Remove underground installations to a depth of 2 feet. Grade site as indicated.

2. Restore permanent facilities used during construction to specify or to original condition.

3. Repair damaged surfaces to match adjacent surfaces.

4. Prior to final inspection, remove temporary lamps in all light fixtures and install new lamps.

END OF SECTION

SECTION 02050 DEMOLITION AND REMOVAL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of existing structures, concrete pads, water lines, walls, electrical components and other items as indicated on the Drawings, and as required to accomplish the work.

2. Disconnection, capping and identification of utilities.

3. Removal and disposal of miscellaneous items that will be a hindrance or hazardous to the work to be done, as directed by the Owners representative.

4. Removal of designated partitions and components; frames, doors and windows.

5. Removal of designated building equipment, fixtures and cabinetry.

6. Removal of designated finishes and specialty items.

7. See Electrical Sections for lighting, power and alarm systems requirements.

8. Construction and maintenance of temporary partitions to allow continual occupancy of adjacent building areas.

9. Disposal of materials at approved off-site location(s).

10. Procedures for safe conduct of the work.

11. Protection of property to remain.

12. Coordination with other work.

B. Related Documents: The Contract Documents, as defined in Section 01010 - Summary of Work, apply to the work of this Section. Additional requirements and information necessary to complete the work of this Section may be found in other Documents.

1.2 DESCRIPTION OF WORK

A. The extent of the demolition and removal work is indicated on the Drawings and as specified herein, and includes the demolition of designated existing construction, equipment, fixtures and cabinetry; protection of materials for re-use; construction of temporary partitions; disconnection, capping and identification of utility services; removal and disposal of debris; and protection of property to remain.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Procedures for submittals.

1. Submit a demolition and removal plan for approval before work begins. Include procedures for careful removal and disposition of the materials specified to be salvaged, disconnection schedule for utility services, coordination with other work, and a detailed description of methods and equipment to be used for each, and the sequence of operation.

1.4 REQUIREMENTS

A. Conform to Section 01560 - Environmental Protection and applicable codes and regulations of authorities having jurisdiction for demolition, removal and disposal.

B. Obtain written clearances from all public and private utility companies and agencies serving the Project Site prior to the start of any demolition work. Request that each utility agency mark the location of their utility service.

C. Obtain all required government Permits.

D. Conform to applicable regulatory procedures if hazardous, toxic or contaminated materials are encountered. Immediately notify the Owners representative, in writing.

E. Conduct demolition to minimize impact on existing and adjacent structures. Protect existing structures, utilities, and other items of properties to remain from damage during demolition and removal operations.

F. Minimize interference with adjacent building occupancies.

G. Immediately cease operations if adjacent structures appear to be in danger, and take appropriate corrective measures to ensure safety of the structures and occupancies.

1.5 PROJECT CONDITIONS

A. Provide, erect, and maintain temporary shoring, dust barriers, and security and protection barriers.

B. Conduct demolition to minimize interference with adjacent building areas.

C. Maintain protected access and egress at all times.

D. The use of explosives will not be permitted.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01700 - Execution Requirements: Verification of existing conditions before starting the work.

B. Verification of Conditions: Verify that measurements, surfaces, materials, substrates and conditions are as indicated.

C. Report, in writing, prevailing conditions that will adversely affect satisfactory execution of the work of this Section, Do not proceed with the work until the unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Construct and maintain weatherproof closures for unprotected existing openings.

B. Construct and maintain temporary partitions or barriers to prevent the spread of dust, fumes, noise and smoke to adjacent occupied facilities.

C. Protect existing work not indicated to be altered or removed.

D. Provide bracing and shoring as required for work to remain.

E. Disconnect, remove and cap designated utility services within the demolition area. Mark the location of disconnected utilities. Identify and indicate the capped locations on the Project Record Documents.

3.3 REMOVAL

A. Do not begin demolition until authorization has been received from the Owner=s representative.

B. Notify the Owner=s representative, in writing, ten (10) working days prior to commencement of the work.

C. Construct demolition in an orderly and careful manner. Protect existing construction to remain.

D. Where indicated, remove foundation walls and footings to the dept below finished grade, as shown.

E. Remove concrete curbs, walks and asphalt paving on grade. Backfill, rough grade and compact areas affected by the demolition.

F. Dust and Noise Control:

1. Dust resulting from the demolition shall be controlled to prevent the spread to occupied portions of the area, and to avoid creation of a nuisance in surrounding areas. The use of water will not be permitted when it will result in, or create hazardous, objectionable conditions, flooding or pollution.

2. Noise associated with the demolition shall be minimized by the selection and use of the proper equipment, procedures implemented, time of day, or day of the week the work is to be accomplished, to minimize the adverse effects of noise from operations and activities of the Contractor.

G. Traffic Control Plan: Where pedestrian and driver safety is endangered in the area of the removal work, install traffic barricades with flashing lights.

H. Existing Work: Protect existing work which is to remain in place, be reused, or remain the property of the Owner. Repair items, which are to remain but are damaged during performance of the work, to their original or better condition or replace with new. Provide new supports and reinforcements to existing construction weakened by the demolition and removal work. Repairs, reinforcements and structural replacements must be approved by the Owner=s representative.

I. Relocations: Perform removal and reinstallation of relocated items, as indicated, with workmen skilled in the trades involved. Coordinate with the agency that has jurisdiction over a utility to be relocated. Repair items to be relocated, which are damaged or replace damaged items with new undamaged items, as approved by the Owner=s representative.

J. Ownership of Materials: Except where specified in other Sections, all material and equipment removed, and not reused, shall become the property of the Contractor and shall be removed from the Project Site. The ownership of materials resulting from demolition, and materials and equipment removed, is vested in the Contractor upon approval of the Contractor=s demolition and removal plan and procedures, and authorization by the Owner=s representative. The Owner will not be responsible for the condition or loss of, or damage to, such property after the Contract award. Prospective purchasers shall not be allowed on the Project Site to view materials and equipment to be sold by the Contractor.

K. Salvage: The Contractor shall remove existing facilities, as necessary or as indicated; salvage usable materials as directed; store, transport, stockpile and / or protect materials at the location designated. All salvaged materials shall remain the property of the Owner.

L. Disposition:

1. Refuse resulting from demolition operations shall be hauled to an approved disposal site(s) or landfill and shall be disposed of in a manner to meet all applicable federal and local requirements, regulations and laws regarding environmental protection, health, safety and public welfare.

2. Remove rubbish and debris from the Project Site daily. Do not allow accumulation inside or outside the building. Store materials that cannot be removed daily in

areas designated by the Owner=s representative.

3. Materials shall not be left on the Project Site, moved to adjoining properties or areas, or be buried on-site.

4. Refuse may not be burned on the Project Site.

5. Remove and promptly dispose of contaminated, vermin infested, and dangerous materials encountered.

M. Restore damaged surfaces, equipment and fixtures to their condition prior to beginning the work, with the same type materials, size and finish as the existing. Damage to existing facilities, structures, utilities or other work to remain shall be repaired by the Contractor using materials equal to or better than those existing, and at the Contractor=s expense.

3.4 CLEANUP

1. Upon completion of demolition and removal operations, the entire area shall be cleaned of all debris and rubbish in a manner satisfactory to the Owner=s representative.

2. Leave the areas of work in a broom clean condition.

END OF SECTION

DIVISION 2 - SITE WORK

SECTION 02102 - CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Clearing and grubbing the project site prior to the grading work

1.02 RELATED WORK

A. Section 02200 - Earthwork

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workers thoroughly trained and experienced.

1.04 PROTECTION

A. Roads and adjoining land: Keep roads and adjoining land free of dirt and debris at all times.

B. Blasting: The use of explosives will not be permitted.

PART 2 - PRODUCTS

(None) PART 3 -

EXECUTION

3.01 CLEARING: Clearing shall consist of the felling, trimming and cutting of trees into sections, and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Cut off flush with or below the original ground surface trees, stumps, roots, brush and other vegetation in areas to be cleared. Remove surface boulders.

3.02 GRUBBING: Grubbing shall consist of the removal and disposal of roots larger that 3 inches in diameter, matted roots and designated stumps from the indicated grubbing areas. Excavate this material together with logs, organic and metallic debris, brush and refuse and remove to a depth of not less than 12 inches (unless indicated otherwise on plans and/or in other

specification sections) below the original soil surface in areas indicated to be grubbed and in areas indicated as construction areas

this contract. Fill depressions made by grubbing with suitable material and compact in accordance with the requirements specified in Section 02200 Earthwork to make the profile of the new surface match that of the existing adjacent surface of the ground.

3.03 DISPOSAL OF CLEARED AND GRUBBED MATERIALS:

Remove from the project site unless indicated otherwise on the drawings and/or other specification sections.

END OF SECTION

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Building footing excavation, back filling, under slabs filling, compaction, and dewatering.

1.02 QUALITY ASSURANCE

A. Use adequate numbers of skilled workers thoroughly trained and experienced.

1.03 APPLICABLE PUBLICATIONS: The publication listed below form a part of this specification to the extend referenced. The publications are referred to in text by the basic designation only.

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

C33-84	Concrete Aggregates
C136-84	Sieve Analysis of Fine and Coarse Aggregates
D1140-54 (1971)	Amount of material in soils finer than the No. 200 (75 um) Sieve
D1556-82	Density of Soil in Place by the Sand-Cone method
D1557-78	Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb. (4.54 kg) Rammer and 18-inch (45 7 mm) Drop
D2419-74 (1979)	Test for Sand equivalent value of soils and fine aggregate
D2487-83	Classification of Soils for Engineering Purposes
D3017-78	Moisture content of soil and soil aggregate in place by Nuclear Method (ShallowDepth)

D4318-83 Liquid limit, Plastic limit and plasticity index of Soils.

1.04 SUBMITTALS

A. Compaction test results: In accordance with Part 3 of this section.

1.05 DELIVERY AND STORAGE:

Deliver and store materials in a manner to prevent contamination or segregation.

1.06 CRITERIA FOR BIDDING:

A. Base bids on the following criteria:

1. That the surface elevations are as indicated.
2. That no pipes or other artificial obstructions, except those indicated will be encountered.

B. Existing utilities and construction shall be protected from damage during the excavation and back filling operations and if damaged, shall be repaired. No excavation shall be made with power driven equipment within 3 feet of any known utility crossing the excavation. For subsurface obstructions the Contractor shall employ carefully performed hand excavation. Hand excavation shall start a reasonable distance from each side of the indicated obstruction and shall be continued until the obstruction is uncovered or until clearance for the new line is assured. The Contractor shall properly support all uncovered lines or other existing work as affected by the contract excavation and shall report to the Engineer for a decision of any condition as found which is not indicated.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS: In general, shall be free of debris, roots, wood, scrap, material, vegetable matter, refuse, soft unsound particles, deleterious or objectionable materials.

A. Granular Fill: Capillary water barrier under building pad shall conform to the requirements for soil materials under above and shall be a clean, coarse grained crushed stone, uncrushed gravel,

or crushed gravel conforming to the following gradation: 90 to 100 percent passing the ¾ inch sieve and zero to five percent passing the No. 4 sieve and with a sand equivalent of not less than 50 when tested in accordance with ASTM D 2419.

B. Selected Fill: Material shall be coral or basalt and shall be free or organic and other perishable matters and fragments larger than 4" in any dimension, and shall conform to the following requirements:

SIEVE SIZE	PERCENT PASSING WEIGHT
3 inches	100
No. 4	30-60
No. 200	8-25
Liquid limit	25 maximum
Plasticity index	6 maximum

C. Structural Fill shall be a non-expansive fill material such as dredged coral and or quarried material having a plasticity index not greater than 15 and liquid limit not more than 40.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

A. Unsuitable Material: Vegetable matter, sod, muck, and rubbish shall be removed under concrete slabs.

3.02 EXCAVATION

A. General: After excavation to the dimensions indicated on the drawings, the exposed bottom surface of outside building areas to be filled shall be scarified to a depth of 6 to 8 inches, moisture conditioned as necessary and re-compacted to at least 95 percent compaction in accordance with ASTM D 1556 and D 1557. Keep excavations free from water while construction is in progress. Notify the Soils Engineer immediately in writing in the event that it becomes necessary to remove hard, soft, weak, or wet material to a depth greater than indicated. Excavations cut below the depths indicated shall, unless otherwise specified, be refilled with structural fill and be compacted to 95 percent of ASTM D1557 maximum density.

Soil disturbed or weakened by the Contractor's operations and soils permitted to soften from exposure to weather shall be excavated to 95

percent of ASTM D1557 maximum density. All additional work of this nature will be at the Contractor's expense.

B. Excavations for Proposed Buildings:

1. For concrete pads, the existing sub grade area shall be excavated to a depth below the planned bottom of the pad and filled with 8-inch maximum lifts of structural fill to the limits shown on the drawings. If soft, yielding soil, as determined by the Soils Engineer, is encountered at the excavated depth, then the thickness of the structural fill under the thickened slab edge shall be increased. Each lift shall be compacted to at least 95 percent of the maximum dry density as determined by ASTM D 1557, the top 6 inches, which shall be compacted to 95 percent.

2. For building footings, excavation shall be to the planned bottom of the footing. If soft, yielding soil, as determined by the Soils Engineer, is encountered at this depth, additional excavation shall be done to the depth equal to one-footing depth, and filled with structural fill compacted to at least 95 percent maximum density. If the soil is still soft and yielding at this excavated depth, as determined by the Soils Engineer, the soils shall be over excavated for an additional depth equal to one-footing width below the planned footing bottom. After the over excavation is completed, the over excavated areas shall be backfilled with general fill material with each 8-inches maximum lift compacted to at least 95 percent maximum density, the top 12-inches shall be structural fill compacted to at least 95 percent maximum density. If the bottom of the over excavated area is still too soft, as determined by the Soils Engineer, a 12-inch layer of granular fill, as specified in paragraph 2.01A of this section, shall be placed on the bottom before placing the general fill.

3.03 FILLING AND BACK FILLING

A. Fill beneath structures: Under spread footings and concrete slabs, shall be placed in accordance with the dimensions shown on the drawings and in lifts of maximum 8 inches thick with each lift compacted to 95 percent maximum density, before the overlaying lift is placed. Concrete slabs-on-grade floors shall be supported by granular fill and/or structural fill to the limits shown on the drawings. Backfill adjacent to structural elements shall be placed as far as practicable as the adjacent structural elements have been

completed and accepted. Backfill against concrete shall be done only when directed by the Soils Engineer.

3.04 COMPACTION: Testing shall be in accordance with ASTM D 1556 and D1557 to maximum densities indicated in paragraph 3.02 and 3.03 of this section.

A. Tests: Fill, backfill and granular fill shall be tested in accordance with ASTM C136 for conformance to ASTM C33, ASTM D2419 and ASTM D2487 gradation limits. Test fill and backfill for material finer than the No. 200 sieve in accordance with ASTM D1140. Test fill and backfill for liquid limit and for plasticity index in accordance with ASTM D4318. Test fill and backfill materials for moisture density relations in accordance with ASTM D1557. Perform one of each of the required tests for each material used when directed. Provide additional tests as specified above for each source change. Perform density tests in randomly selected locations and in accordance with ASTM D1556 as follows:

Materials		Test Frequency
1.	Fill and Backfill	1 per lift per 200 SF
2.	Sub grade	1 per lift per 200 SF
3.	Under footings	1 per lift per 100 SF & each unit
4.	Under slabs and Other structures	1 per lift per 100 SF

END OF SECTION

DIVISION 3 - CONCRETE

SECTION 03300 - CAST IN PLACE CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Provided cast in place concrete as indicated on the drawings, and as required for a complete installation.

1.02 SUBMITTALS

A. Shop Drawings: The following shop drawings shall be submitted to and approved by the Architect before work is started.

1. Reinforcing steel drawings: Shop drawings for reinforcing steel shall be prepared in accordance with ACI 315. They shall indicate bending diagrams, assembly diagrams, splicing and laps of rods and shapes, dimensions and details of bar reinforcing and accessories. Scaled dimensions from structural drawings shall not be used in determining the lengths of reinforcing rods.

2. Formwork Drawings: Shop drawings shall cover all formwork required. They shall show general arrangement of forms, sizes and grades of lumber, panels and related components. Shop drawings shall indicate schedules of placement, construction and control joints and their method of forming: locations of inserts, tees, sleeves and other related items.

B. Contractor - Furnished Mix Design: A concrete mix design for each class of concrete included in the work shall be submitted to the Architect for approval.

1.03 DELIVERY AND STORAGE

A. Cement: Cement shall be stored immediately upon receipt. Cement in bags shall be stored in a suitable weatherproof

structure which shall be as air-tight as practicable, floor shall be elevated above the ground a distance sufficient to prevent the absorption of moisture.

Bags shall be stacked close together to reduce circulation of air but shall not be stacked against outside walls; the manner of storage shall permit easy access for inspection and identification of each shipment. Bulk cement shall be transferred to elevated air tight and weatherproof bins. At the time of use all cement shall be free flowing and free of lumps. Cement that has been in

storage longer than 6 months will be tested by standard mortar tests or other tests as deemed necessary by the Architect to determine its suitability for use and such cement shall not be used without approval of the Architect.

B. Aggregates: Aggregates shall be stored on areas covered with tightly laid wood planks, sheet metal, or other hard and clean surface, and in a manner that will preclude the inclusion of foreign material. Aggregate of different sizes shall be stored in separate piles. Stockpiles of coarse aggregate shall be built in horizontal layers not exceeding 4 feet in depth to minimize segregation. Should the coarse aggregate become segregated, it shall be remixed to conform to the grading requirements.

C. Reinforcement: Reinforcement shall be stored in a manner that will avoid excessive rusting or coating with grease, oil, dirt and other objectionable materials. Storage shall be in separate piles or racks so as to avoid confusion or loss of identification after bundles are broken.

1.04 CONCRETE

A. Contractor-Furnished mix design: Concrete shall be designed in accordance with ACI 211.1. A concrete mix design for each class of concrete included in the work shall be furnished as required under submittals. Tests for yield shall be as specified herein. Slump shall be between 2 inches and 4 inches.

The concrete shall have a 28-day compressive strength and

maximum aggregate size, respectively as follows:

1.1.1 DECEM EXTENTION AND REFURBISHMENT

LOCATION	28 DAY COMPRESSIVE STRENGTH (PSI)	MAX. AGGREGATE SIZE (INCHES)	MAX. WATER CEMENT RATIO (GAL. PER BAG)
Beams	3,000	1	5.5
Slabs on grade	2,500	1	6.75
Floor slab	3,000	1	5.5
Columns	3,000	1	5.5
Footings	3,000	1	5.5
Walks & Curbs	2,000	1	6.75
Drainage structures	2,500	1	6.75
Miscellaneous	2,500	1	6.75

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement - ASTM C-150, Type I or II

B. Water - water for mixing and curing including free moisture and water in the aggregates shall be fresh, clean and potable. Turbidity of the water shall not exceed 2,000 parts per million. Mortar specimens made in accordance with ASTM C 87, when compared with similar mortar specimens with water of known satisfactory quality and using the same sand and cement, shall show no unsoundness or marked change in setting and the comprehensive strength of mortar specimens at 28 days shall be at least 95 percent of the compressive strength of the specimens made with water of known satisfactory quality.

C. Aggregates - Aggregates shall be normal weight and shall conform to ASTM C 33 except as modified herein. All aggregates for exposed concrete surfaces shall be obtained from one source. Aggregates shall be free from any substance, which may be deleteriously reactive with the alkalis in the cement in an amount sufficient to cause excessive expansion of the concrete. Acceptability of the

aggregate shall be based upon satisfactory evidence furnished by the Contractor to the Architect for approval, that the aggregate is free from such materials.

1. Fine aggregates from different sources of supply: Fine aggregates from different sources of supply shall not be mixed or stored in the same stockpile or use alternately in the same structure. The fineness modulus of fine aggregates shall be not less than 2.40 or greater than
2.90 except as listed herein for 0.375 and 0.25 maximum sizes.

   Fineness modulus greater then 0.20 more or less than that of the representative sample submitted shall be rejected unless at the option of the Architect the aggregate is accepted subject to by the Architect and for which no change in the contract price will be made. Fine aggregate shall be graded according to the following limits:

Sieve	Percentage passing
3/8 inch	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10

The fineness modulus of fine aggregate for corresponding coarse aggregate maximum sizes shall be as follows:

Coarse Aggregate:	Maximum size	Fine modules
	0.5 inch and larger	2.40-2.90
	0.375 inch	2.60-3.00
	0.25 inch	2.90-3.20

1. Coarse Aggregate: Grading of coarse aggregate shall be in accordance with the following tables:

a. Separate sizes of coarse aggregates shall be combined with other sizes of the proportioning plant in proportions by weight to produce an aggregate meeting the grading specified herein.

Percentage by weight passing sieves

Size if Coarse Aggregate (inches)

	1-1/2.	1.	¾	½	3/8	#4	#8	#16
1	100	90-100	-	25-60	-	0-10	0-5	-
¾	-	100	90-100	-	20-55	0-10	0-5	-
½	-	-	100	90-100	40-70	0-15	0-5	1
3/8	-	-	-	100	85-100	10-30	0-10	0-5

D. Reinforcement: All reinforcing steel except no. 2 bars shall be deformed conforming to ASTM and the reinforcing steel shall have a minimum yield strength of 40,000 psi and they conform to one of the following ASTM:

1. Reinforcing bars:

A615 Deformed billet-steel bars for concrete reinforcement, Grade 40

A617 Axle-steel deformed bars for concrete reinforcement, Grade 40

High strength or special large size reinforcement shall conform to one of the following applicable ASTM specification

A615 Deformed billet-steel bars for concrete reinforcement, Grades 60.

2. Welded Wire Fabric: Welded wire fabric shall be electrically welded fabric of cold-drawn wire of gauge and mesh size indicated or specified herein, and shall conform to ASTM A185. Welded wire fabric shall be as indicated on the drawings, where the size, mesh

and weight of the fabric are not indicated or specified otherwise, fabric shall be 6-inch by 6-inch mesh, no. 6 gauge of 0.192-inch nominal diameter wire weighing approximately 42 pounds per 100 square foot.

E. Materials for Curing concrete:

1. Cotton Mats: Cotton mats shall be free from any substance, which may have a deleterious effect on fresh concrete.

2. Waterproof paper: Waterproof paper shall conform to Fed. Spec. UU- B-790.

3. Polyethylene Sheeting: Polyethylene sheeting shall be natural color and shall have nominal thickness of 0.006-inch. The loss of moisture when determined in accordance with ASTM C156 shall not exceed 0.055 gram per square centimeter of surface.

4. Polyethylene-coated: Polyethylene coated burlap shall be 4 mils thick white opaque polyethylene film impregnated or extruded into one side of the burlap. Burlap shall weigh not less than 9 ounces per square yard and shall conform to Fed. Spec. CCC-C-467. The loss of moisture when determined in accordance with ASTM C156 shall not exceed 0.055 gram per square centimeter of surface.

F. Chemical floor hardener: Chemical floor hardener shall be zinc or magnesium flu silicate dissolved in water at one to two and a half pounds per gallon of water, Ashford Formula, Sikagard/Cure Hard or an approved chemical floor hardener.

G. Joint-Sealing Materials: As specified under Section 07920, “Sealants and Caulking”.

H. Expansion Joint Filler: Expansion joint filler shall be preformed type conforming to ASTM D1752.

2.02 FORMS

2. General Requirements: Forms shall be provided for all concrete not indicated or specified otherwise.

Forms shall be set true to line and grade and maintained so as to insure completed work within the allowable tolerances specified, and shall be mortar- tight. The contractor shall be responsible for the adequacy of forms and form supports. Bolts and rods used for internal ties shall be arranged so that when the forms are remove, all metal will be not less than 2 inches from any surface for concrete which will be exposed to sea water or other destructive agents, not less than 1-1/2 inches for concrete exposed to weathering and for water tight and oil tight concrete, and not less than one inch for unexposed concrete. Wire ties shall not be used where the concrete surface will be exposed to weathering and where discoloration will be exposed. All formwork shall be provided with adequate clean-out openings to permit inspection easy cleaning after all reinforcement had been placed. In columns, walls and similar members of small dimensions the height of forms for each vertical lift shall not exceed 6 feet unless suitable openings are provided at not more than 6-foot vertical intervals to permit proper placing the concrete. Where forms for continuous surfaces are placed successive units, the forms shall be fitted over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar. Panel forms shall be constructed to provide tight joints between panels.

All forms shall be constructed so that they can be removed without damaging the concrete. All exposed joints, edges, land external corners shall be chambered a minimum of ¾-inch unless specified otherwise herein. Forms for heavy girders and similar members shall be constructed with a proper chamber as indicated. Concrete for footings may be placed in excavations without forms. The dimensions of excavations in earth shall be not less than 3 inches outside of the concrete lines indicated.

B. Materials for Forms: Forms shall be of wood, plywood, or steel. Forms for concrete pavements, except on curves, shall be metal; on curves, flexible or curved forms of metal may be used. Wood forms, for surfaces exposed to view in the finished structure and requiring a smooth form finish, shall

be plywood. For unexposed surfaces, undressed square-edge lumber may be used. Plywood shall be concrete-form plywood not less than 5/8-inch thick and shall conform to Department of Commerce PS-1 free of raised grain, torn surfaces, worn edges, patches, or other surface defects, which would impair the texture of the concrete surface. Surfaces of steel forms shall be free from irregularities, dents, and sags.

2. Coating: Before placing the concrete, the contract surfaces of forms shall be coated with a non-staining mineral oil or suitable non-staining form coating compound or shall be given two coats of nitro cellulose lacquer, except as specified otherwise.

   Mineral oil shall not be used on forms for surfaces, which are to be painted. For surfaces not exposed to view in the finished structure and when the temperatures is above 40 degrees F, sheeting may be wetted thoroughly with clean water. All excess coating shall be removed by wiping with cloths. Reused forms shall have the contact surfaces cleaned thoroughly; those, which have been coated, shall be given an additional application of the coating.

D. Tolerances and Variations: The Contractor shall set and maintain concrete forms to ensure that, after removal of the forms and prior to patching and finishing, no portion of the concrete work will exceed any of the tolerances specified. Variations in floor levels shall be measured before removal of supporting shores. The contractor shall be responsible for variations due to deflection, when the latter results from concrete quality or curing other than that which has been specified.

PART 3 - EXECUTION

3.01 MIXING:

A. Mixing:

1.1 **for decem extension -** All concrete shall be machine mixed. In emergencies, the mixing may be done by hand if so authorized by the Architect. Mixing shall begin within 30 minutes after the cement has been added to the aggregates. The time of mixing after all cement and aggregates are in the mixer drum shall be

not less than one minute for mixers having a capacity of one cubic yard or less; for mixers having a capacity of one time shall be increased 15 seconds for each additional cubic yard or fraction thereof of additional capacity. A reduction in the aforementioned mixing times shall be permitted in accordance with ASTM C94 if mixer performance tests, made at the Contractor's option and at his expense, indicate adequate mixing times shall be permitted in accordance Contractor's option and at his expense, indicate adequate mixing with the reduced time. All mixing water shall be introduced in the drum before one-fourth of the mixing time has elapsed. The entire time elapsing between the introduction of the mixing water to the cement and aggregates or the cement to the aggregates and placing of the concrete in final position in the forms shall not exceed 60 minutes if the air temperature is less than 85 degrees F, and 45 minutes if the air temperature is less than 85 degrees F. The re-tempering of concrete, i.e., remixing with or without additional cement, aggregates, or water will not be permitted.

TABLE 1

Compressive Strength of Concrete	Maximum Net Water Content (gallons/bag)		Minimum Cement Content (bags/cubic yard)	
	Without Air Entrainment	With Air Entrainment	Without Strength Test	With Strength Test
3000	7	6	6	5
4000	6	5	6.5	6

Note: A bag of cement weighs 94 pounds.

B. Consistency of Concrete: Except as specified otherwise, the slump shall be from 2 to 4 inches and shall be determined in accordance with ASTM C143. Consistency may be determined in the field by means of the ball-penetration method in accordance with ASTM C360 after a correlation between slump and ball penetration is determined. Tests to verify the ratio shall be made at least once each working day. Samples for slump determination shall be taken from

the concrete during placing in the forms; samples for ball penetration shall be taken as specified in ASTM C360.

3.02 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS:

A. General Requirements: All reinforcement bars, stirrups, hanger bars, wire fabric, spirals, and other reinforcing materials shall be provided as indicated or required by this specification, together with all necessary wire ties, chairs, spacers, supports, and other devices necessary to install and secure the reinforcement properly.

All reinforcement, when placed, shall be free from rust, scale, oil, grease, clay, and other coatings and foreign substances that would reduce or destroy the bond. Rusting or reinforcement shall not be a basis of rejection, provided that the rusting has nor reduced the effective cross sectional area of the reinforcement to the extent that the strength is reduced beyond specified values. Heavy, thick rust or loose, flaky rust shall be removed by rubbing with burlap or other approved method, prior to placing.

Reinforcement which has bends not shown on the project drawings or on approved shop drawings, or is reduced in section by rusting such that its weight is not within permissible ASTM tolerances, shall not be used. All reinforcement shall be supported and wired together to prevent displacement by construction loads or by the placing of the concrete.

Unless directed otherwise by the Architect, reinforcement shall not be bent after being partially embedded in hardened concrete. Detailing of reinforcing shall conform to ACI 315. Where cover over reinforcing steel is not specified or indicated it shall be in accordance with ACI 318.

B. Placing: Reinforcement shall be placed accurately and secured. It shall be supported by suitable chairs or spacers or by metal hangers. On the ground, and where otherwise subject to corrosion, concrete or other suitable non-corrosible material shall be used for supporting reinforcement.

C. Splicing of Reinforcement: Splicing of reinforcement shall be in accordance with ACI 318, except as indicated otherwise or modified herein. Where splices in addition to

those indicated on the drawings are necessary, they shall be approved by the Architect prior to their use. Except as indicated, or specified otherwise herein, in lieu of lapping, butt splicing of reinforcement may be permitted provided the splicing of material equal or greater in cross-sectional area to the spliced steel, shall possess a minimum of 125 percent of the yield strength or 90 percent of the ultimate strength of the reinforcing steel, whichever is the greater.

If butt splices are used the Contractor shall ensure that the splice meets the requirements specified herein by performing at least three test splices which shall be submitted for tests to a testing laboratory that has been approved for such testing by the Architect. The costs of these tests shall be borne by the Contractor.

1. Splicing of Welded Wire Fabric: In regions of maximum stress, where the wires are carrying more than one-half of the permissible stress, splicing in structural slabs shall be avoided wherever possible; such splices, where used, shall be made so that the overlap measured between outermost cross wires of each fabric sheet is not less than 2 inches.

D. Moving Reinforcing Steel: All placement or movement of reinforcing steel after placement, to positions other than indicated or specified shall be subject to the approval of the Architect.

E. Concrete Protection for Reinforcement: Concrete protection for reinforcement shall be as indicated; if not indicated, in accordance with ACI 318.

F. Tolerances and Variations: The minimum concrete cover for reinforcement specified in the contract documents takes precedence over all permissible reinforcement-placement variations; nothing in the variations listed below is to be construed as permitting violation or compromise thereof:

1.	Height of bottom bars above form	plus or minus ¼”
2.	Lengthwise positioning of bars	plus or minus 2”
3.	Spacing bars in walls and solid slabs	plus or minus 1”

4.	Spacing bars in joists, beams, footings		minus 0” and plus ¼”
5.	Height of top bars		minus 0” plus ¼”
6.	Stirrup spacing		
	a)	For any one stirrup	plus or minus 1”
	b)	For over-all group of stirrups	plus or 1”

3.03 CONVEYING AND PLACING CONCRETE:

A. Conveying: Concrete shall be conveyed from the mixer to the forms as rapidly as practicable by proper methods, which will not cause segregation or loss of ingredients. It shall be deposited as nearly as practicable in its final position in the forms. At any point in the conveying, the free vertical drop of the concrete shall not exceed 3 feet. Chuting will be permitted only where theconcrete is deposited into a hopper before it is placed in the forms. Conveying equipment shall be cleaned thoroughly before each run. All concrete shall be deposited as soon as practicable after the forms and the reinforcement have been inspected and approved by the Architect. Concrete, which has segregated in conveying, shall be removed and disposed of as directed by the Architect.

B. Placing Concrete: No concrete shall be placed after there is evidence of initial set. Concrete placement will not be permitted when weather conditions prevent proper placement and consolidation. The placement of concrete in uncovered areas, during periods of heavy precipitation will not be allowed except with the specific concurrence of the Architect. Sub grades of earth or other material shall be properly prepared and, if necessary covered with heavy building paper or other suitable material to prevent the concrete from becoming contaminated. Before placing concrete on porous sub-grades, they shall be dampened. Forms shall be clean of dirt, construction debris and water. Fresh concrete shall not be placed on vertical supporting members such as columns and walls without approval of the Architect. Concrete shall be deposited in approximately

horizontal layers 12 to 20 inches deep in a manner to preclude the formation of cold joint between successive layers. The method of depositing concrete shall be such as to avoid displacing the reinforcement and segregating the aggregate. Concrete shall be worked about the reinforcement and embedded fixtures and into corners and angles of the forms care being taken to avoid overworking, which may result in segregation.

On the bottom of beams, slabs and girders where the congestion of steel near the forms makes placing difficult, a layer of mortar equal to the approved concrete mix, with the coarse aggregates removed and 5- to 6- inch slump, shall be deposited to cover the surface to a depth of approximately one inch before placing the concrete.

Water, which accumulates on the surface of the concrete during placing, shall be removed by absorption with porous materials in a manner that prevents removal of cement. Pumping of concrete through aluminum pipe shall not be permitted.

C. Vibration: All concrete, with the exception of concrete slabs 4 inches or less in depth, shall be compacted with high frequency, internal mechanical vibrating equipment supplemented by hand spading and tamping. Concrete slabs 4 inches or less in depth shall be consolidated by wood tampers, spading and settling with a heavy leveling straight edge. Vibrators shall be designed to operate with vibratory element submerged in the concrete, and shall have a frequency of not less than 6,000 impulses per minute when submerged. The vibrating equipment shall be adequate at all times in number of units and power each unit to consolidate the concrete properly. Vibration of forms and reinforcement shall not be employed except when authorized specifically bythe Architect. Vibrators shall be discontinued when the concrete has been compacted thoroughly and ceases to decrease in volume.

D. Construction joints: Joints not shown on the drawings shall be made and located so as to least impair the strength of the structure and shall be subject to approval of the Architect. In

general, they shall be located near the middle of the spans of slabs, beams, and girders unless a beam intersects a girder at this point, in which case the joints in the girders shall be offset a distance equal to twice the width of the beam. Horizontal joints in walls and columns shall be at the underside of floors, slabs, beams or girders and at the top of footings or trade slabs. Beams shall be placed at the same time as slabs. Joints shall be perpendicular to the main reinforcement.

1. Reinforcement in Construction Joints: All reinforcing steel and welded fabric shall be continued across joints. Keys and inclined dowels shall be provided as indicated. Longitudinal keys at least

2. Preparation of Surface: The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed.

3. Bonding: When a bonded construction joint is required, bond shall be obtained by one of the following methods.

   a. The use of a bonding compound for concrete, conforming to Mil. Spec. MIL-B-19235.

   b. The use of suitable chemical retardant, which delays but does not prevent settling of the surface mortar. Retarded mortar shall be removed within 24 hours after placing to produce a clean exposed aggregate bonding surface.

   c. By roughening the surface of the concrete in proper manner, which will expose the aggregate uniformly and will not leave laitance, loosened particles of aggregate uniformly and will not leave laitance, loosened particles of aggregate or damaged concrete at the surface.

E. Expansion joints, Cleavage joints, Water stops and Embedded Items:

1. Expansion joints and cleavage joints: Expansion joints and cleavage joints shall not be less than ½ inch wide except as indicated otherwise. Expansion joints not exposed to weather shall be filled completely with preformed joint material conforming to ASTM D1752. Expansion joints exposed to weather and cleavage joints between vertical masonry surfaces and floor slabs laid on earth shall be filled to a depth of one inch from the surface or face of the concrete with preformed joint material conforming to ASTM D1751 or ASTM D1752. The one-inch deep space above the preformed material shall be cleaned after the concrete has been cured, and when dry, filled flush with joint sealing material. Reinforcement of other embedded metal items bonded to the concrete, except dowels in floors bonded on only one side of joint, shall not be permitted to extend continuously through any expansion joint.

2. Other embedded items: All sleeves, inserts, anchors and embedded items required for joining work or for its support shall be placed prior to concreting.

   All sub-contractors, whose work is related to the concrete or must be supported by it, shall be given sample notice and opportunity to introduce or furnish embedded items before the concrete is placed.

   All ferrous metal sleeves, inserts, anchors, and other embedded ferrous items exposed to the weather or where rust should impair the appearance or finish of the structure shall be galvanized.

3. Placing embedded items: Expansion joint material, water stops, and embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, insert and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids. Aluminum shall not be embedded in concrete except where aluminum is protected from directed contact

with the concrete.

2. Reinforcing bars: Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items, but not so as to impair design strengths of the members.

   If bars are moved more than one bar diameter, the resulting arrangement of bars shall be subject to the approval of the Architect.

F. Placing Concrete in Hot Weather: Placing concrete in hot weather shall be in accordance with ACI 305 except as modified herein. In hot weather, extra care shall be taken to reduce the temperature of the concrete being placed, and to prevent rapid drying of newly placed concrete. When the outdoor ambient temperature is more than 90 degrees F; the temperature of the concrete shall be placed not exceed 90 degrees F; the fresh concrete shall be shaded as soon as possible after placing and curing shall be started as soon as the surface of the fresh concrete is sufficiently hard to permit it without damage.

3.04 SURFACE FINISHES:

A. Repair of Surface defects: All surface defects including tie holes, minor honeycombing and otherwise defective concrete shall be repaired with cement

mortar. Cement mortar for patching shall be the same composition as that used in the concrete, except that for exposed surfaces part of the cement shall be white Portland cement to provide a finish floor matching the surrounding concrete.

Patching shall be done as soon as the forms are removed; areas of surfaces, which are to be cured with a curing compound, shall be covered during the application of the compound. All areas to be patched shall be cleaned thoroughly. Minor honeycombed or otherwise defective areas shall be cut out to solid concrete to a depth of not less than one inch.

The edges of the cut shall be perpendicular to the surface

of the concrete. The area to be patched and at least 6" adjacent thereto shall be saturated with water before placing and shall be remixed occasionally during this period with a trowel without the addition of water.

A grout of cement and water mixed to the consistency of paint shall then be brushed onto the surfaces to which the mortar is to be bonded. The mortar shall be compacted into place and screened slightly higher than the surrounding surface. Patches shall be cured as specified for the concrete. Holes extending through the concrete shall be filled by means of plunger type gun or other suitable device from the unexposed face. The excess mortar shall be wiped off the exposed face with a cloth. Finished surface shall be protected from stains and abrasions.

As cast finish against steel, plywood, forms and rubber finish shall be equal in workmanship, texture and general appearance to that of sample panels specified herein. Concrete with excessive honeycombing, which exposes the reinforcing steel or other defects, which affect the structural strength of the member, shall be rejected or the defects corrected as directed by the Architect, and at the expense of the contractor.

B. Finishing of Formed Surfaces: Finishing of formed surfaces shall be accomplished as soon as practicable after form removal and repair of surface defects. Finishing shall be accomplished as specified herein where indicated.

1. As Cast Finishes:

a. Smooth Form finish: The form facing material shall produce a smooth, hard, uniform texture on the concrete. Tie holes and defects shall be patched. All fins shall be completely removed.

b. Rough Form Finish: No selected form facing materials are required for rough form finish surfaces. Tie holes and defects shall be patched. Fins exceeding ¼ inch in height shall be chipped off or rubbed off. Otherwise,

surfaces shall be left with the texture imparted by the forms.

C. Un-indicated Finish: Finishes not indicated on the drawings shall be as follows:

1. Smooth Form Finish: For all concrete surfaces exposed to public view.

2. Rough Form Finish: For all concrete surfaces not exposed to public view.

3.05 FLOOR FINISHES:

A. General requirements: The finishes specified herein include surface finishes, treatments, and toppings for floors and slabs. For floors in which drains occur, special care shall be exercised to slope the floors uniformly to the drains.

In all areas where ceramic tile or quarry tile are to be laid, the concrete base slab shall be depressed as indicated to provide a finished floor at the same elevations as surrounding areas. All floor slabs where finish is not indicated or specified shall receive a single steel toweling. Dry cement shall not be placed directly upon the new concrete surface to absorb excess moisture.

B. Sample Panels: Sample panels shall be submitted as specified herein under “Submittals”.

D. Curing: Finished floor surfaces shall be cured adequately as specified herein. Colored-shake and metallic-aggregate surfaces shall be cured with liquid or wax membrane forming compounds as recommended by the manufacturer of the surfacing material.

1. Curing with Water: Moist or wet curing with water or by complete covering with waterproof membrane sheets shall be continuous for 7 days at temperatures of 60 degree F and above, and for longer periods at lower temperatures, as necessary.

E. Cleaning: Upon completion of the work, all concrete floors, except those having a sealer-hardener finish, shall be cleaned as follows: After sweeping with an ordinary broom to remove the loose dirt, the finish shall be wetted with soapsuds and rubbed with a scrubbing machine fitted with a wire brush or fine steel wool.

The suds shall be mopped up, and the surface shall be flushed with clean warm water, after which a final scrubbing by hand in lieu of machine scrubbing will

be permitted. Floors having sealer-hardener finish shall be cleaned of loose dirt and debris by sweeping with ordinary brooms or by other suitable method.

3.06 PROTECTION:

A. General requirements: Concrete shall be protected adequately from injurious action by sun, rain, flowing water and mechanical injury, and shall not be allowed to dry out from the time it is placed until the expiration of the minimum curing periods specified herein. Curing shall be accomplished by moist curing or by application of liquid chemical or liquid membrane forming compound, except as specified otherwise herein.

Membrane-forming compound shall not be used on surfaces for which special finish is specified, on any surface to painted, waterproofed, tiled, roofed or where coverings are to be bonded.

Completion of curing shall be initiated immediately following the removal of forms. The temperature of the air next to the concrete shall be maintained at not less than 40 degrees F. for the full curing periods. Heating of the concrete in place shall be affected by venters heaters or steam coils under canvas covers or by other suitable means.

The temperature within enclosures shall not exceed 100 degrees F, and adequate moisture shall be applied to the concrete surface during the heating period to prevent it from drying out.

The rate of cooling after the protection period shall be approximately on degree F per hour for the first 24 hours and 2 degrees F per hour thereafter. Concrete shall be protected against freezing for the full curing period specified herein.

B. Curing periods: When the 7-day compression test cylinders, representative of parts of a structure already placed, indicate that the 28-day strengths may be less than 90 percent of the design strengths, those parts of the structure shall be given additional curing, as directed by the Architect. Cast-in-place parts of a structure which will be permanently submerged in fresh water may be cured for not less than 12 hours, provided they are submerged immediately thereafter. Curing, except steam curing, shall be as follows:

Time (minimum) applicable)	Concrete Element (Where
7 days otherwise	all concrete not specified
10 days	Pavement not under cover

C. Removal of forms and protection: Forms shall be removed in a manner

which will prevent damage to the concrete. Forms shall not be removed without approval of the Architect, or before the expiration of the minimum periods specified herein.

	Days after placing
Side forms on beams, girders, columns, and walls (lifts 15 feet and under)	1
Forms for columns and walls (lifts over 15 feet)	2
Supporting forms for arches, beams, girders, and slabs	14

Sufficient shoring members to support dead load plus construction loads on beams, girders, slabs and arches shall be provided for a period of 8 days in addition to the 6 days specified herein. If curing temperatures are below 50

degrees F, the minimum time for removal of forms and shores shall be 50 percent greater than specified. The time for removal of forms for structures not included herein shall be as directed by the Architect. Concrete work shall be protected from damage during the construction.

3.07 MISCELLANEOUS CONSTRUCTION**:**

A. Concrete Lintels, Coping and Sills: Concrete lintels, coping and sills shall be either cast-in-place or pre-cast concrete. All exposed surfaces shall be smooth and true, with sharp edges

END OF SECTION

DIVISION 4 - MASONRY

SECTION 04200 - CONCRETE MASONRY UNIT

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Unit masonry work as indicated on the drawings and specified herein.

1.02 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extend referenced. The publication are referred to in the text by the basic designation only.

A. American Society for Testing and Materials (ASTM)

Publications: A82-79 Cold-Drawn Steel Wire for Concrete Reinforcement

A615-82	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C90-75 (R1981)	Hollow Load-Bearing Concrete Masonry Units
C129-75 (R1980)	Non-Load-Bearing Concrete Masonry Units
C144-81	Aggregate for Masonry Mortar
C150-81	Portland Cement
C270-80 (Rev. A)	Mortar for Unit Masonry
C476-90	Grout for Reinforced and Non-reinforced Masonry

1.03 SUBMITTALS: Meet the Applicable requirements of Section 01300.

A. Certified Test Reports: Submit certified efflorescence test

reports on masonry units and mortar that are to be exposed to weathering.

Schedule tests far enough in advance of starting masonry work to permit re-testing if necessary. Test five pairs of specimens of each type of

masonry unit for efflorescence in accordance with ASTM C 67. If any pair is rated “effloresced,” reject the units represented by the samples.

1.04 DELIVERY AND STORAGE: Deliver cementitious materials to the site in unbroken containers, plainly marked and labeled with manufacturer’s names and brands .

Store cementitious materials in dry, weather tight sheds or enclosures and handle so as to prevent entry of foreign materials and damage by water or dampness.
Store masonry units off the ground and handle with care to avoid chipping and breakage. Protect materials from damage and, except for sand, keep dry until used. Cover sand to prevent instrusion of water and foreign materials and to prevent drying. Do not use materials containing frost or ice.

PART 2 - PRODUCTS

2.01 CONCRETE MASONRY UNITS: Units of modular dimensions and air, water, or steam cured. Store Type II units at the site before use a minimum of 28 days for air cured units, 10 days for atmospheric steam or water cured units, and 3 days for units cured with steam at a pressure of 120 to 150 psi and at a temperature of 350 to 365 degrees for at least 5 hours. Surfaces of units which are to be plastered or stuccoed shall be sufficiently rough to provide a suitable bond; elsewhere, exposed surfaces of units shall be comparatively smooth and of uniform textures.

A. Hollow Load-Bearing units: ASTM C 90, Grade N-I or N-II, made with normal weight aggregate, Provide load-bearing units for all exterior walls, foundation walls, load-bearing walls, and shear walls.

B. Hollow Non-load-Bearing Units: ASTMC 129 , Type I or II, made with normal weight aggregate. Load-beating units may be

provided in lieu of non-load-bearing units.

2.02 MORTAR

A. Portland Cement: ASTMC 150, Type I or II.

B. Hydrated Lime: ASTMC 207, Type S.

C. Masonry Cement: ASTMC 91, except that for masonry cement used in a mortar for exterior walls, the air content of the mortar specimen shall be not more than 16% by volume in lieu of 22%. Container shall bear

complete instruction's for proportioning and mixing to obtain the required types of mortar.

D. Sand: ASTMC 144.

E. Water: Clean, potable and free from substances which could adversely affect the mortar.

F. Mortar Types: ASTMC 270, Type M for foundation walls; Type N or S for non-load-bearing; Type S for all other masonry work; except where higher compressive strength is indicated on structural drawings.

2.03 ACCESSORIES

A. Horizontal and vertical reinforcing bars: ASTMA 615.

PART 3 - EXECUTION

3.01 INSTALLATION: Coordinate masonry work with the work of other trades to accommodate built-in items to avoid cutting and patching. Do not change source of supply of materials after the work has started if the appearance of the finished work would be affected.

A. Protection:

1. Stains: protects exposed surfaces from mortar and other stain. When mortar joints are tooled, remove mortar from expose surfaces with fiber brushes and wooden paddles.

Protect base of walls from splash stains by covering adjacent ground with sand, saw dust or polyethylene.

2. Loads: Do not apply uniform loads for at least 12 hours or concentrated loads for at least 72 hours after masonry is constructed.

3. Provide temporary bracing as required to prevent damage during construction.

B. Workmanship: Carry masonry up level and plumb all around. Furnish and use story poles or gage rods throughout the work. Changes in coursing or bonding after the work is started will not be permitted. Do not carry one section of the walls is started will not be permitted. Do not carry one section of the walls up in advance of the others. Step back unfinished work for joining with new work.

Toothing will be not permitted. Check heights of masonry with an instrument at each floor and at sills and heads of openings to maintain the level of the walls. Build in door and window frames, louvered openings, anchors, pipes, ducts, and conduits carefully and neatly as the masonry work progresses. Fill spaces around metal door frames solidly with mortar. Handle masonry units with care to avoid chipping, cracking and spalling of faces and edges. Drilling, cutting, fitting and patching to accommodate the work of others shall be performed exposed work.

C. Mortar Mixing: Measure mortar materials in proper containers to maintain control and accuracy of proportions. Do not measure materials with shovels. Mix mortar in mechanical batch mixer for not less than 3 nor more than 5 minutes after all ingredients are in so as to produce a uniform mixture. Add water gradually as required to produce a workable consistency. Do not load mixer beyond its rated capacity. Keep mortar boxes, pans, and mixer drums clean and free of debris and dried mortar. Retemper mortar which has stiffened because of evaporation by adding water and mixing to obtain a workable consistency. Do not use or retemper mortar which has not been placed in final position within 2-1/2 hours after the initial mixing. Do not use anti-freeze compounds, salts, or any other substance to lower the freezing point of mortar.

END OF SECTION

DIVISION 5 - METALS

SECTION 05010 - MISCELLANEOUS METALS

PART 1 - GENERAL

1.01 SCOPE: Furnish material, equipment and perform labor required to complete:

A. Steel fasteners, plates, bolts, and anchorage

B. Other miscellaneous metals as indicated

See drawings for sizes, detail and location of work required.

C. carbon steel A36

1.02 RELATED WORK

A. Section 084000 – doors and windows

B. Section 09900 – Painting

C. concrete

1.03 QUALITY WORK:

A. Quality control provisions of General requirement apply to this section. Approvals except those field tests and applications shall be submitted for approval.

B. Use adequate numbers of skilled workers that are thoroughly trained and experienced.

PART 2 PRODUCTS

A. Mild steel angles, flat bars, square bars, channels, straps, brackets, dowels, frames, connectors, sheets and plates with thickness, shape, size and designed as indicated in the drawings.

B. Galvanized iron - plates, connectors and all other as indicated in the

drawing (conform to ASTM A123).

C. Bolts and Accessories - conforms to ASTM A307 and ASTM A323.

D. Aluminum - Aluminum by Reynolds or Hooven or approved equal, for doors and windows frames and as indicated in the drawings.

E. carbon steel A36

F. Wide flange steel for rafters

G. Stainless Steel: AISC, Type 304 for fumed and welded products; ASTM A 276 for base shapes and forging; ASTM A 167 or A 176, as best suited for plates sheets and strip. Satin finish typical.

PART 3 - EXECUTION

3.01 PREPARATION/INSTALLATION

A. Make all work-formed to shape and size shown and assembles as detailed.

B. Cut, sheer and punch to produce clean, true lines and surfaces with burrs removed.

C. Provide all work with proper clearances. Fabricate and install in a manner to provide for expansion and contraction but will ensure rigidity and provide close fitting of sections. Fabricate and install as directed by Manufacturer.

D. Conform the technique of welding employed, the appearance and quality of welds made, the method used in correcting defective work to the requirement of the Standard Code for welding.

E. Bolts - Tighten all bolts to a bolt tension not less than the proof load given in the applicable ASTM specifications for the type of bolt used.

F. Painting (Coating) - Clean all steel work of loose mill scale, loose rust, dirt and other foreign matter by wire brushing, or by sand blasting prior to painting.

Remove oil and grease deposits by solvent.

Apply two (2) coats of red oxide primer to all bare metals except

aluminum and stainless and other finish metal that are not intended to received painting.

Finish coat shall be applied as direct under Section 09900.

3.02 INSPECTION

A. Subject material and workmanship at all times to the inspection of the Architect or Constructing Office at place of fabrication and to all places of work.

B. Inspection of welding shall be performed in accordance with the provision of Section 6 of the Standard Code of Welding in Building Construction of the American Welding Society.

END OF SECTION

SECTION 092216 – NON- STRUCTURAL METAL

FRAMING PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-Structural steel framing systems for interior partitions.

B. Related Requirements:

1. Section 09250 – gypsum and cement board
2. Section 05520 – non structural framing system

2.2 SUBMITTALS

A. Product Data: For each type of product.
Retain "Studs and Runners" Subparagraph below for third-party verification of products. SFIA's program certifies that studs and runners comply with the IBC, ASTM C 645, AISI S100, and AISI S220. Mechanical properties, coatings, dimensions, and labeling are checked.

1. Studs and Runners: Provide documentation that framing members' certification is according to SFIA's "Code Compliance Certification Program for Cold-Formed Steel Structural and Non-Structural Framing Members".

B. Manufacturers' height limiting tables indicating products provided.

C. Evaluation Reports: Submit evaluation reports certified under an independent third party inspection program administered by an agency accredited by IAS to ICC-ES AC98, IAS Accreditation Criteria for Inspection Agencies.

D. The Collective Voice of America's Steel Framing Industry The Steel Framing Industry Association (SFIA) is dedicated to expanding the market for cold-formed steel in construction through programs and initiatives that Promote the use of cold formed steel framing as a sustainable and cost-effective solution, Advocate the development and acceptance of favorable code provisions, Educate members with reliable data and other critical information that is essential to effective business planning, and create a positive environment for Innovation.

E. Manufacturer's Certification: Submit manufacturer's certification of product compliance with codes and standards along with product literature and data sheets for specified products.

F. Sustainable Design Submittals:

1. Product Data for Credit MR 4.1 [and Credit MR 4.2]: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

2. Product Data for Credit MR 2.1 [and Credit MR 2.2]: For products diverted from disposal in landfills and incinerators, and where recycled resources are directed back to the manufacturing process. Include statement indicating percentage of materials diverted and recycled, and the costs associated with each.

3. Product Data for Credit MR 5: For products where product manufacturing is within a 500 mile radius of the jobsite and the point of extraction of the raw materials. Include a statement indicating the location and distances for the manufacturing plant and the point of extraction of raw materials in relation to the jobsite location.

1.3 QUALITY ASSURANCE

A. Provide certification of code compliance with the “Code Compliance Certification Program” implemented by the Steel Framing Industry Association (SFIA).

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate nonstructural steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by, and displaying a classification label from, an independent testing agency acceptable to the authority having jurisdiction.

1. Construct fire-resistance rated partitions in compliance with tested assembly requirements [indicated on drawings].

2. Rated assemblies to be substantiated from applicable testing using proposed

products, by Contractor.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Horizontal Deflection: For wall assemblies, limited to [1/240] [1/360] of the wall height based on horizontal loading of [5 lbf/sq. ft. (239 Pa)] [10 lbf/sq. ft. (480 Pa)].

D. Design framing systems in accordance with American Iron and Steel Institute Publication S220 “North American Specification for the Design of Cold-Formed Steel Framing – Non- Structural Members”, except as otherwise shown or specified.

E. Design loads: As indicated on the Architectural Drawings or 5 PSF minimum as required by the International Building Code.

F. Design framing systems to accommodate deflection of primary building structure and construction tolerances and to withstand design loads with a maximum deflection of inches.

2.2 FRAMING SYSTEMS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Framing Members, General:

1. Protective Coating: Comply with ASTM C 645. Coatings shall have a protective coating meeting the requirements of ASTM A653/A653M, G40, or shall have a protective coating with an equivalent corrosion resistance.

a. Coatings providing equivalent corrosion resistance to a G40 shall demonstrate equivalent corrosion resistance with an evaluation report acceptable to the authority having jurisdiction.

C. Studs and Runners: Comply with manufacturers’ for conditions indicated.

1. Steel Studs and Runners: ASTM C 645.

a. Minimum Base-Steel Thickness: indicated in the physical properties table of the submitted manufacturers literature, and cross referenced with the

appropriate height determination table to meet required performance.

b. Depth: As Specified on the Architectural Drawings, and cross referenced with the appropriate height determination table to meet required performance.

D. Slip-Type Head Joints: Where indicated, provide [one of] the following:

1. Single Long-Leg Runner System: top runner with 2-inch deep flanges (or as required) in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.

2. Double-Runner System: top runners, inside runner with 2-inch deep flanges (or as required) in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.

3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

E. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

F. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated. 1. Minimum Base-Steel Thickness: As indicated on Drawings.

G. U-Channel Bridging: Steel, 0.054-inch minimum base-steel thickness, with minimum 1/2- inch wide flanges. 1. Depth: As indicated on Drawings. 2. Clip Angle: Not less than 1-1/2 by 1- 1/2 inches, 0.0538-inch thick, galvanized steel.

H. Hat-Shaped, Rigid Furring Channels: ASTM C 645. 1. Minimum Base-Steel Thickness: [0.018 inch] [0.0296 inch]. 2. Depth: [7/8 inch] [1-1/2 inches].

I. Resilient Furring Channels: 1/2-inch deep, steel sheet members designed to reduce sound transmission.

J. Carrying Channels: 0.054-inch uncoated-steel thickness, with minimum 1/2-inch wide flanges.

1. Depth: 3/4 inch.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.0296 inch.
3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch diameter wire, or double strand of 0.048-inch diameter wire.

K. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-steel thickness of 0.018 inch, and depth required to fit insulation thickness indicated.

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards. 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide the following: 1. Foam Gasket: Adhesive- backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow- metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates, zfurring members, or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous

plates fastened to building structure not more than 24 inches o.c.

2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage. Repair or replace any fire-resistive materials as required.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C754.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-structural steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: [16 inches] [24 inches] o.c. unless otherwise indicated.
2. Multilayer Application: [16 inches] [24 inches] o.c. unless otherwise indicated.
3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at or above suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.

2. Door Openings: Securely fasten vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs. Fasteners shall not exceed height from face of framing members more than specified in ASTM C840.

a. Install two studs at each jamb unless a framing member has been specifically engineered for the jamb.
b. Extend jamb studs through suspended ceilings and attach to underside of overhead structure if suspended ceiling system cannot withstand forces imposed by door swings.
c. If jamb studs cannot be attached to the overhead structure, the Design Professional should be consulted for bracing design.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance- rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

a. Firestop Track: Where indicated, install to maintain continuity of fire- resistancerated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

6. Curved Partitions:

a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c. (or as required).

E. Direct Furring:

1. Screw to wood framing.

2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Furring Members:

1. Erect insulation, specified in Section 07210 "Building Insulation," vertically and hold in place with Z-furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

G. Installation Tolerance: Install framing members plumb within ¼ inch in 10 ft-0 in.

H. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION

SECTION 05800 EXPANSION CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior expansion joint sealing systems at junctures of buildings above and below grade.

2. Interior expansion joint cover assemblies.

3. Fire-rated joint sealing assemblies.

4. Pre-molded joint fillers.

5. Roof expansion joints.

6. Accessories.

B. Related Documents: The Contract Documents, as defined in Section 01010 - Summary of Work, apply to the work of this Section. Additional requirements and information necessary to complete the work of this Section may be found in other Documents.

C. Related Sections:

1. Section 03300 - Cast-In-Place Concrete: Substrate for attachment.

2. Section 07920 - Joint Sealers: Caulking and sealants.

1.2 DESCRIPTION OF WORK

A. The extent of the expansion control work is indicated on the Drawings and as specified herein, and includes providing and installing expansion and contraction joints and accessories required for complete systems installation.

1.3 REFERENCES

A. The publications listed below form a part of this Specification to the extent referenced. Publications are referred to in the text by basic designation only.

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

1. ASTM A 167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

2. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods. Wire, Shapes and Tubes.

3. ASTM C 920 - Standard Specifications for Elastomeric Joint Sealants.

4. ASTM E 1399 - Standard Test Methods for Cyclic Movement and Measuring the Minimum Joint Widths of Architectural Systems.

C. American Iron and Steel Institute (AISI).

D. International Code Council:

1. International Building Code (IBC), 2009.

E. Copper Development Association (CDA).

F. Federal Specifications (FS):

1. FS TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant.

G. National Association of Architectural Metal Manufacturers (NAAMM).

1.4 SUBMITTALS

A. Section 01330 - Submittal Procedures: Procedures for submittals.

1. Product Data: Manufacturer's product specifications, installation instructions and general recommendations for each specified material and fabricated product.

2. Shop Drawings: Indicate layout, joining, profiles, and anchorages of expansion and contraction joint products.

3. Samples: 8" long samples of the specified materials to be exposed as finished surfaces, when requested.

4. Assurance / Control Submittals:

a. Manufacturer's certificate that the products meet or exceed the specified requirements.

b. Documentation of experience indicating compliance with the specified qualifications requirements.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain all expansion joint cover assemblies from a single manufacturer.

B. Coordinate compatibility with expansion joint cover assemblies specified in other Sections.

C. Fire-Test-Response Characteristics: Where indicated, provide expansion joint cover assemblies whose fire resistance has been determined per ANSI / UL 263, NFPA 251, UBC 43-1 or ASTM E 119, including hose stream test of vertical wall assemblies, by a nationally recognized testing and inspecting agency acceptable to the government authorities having jurisdiction.

1. Fire-Resistance Rating: Not less than the rating of the adjacent construction.

D. Qualifications:

1. Manufacturer: Company specializing in fabricating the products specified with a minimum of five (5) years documented experience.

2. Installer: Company experienced in performing the work of this Section with a minimum of five (5) years documented experience.

E. Performance Requirements:

1. Design and install to withstand the following loading requirements, where applicable:

a. Design, fabricate and install to resist combined positive and negative windloading in accordance with IBC 2009, Section 1609 with a Vmph of 170, qs of 74.0 psf, exposure [B] [C] [D] and importance factor [1.0] [1.25] [1.5], as applicable per ASCE 7.

b. In no case shall the combined loading be less than 75 psf.

c. Comply with requirements of the applicable Building Code, if more stringent than the requirements stated above.

F. Section 01780 - Closeout Submittals: Procedures for closeout submittals.

1. Warranty: Submit a written Warranty with forms completed in the name of the Owner and registered with the manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

A. Section 01600 - Product Requirements: Transport, handle, store, and protect the products.

B. Deliver products to the Project Site in the manufacturer=s original, unopened protective packaging.

C. Stack the materials to prevent twisting, bending and abrasion. Slope metal sheets to ensure drainage. Provide ventilation.

D. Prevent contact with materials which may cause corrosion or discoloration.

1.7 JOB CONDITIONS

A. Coordinate the work of this Section with interfacing and adjoining work for the proper sequencing of each installation. Ensure the best possible weather resistance, appearance and durability of the work, and protection of the materials and finishes.

1.8 WARRANTY

A. Section 01780 - Closeout Submittals: Procedures for closeout submittals.

B. Special Warranty:

1. Provide a written Warranty jointly signed by the manufacturer and the installer certifying that the products and the installation is free of defective materials and workmanship and will replace or repair any defective component or the system, in whole or in part, as necessary to provide an installation meeting its intended purpose and integrity.

2. Warranty Period: One (1) year for labor, materials and installation; two (2) years against leaks from the date of Substantial Completion.

2.1 MATERIALS

A. Aluminum: ASTM B 221, alloy 6063-T5 for extrusions; ASTM B 209, alloy 6061-T6 for sheet and plates.

1. Protect aluminum surfaces to be placed in contact with cementitious materials with a protective coating.

B. Bronze: ASTM B 455, alloy C38500 for extrusions; alloy C28000 Muntz Metal for plates.

C. Brass: UNS alloy C26000 for half hard sheet and coil.

D. Stainless Steel: ASTM A 167, Type 304 with non-slip finish, unless indicated otherwise, for plates, sheets, and strips. Finish as selected from the manufacturer=s standards..

E. Extruded Preformed Seals: Single or multicellular elastomeric profiles as classified under ASTM D 2000, designed with or without continuous, longitudinal, internal baffles. Formed to fit compatible frames. Color as selected from the manufacturer=s standards.

F. Preformed Sealant: Manufacturer's standard elastomeric sealant complying with ASTM C 920, Use AT@, factory-formed and bonded to metal frames or anchor members. Color as selected from the manufacturer's standards.

1. Joints 2" Wide and Less: Withstand plus or minus 35% movement of the joint width without failure.

2. Joints 2" to 4" Wide: Withstand plus or minus 50% movement of the joint width without failure.

G. Seismic Seals: Typical for exterior applications; two single-layered elastomeric profiles, one interior and one exterior, as classified under ASTM D 2000; retained in a set of compatible frames. Color as selected from the manufacturer=s standards.

H. Fire Barriers: Designed for the indicated or required dynamic structural movement without material degradation or fatigue when tested in accordance with ASTM E 1399. Tested in maximum joint width condition with a field splice as a component of an expansion joint cover per ANSI / UL 263, NFPA 251, UBC 43-1, or ASTM E 119, including hose stream test

of vertical wall assemblies by a nationally recognized testing and inspection agency acceptable to the government authorities having jurisdiction.

I. Accessories: Manufacturer's standard anchors, fasteners, set screws, spacers, flexible moisture barriers and filler materials, drain tubes, lubricants, adhesive, and other accessories compatible with the material in contact, as indicated or as required for a complete installation.

2.2 EXPANSION JOINT COVER ASSEMBLIES

A. General: Provide expansion joint cover assemblies of the design, basic profile, materials, and operation indicated. Provide units comparable to those indicated or as required to accommodate the joint size, variations in adjacent surfaces, and dynamic structural movement without material degradation or fatigue when tested in accordance with ASTM E 1399. Furnish units in the longest practicable lengths to minimize the number of end joints. Provide hairline mitered corners where joints change directions or abuts other materials. Include closure materials and transition pieces, tee-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous joint cover assemblies.

B. Moisture Barrier: Provide manufacturer's continuous, standard, flexible vinyl moisture barrier under covers at roofs, exterior walls and locations indicated.

C. Fire-Rated Joint Covers: Proved expansion joint cover assemblies with manufacturer=s standard continuous flexible fire barrier seals under covers at locations indicated, to provide a fire-resistive rating not less than the rating of the adjacent construction.

D. Coverless Fire Barrier: Provide manufacturer=s standard continuous flexible fire barrier seals at locations indicated, to provide a fire-resistive rating not less than the rating of the adjacent construction.

E. Metal Floor-to-Floor Joint Cover Assemblies: Provide continuous extruded metal frames of the profile indicated with seating surface and raised floor rim or exposed trim strip to accommodate the flooring and concealed bolt and anchors embedded in concrete. Provide assemblies formed to receive cover plates of the design indicated and to receive filler materials, if any, between the raised rim of the frame and edge of the plate. Furnish depth and configuration to suit the type of construction and to produce a continuous non-slip wearing surface flush with the adjoining finish floor surface.

1. Partially Concealed Cover: Provide one frame on each side of the joint, designed to accommodated the manufacturer=s floor cover plate and filler.

2. Exposed Cover: Provide one frame on each side of the joint, designed to support the floor plate and filler.

3. Flat Cover Plates: Provide cover plates of the profile and wearing surface indicated. Extend flat plates to lap each side of the joint.

a. Filler Insert: Furnish abrasive-resistant flexible gasket filler between the edge of the cover plate and the raised rim of the frame to accommodate the required movement.

4. Fixed Cover Plates: Attach one side of the cover plate to a frame or finished wearing surface with the other side resting on the other frame or finished wearing surface to allow free movement.

5. Self-Centering Cover Plates: Concealed centering device with the cover plate secured in or on top of the frames so as to have free movement on both sides.

6. Floor Cover Plate Wearing Surfaces: Provide cover plates with the following type of wearing surface:

    a. [Plain.]

    b. [Fluted.]

    c. [Recessed to receive full thickness of the flooring material.]

    d. [Abrasive plate.]

    e. [Adhesive filled plate.]

    f. [Adhesive strip plate.]

7. Ceiling infill, if required, as detailed.

F. Floor-to-Wall Joints: Provide one frame on the floor side of the joint only. Provide wall side frame where required by the manufacturer=s design.

1. Angle Cover Plates: Attach angle cover plates for floor-to-wall joints to the wall with countersunk, flat-head exposed fasteners secured to drilled-in-place anchor shields, unless otherwise indicated, at the spacing recommended by the joint cover manufacturer.

G. Metal Wall Joint Cover Assemblies: Provide continuous extruded metal frames of the profile indicated. Concealed anchors embedded in concrete. Provide assemblies formed to receive cover plates of the design indicated.

1. Cover plates: Provide cover plates of the profile indicated. Extend plate to lap each side of the joint. L000-82-11 and 000-92-11 by Architectural Art Manufacturing or approved equal.

H. Wall, Ceiling and Soffit Joint Cover Assemblies: Provide interior wall and ceiling expansion joint cover assemblies of the same design and appearance. Provide exterior wall and soffit expansion joint cover assemblies of the same design and appearance. Provide wall expansion joint cover assemblies compatible with the floor expansion joint cover assemblies design and appearance.

1. Fixed Metal Cover Plates: Provide a concealed, continuously anchored frame fastened to the wall, ceiling, or soffit only on one side of the joint. Extend the cover to lap each side of the joint to permit free movement on one side. Attach the cover to the frame with the cover in close contact with adjacent finish surfaces.

2. Floating Metal Cover Plates: Cover plate secured in or on top of the frames to

permit free movement on both sides.

3. Self-Centering Cover Plates: Concealed centering device with the cover plate secured in or on top of the frame to permit free movement on both sides.

4. Flexible Filler: Secure the approved flexible filler between the frames to compress and expand with movement.

I. Joint Cover Assemblies with Preformed Seals: Provide joint cover assemblies consisting of continuously anchored aluminum extrusions and continuous extruded preformed seals of the profile indicated or as required to suit the types of installation conditions shown. Furnish extrusions designed to be embedded in or attached to concrete with lugs. Vulcanize or heat-weld splice, if any, to ensure hermetic joint conditions.

1. Cover Plate: Include extruded aluminum cover plate fastened to one side of the joint and extend the plate to lap each side of the joint to permit free movement with the cover in close contact with the adjacent surfaces.

J. Joint Cover Assemblies with Elastomeric Sealant: Provide continuous joint cover assemblies consisting of elastomeric sealant, factory-bonded to extruded aluminum frames of the profile indicated or required to suit the types of installation conditions shown. Provide frames for floor joints with means for embedding in or anchoring to concrete without using exposed fasteners and that will result in exposed surfaces of sealant and aluminum frames finishing flush with adjacent finished floor surfaces without exposing the anchors.

K. Compression Seals: Preformed, elastomeric extrusions having an internal baffle system in sized and profiles shown or as recommended by the manufacturer. Provide lubricant and adhesive for installation as recommended by the manufacturer.

L. Foam Seal: Non-extruded, low-density, cross-linked, nitrogen-blown ethylene vinyl acetate polyethylene copolymer foam; Evazote 380 E.S.P. by Royston or approved equal. Provide adhesive for the installation as recommended by the manufacturer.

2.3 METAL FINISHES

A. General: Comply with NAAMM, AMetal Finishes Manual@ for finish designations and application recommendations, except as otherwise indicated. Apply finishes to products in the factory after fabrication. Protect finishes on exposed surfaces before shipment.

B. Aluminum Finishes: Medium Bronze, Anodized.

C. Bronze Finish: Comply with NAAMM, AMetal Finishes Manual@ for recommendations relative to application and designations for finishes.

D. Natural Satin Finish: CDA Designation M32, mechanical finish, directional textured, medium satin.

E. Stainless Steel Finishes: Comply with NAAMM, AMetal Finishes Manual@ for recommendations relative to application and designations of finishes.

1. [Bright, Cold-Rolled Unpolished Finish: AISI, No. 2B finish.]

2. [Bright, Directional Polish: AISI, No. 3 finish.]

F. Factory Finish: Manufacturer=s standard factory finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01700 - Execution Requirements: Verification of existing conditions before starting the work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive the work.

1. Verify that roofing terminations and base flashings are in place, sealed, and secure.

C. Report in, writing, prevailing conditions that will adversely affect satisfactory execution of the work of this Section. Do not proceed with the work until the unsatisfactory conditions have been corrected.

3.2 PREPARATION

. Manufacturer's Instructions: In addition to the requirements herein, comply with the manufacturer's instructions and recommendations for the phases of work, including the preparation of substrates, application ofmaterials, and protection of the installed work.

B. Coordinate and furnish anchorages, setting drawings, templates, and instructions for the installation of expansion joint cover assemblies to be embedded in or anchored to concrete or to have recesses formed into the edges of concrete slabs for later placement and grouting-in of frames.

C. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary to secure expansion joint cover assemblies to in-place construction, including threaded fasteners with drilled-in expansion shields for masonry and concrete where anchoring members are not embedded in concrete. Provide fasteners of metal, type and size to suit the type of construction indicated and to provide for the secure attachment of expansion joint cover assemblies.

3.3 INSTALLATION

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting as required to install expansion joint covers. Install joint cover assemblies in true alignment and in proper relationship to the expansion joints and adjoining finished surfaces, measured from established lines and levels. Allow adequate free movement for thermal expansion and contraction of the metal to avoid buckling. Set floor covers at elevations to be flush with adjacent finished floor materials. Locate wall, ceiling and soffit covers in continuous contact with adjacent surfaces. Securely attach in place with the required accessories. Locate anchors at intervals recommended by the manufacturer, but not less than 3" from each end and at not more than 24" on center.

B. Continuity: Maintain continuity of the expansion joint cover assemblies with a minimum number of end joints. Align metal members mechanically using splice joints. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of the metal to avoid buckling of the frames. Adhere flexible filler materials, if any, to the frames with adhesive or pressure-sensitive tape as recommended by the manufacturer.

C. Extruded Preformed Seals: Install seals complying with the manufacturer=s instructions and with a minimum number of end joints. For straight sections, provide preformed seals in continuous lengths. Vulcanize or heat-weld field splice joints in preformed seal material to provide watertight joints using procedures recommended by the manufacturer. Apply adhesive, epoxy, or lubricant-adhesive approved by the manufacturer to both frame interfaces before installing the preformed seal. Seal transitions according to the manufacturer=s instructions.

D. Elastomeric Sealant Joint Assemblies: Seal end joints within continuous runs and joints at transitions according to the manufacturer's directions, to provide a watertight installation.

E. Seismic Seals: Install interior seals in continuous lengths; vulcanize or heat-weld field splice joints in interior seal material to provide watertight joints using the manufacturer=s recommended procedures. Install exterior seals in standard lengths. Seal transitions and end joints in accordance with the manufacturer=s instructions.

F. Moisture Barriers: Install moisture gutters with a tight fit and sealed ends. Drain as required.

G. Fire Barriers: Install fire barriers, including transitions and end joints, according to the manufacturer=s instructions so that the adjacent fire-rated construction is continuous.

3.4 ISOLATION REQUIREMENTS

A. Wood Contact: Isolate from cedar, redwood, oak and acid-treated lumber with an unbroken 6-mil polyethylene construction sheet or a heavy coating of metal-protective paint.

B. Aluminum Surfaces: Shall not directly contact other metals except stainless steel, zinc, or zinc coated. Where aluminum contacts another metal, paint the dissimilar metal with a primer followed by two coats of aluminum paint. Where drainage from a dissimilar metal passes over aluminum, paint the dissimilar metal with a non-lead pigmented paint.

C. Metal Surfaces: Paint where in contact with mortar, concrete, or masonry materials with an alkali-resistant coating such as heavy-bodied bituminous paint.

3.5 REPAIRS TO FINISH

A. Scratches, Abrasions and Minor Surface Defects: May be repaired in accordance with the manufacturer=s printed instructions. Replace items which cannot be repaired to the satisfaction of the Owner=s representative.

3.6 FIELD QUALITY CONTROL

A. Section 01450 - Quality Control: Field testing and inspection.

B. Inspect the floor slab, roof slab and wall construction, alignment and attachment to the structure.

3.7 CLEANING

A. Section 01700 - Execution Requirements: Cleaning the installed work.

B. Do not remove protective coverings until the finish work in adjacent areas is complete.

When the protective coverings are removed, clean the exposed metal surfaces in compliance with the manufacturer's instructions.

C. Remove substances which might cause corrosion of metal or deterioration of finishes.

3.8 PROTECTION

A. The installer shall advise the Contractor of required procedures for surveillance and protection of the work during construction to ensure that all work will be without damage or deterioration at the time of Substantial Completion.

END OF SECTION

DIVISION 6 - WOOD AND PLASTICS
SECTION 06100 - ROUGH CARPENTRY

1.01 SCOPE

A. Furnish all materials, tools, equipment, and supervision and perform the labor required to complete:

1. Form works and wooden framing

1.02 DELIVERY AND STORAGE

A. Materials shall be delivered to the site in an undamaged condition. Material shall be carefully stored off the ground to provide proper ventilation, drainage and protection against dampness. The Contractor at no expense to the Owner shall replace materials, which are defective and or damaged.

1.03 PROTECTION:

A. Protect all lumber from element.
B. Provide and maintain temporary protection of the work as required to safeguard completed work during the progress of the construction.
C. Provide all the necessary rough stair, ladder, and runway, for convenient access to all parts of the building until other permanent facilities are in place.

PART 2 - PRODUCTS

2.01 MATERIAL

A. Lumber - unless otherwise specified each piece of framing and board lumber, or each bundle of small pieces of lumber, shall be identified by the grade mark of a recognized association or independent INSPECTION AGENCY USING SPECIFIC GRADING requirements of the association recognized as covering the species used.

B. Structural lumber shall be any of the species and grade listed in NFPA National Design Specification for stress not less than 1700. Structural lumber shall be used for studs, jambs and joist and other members.

2.02 SIZES AND SURFACING

A. Sizes and surfacing of lumber shall conform to PS20 for dressed sizes of yard and structural lumber. All lumber shall be surfaced four sides. Sizes of framing lumber and board indicated on the drawings and specified herein given by nominal sizes, unless otherwise specified or indicated.

B. Moisture Content - The moisture content of lumber at the time of delivery to the job site shall be 18 percent maximum.

PART 3 - EXECUTION

3.01 INSTALLATION:

Framing lumber and other rough carpentry shall be fitted closely, set frame accurately to the required lines and levels, and secure rigidly in place. Framing members shall be spliced between bearing points.

All lumber and plywood shall be treated with wolmanized preservative, pressure treated or approved equal.

END OF SECTION

SECTION 06200 - FINISH CARPENTRY

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Finish carpentry.

B. Installation of finishing hardware and metal and specialty items not normally installed by other trades.

1.02 RELATED WORK

A. Section 06100 - Rough Carpentry

1.03 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. Federal Publications (Fed. Spec.):

FF-B-588C & Am 1	Bolt, toggle, and expansion sleeve, screw
FF-N-105B & Am 4	Nails, brads, staples and spikes: Wire, cut and wrought
FF-S-111D	Screw, wood
FF-S-325 & Am 3	Shield, expansion, nail, drive screw (devices, anchoring, masonry)
FF-T-1813	Tack

B. U.S. Department of Commerce, Product Standards (PS):

1-74	Construction and Industrial Plywood
20-70 & Am 1	American softwood lumber standard

C. U.S. Department of Commerce Commercial Standard (CS):

236-66	Mat-formed wood particle board (interior use)

D. American Wood Preserver's Bureau (AWPB) Publications:

LP-2 (July 1975)	Standard for softwood lumber, timber and plywood pressure treated with water-born preservatives for above ground use
LP-4	Standard for softwood lumber, timber and plywood pressure treated with volatile petroleum solvent (LPG) pental solution for above ground use

E. National Woodwork Manufacturers Association (NWMA) Publication:

I.S. 4-70 & Addendum	Water repellant preservative non-pressure treatment for millwork

F. Redwood Inspection Service (RIS) Publication:

Standard specifications for grades of California Redwood lumber (1978 edition)

G. West Coast Lumber Inspection Bureau (WCLIB) Publications:

Standard Grading and Dressing Rules for west coast lumber (1976 edition)

H. Western Wood Products Association (WWPA) Publication:

Grading Rules for Western Lumber (1979 Edition)

1.04 SUBMITTALS: Meet the Applicable requirements of Section 01300.

A. Shop drawings: Submit shop drawings and cuts for pre-fabricated items. Include details and erection data associated with the work of other trades; materials and species; sizes of parts; construction; fastenings and clearances.

B. Certificates of Grade: Submit certificates on graded but unmarked

lumber for plywood (unmarked for reasons of appearance) attesting that these materials meet the grade requirement specified herein.

The acceptance of certificates shall in no case jeopardize the owner's right to have lumber or plywood graded by an independent inspection agency when deemed necessary to assure compliance.

1.05 DELIVERY AND STORAGE:

A. Meet applicable requirements of Section 01600.

B. Stack materials to insure proper ventilation and drainage and protect against dampness before and after delivery. Store materials under cover in a well- ventilated enclosure and protect against extreme changes in temperature and humidity.

C. Do not store materials in the building until concrete, masonry and plaster are dry.

1.06 GRADEMARKING

A. Lumber: Each piece for each bundle shall be identified by the grade mark of a recognized association or independent inspection agency that specializes in the particular species used. The Board of Review, American Lumber Standards Committee, to grade to species used, shall certify such association or independent inspection agency.

B. Plywood: Each sheet of plywood shall bear the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood. The mark for softwood plywood shall identify the plywood by species group or identification index, and shall show glue type, grade and compliance with US Department of Commerce PS 1.

1.07 OTHER QUALITY MARKING

A. Lumber and Plywood Specified or Indicated to be pressure-treated: Label each piece with a permanent mark-indicating conformance with the applicable AWPB standard. The label shall be an AWPB approved quality mark or the mark of an independent inspection agency that maintains continuing control, testing, and inspection over the quality of

the product.

B. Woodwork and Millwork specified or indicated to be non-pressure treated: Mark, stamp, or label, indicating compliance with NWMA 1.S.4.

1.08 SIZES AND PATTERNS OF WOOD PRODUCTS:

Yard and board lumber sizes shall conform to US Department of Commerce PS 20. Except, as indicated or specified otherwise, sizes are nominal. Provide shaped lumber and millwork in the patterns indicated and which conform to standard patterns of the association recognized as covering the species used.

Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced.

1.09 MOISTURE CONTENT OF WOOD PRODUCTS: Air-dry or kiln-dry lumber. The maximum moisture content of wood products at time of delivery to the job site shall be as follows:

A. Interior finish lumber, trim and millwork 1-1/4 inch or less on nominal thickness: 12 percent on 85 percent of the pieces and 15 percent on remainder.

B. Exterior treated or untreated finishes lumber and trim 4-inch or less in nominal thickness: 15 percent.

C. Moisture content of other materials shall be in accordance with the standards under which the products are produced.

1.10 PRESERVATIVE TREATMENT OF WOOD PRODUCTS

A. Non-pressure Treatment: Preservative treat woodwork and millwork, such as exterior trim, door trim, and thresholds, in accordance with NWMA I.S. 4. Provide a liberal brush coat of preservative treatment to field cuts or holes.

B. Pressure Treatment: Pressure treat lumber and plywood such a fascia boards, soffits, wood posts, porches, or wood members in contact with masonry or concrete in accordance with AWPB LP-2 or AWPB LP-4. Items of all-heart material of cedar, cypress, or redwood will not require preservative treatment, except if they are in direct contact with soil. Provide a liberal brush coat of preservative treatment to field cuts or

holes.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Wood

1. Wood for finish: Provide species and grades indicated for materials to be paint finished. Materials that are to be stain, natural, or transparent finished shall be one grade higher than that listed in accordance with the respective grading association. Provide only species indicated for materials to be stain, natural, or transparent finished. Provide species and grades in accordance with Table I.

Table I. Grades for Wood to Receive Paint Finish

Grading Rules	Species	Exterior and Interior Trim
WWPA Standard grading rules	Douglas Fir-Larch Douglas Fir-South Engelmann Spruce-Lodgepole pine Engelmann Spruce- Hem Fir Idaho White pine Lodgepole pine Mountain hemlock Mountain hemlock-Hem Fir Ponderosa pine-Lodgepole pine Subalpine fir White woods Western woods Western Cedars	All species: C-select except A for western Red cedar and choice for Idaho white pine

	Western Hemlock Douglas Fir-Larch Hem Fir Mountain Hemlock Sitka spruce Western cedars Western Hemlock	All species: C & Btr VG, except A for Western Red Cedar

B. Softwood Plywood: US Department of Commerce PS 1. Interior type, A-B and B-B grade, any species group.

C. Particle board: US Department of Commerce CS 236.

D. Hardware: Provide sizes, types, and spacing of manufactured building materials recommended by the product manufacturer except as otherwise indicated or specified. Provide hot-dipped galvanized steel or aluminum nails and fastenings where used on the exterior or exposed to the weather.

1. Expansion Shields: Fed. Spec. FF-S-325. Except as shown otherwise, maximum size of devices in Groups IV, V, VI and VIII shall be 3/8 inch.

2. Toggle bolts: Fed. Spec. FF-B-588.

3. Wood screws: Fed. Spec. FF-S-111.

4. Wire Nails and Staples: Fed. Spec. FF-N-105.

5. Tacks: Fed. Spec. FF-T-1813.

E. Insect screen (eave vents): Copper, 18x14 mesh.

PART 3 - EXECUTION

3.01 INSPECTION: Examine the substrates and conditions under which work of this section will be performed. Do not proceed until unsatisfactory conditions detrimental to timely and proper completion of the work have been corrected.

3.02 INSTALLATION

A. General Finish Work: Provide sizes, materials, land designs as indicated or as specified herein. Where practicable, shop assembles finish items. Joints shall be tight and constructed in a manner that will conceal shrinkage. Miter trim and moldings at exterior angles and cope at interior angles and at returns. Material shall show no excessive warp. Install trim in the maximum practical lengths. Fasten finish work with finish nails. Provide blind nailing where practicable. Set face nails for putty stopping.

1. Exterior Finish Work: Machine sand exposed flat members and square edges. Machine finish semi-exposed surfaces. Construct joints to exclude water.

In addition to nailing, glue joints of built-up items as necessary, for weather-resistant construction. Provide well-distributed end joints in built-up members. Shoulder joints in flat work. Hold back of wide- faced miters together with metal rings and glue. Fascias and other flat members, unless otherwise indicated, shall be ¾ inch thick. Provide door and window trim in single lengths. Provide braced, blocked, and rigidly anchored cornices for support and protection of vertical joints. Before installation of exterior finish materials, prime surfaces in accordance with Section 09900-Painting.

2. Interior Finish Work: Machine sand exposed surfaces at the mill. After installation, sand exposed surfaces smooth. Provide window and door trim in single lengths. Before installation of interior finish materials, prime surfaces in accordance with Section 09900-Painting.

3.03 INSTALLATION OF ITEMS SPECIFIED IN OTHER SECTIONS:

A. Wood Door: Hang wood doors in frames specified in Section 08100. Fit and hang doors accurately and free from hinge bind with uniform clearance of 1/16 inch at heads and jambs. Allow ¼ inch clearance between top of floor covering and bottom of door. Verify exact degree of undercutting with samples of floor coverings to be used before installation of doors.

B. Finish Hardware:

1. Install finish hardware in accordance with the best standard practice.

2. Install hardware for labeled doors in strict accordance with manufacturers and UL requirements.

3. After fitting, remove all hardware except butt. Store until painting is complete. Refit at completion.

4. Adjust moving parts to operate free and easy without binding. Hardware shall be in perfect working order and keys tagged on delivery to Owner.

C. Specialties: Install metal and specialty items indicated in accordance with recommended by the manufacturer's printed instruction, subject to modification on the job at the Architect's direction. Secure components, in true alignment, firmly into position for long life under hard use.

END OF SECTION

SECTION 07110 WATERPROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Below grade walls waterproofing.

2. Existing below grade walls affected by new construction waterproofing.

3. Planters waterproofing.

4. Concrete parking and traffic decks waterproofing.

5. Horizontal roof slabs supporting earth waterproofing.

6. Split concrete slabs waterproofing.

B. Related Documents: The Contract Documents, as defined in Section 01010 - Summary of Work, apply to the work of this Section. Additional requirements and information necessary to complete the work of this Section may be found in other Documents.

C. Related Sections:

1. Section 03300 - Cast-In-Place Concrete: Substrate for waterproofing.

1.2 DESCRIPTION OF WORK

A. The extent of each type of waterproofing is indicated on the Drawings and as specified herein, and includes providing and installing all waterproofing materials. Similar work used as an exposed finish is excluded by definition and, if required, is specified as roofing, flooring, special coating or other appropriate category.

1.3 REFERENCES

A. The publications listed below form a part of this Specification to the extent referenced. Publications are referred to in the text by basic designation only.

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

1. ASTM C 642 - Test Method for Water Absorption.

2. ASTM D 56 - Test Method for Flash Point by Closed Cup Tester.

3. ASTM D 3960 - Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

4. ASTM E 514 - Test Method for Water Penetration and Leakage Through Masonry.

C. U. S. Environmental Protection Agency (EPA):

1. Method 24 - Determination of Volatile Matter Content.

1.4 SUBMITTALS

A. Section 01330 - Submittals: Procedures for submittals.

1. Product Data: Submit manufacturers specifications, recommendations for water repellents for each surface specified, performance data, surface preparation and application instructions, precautions for materials which can contaminate the system**,** limitations to coating, protection and cleaning instructions and VOC content. Include recommendations for sealing penetrations, cracks and control, construction and expansion joints. Submit color charts for products required to be integrally colored.

2. Shop Drawings: Indicate details critical to water tightness of the membrane, including, but not necessarily limited to, membrane transitions / terminations at perimeters, drains, sleeves and other penetrating elements.

3. Samples: For each type of waterproofing system, submit a 8-1/2" x 11" board sample of each complete system. Where the membrane is a layered system, expose at least 1" of each succeeding layer. Top coats to be provided with Project required colors as selected.

4. Assurance / Control Submittals:

a. Manufacturers certificate that the products meet or exceed the specified requirements.

b. Manufacturer's Material Safety Data Sheets (MSDS).

c. Manufacturers certification that the products supplied comply with applicable federal and local regulations controlling the use of volatile organic compounds (VOC).

d. Manufacturer's Instructions indicating procedures and conditions requiring special attention, and cautionary procedures required during application.

e. Documentation of experience indicating compliance with the specified qualifications requirements.

C. Section 01780 - Closeout Submittals: Procedures for closeout submittals.

1. Warranty: Submit a written special Warranty with forms completed in the name of the Owner and registered with the manufacturer.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Company specializing in manufacturing the products specified with a minimum of five (5) years documented experience, and has a record of successful in-service performance.

2. Applicator: Company experienced in applying the types of waterproofing required for this Project for not less than five (5) years, and is acceptable to the primary waterproofing materials manufacturer. Employees assigned to the Project shall have been trained by an approved waterproofing materials manufacturer.

B. Mockup: Apply water repellent to a mockup, either partial or full coverage, as directed, before proceeding with the application. Comply with the application requirements contained herein.

C. Regulatory Requirements: Comply with applicable rules and regulations of the pollution-control regulatory agency having jurisdiction regarding volatile organic compounds (VOC) and use of hydrocarbon solvents.

D. General: Obtain the primary materials from a single manufacturer. Provide secondary materials only as recommended by the manufacturer of the primary materials.

E. Manufacturer`s Technical Representative:

1. The primary waterproofing materials manufacturer to make a Technical Representative available to monitor the on-going work to ensure proper application of the waterproofing system. The manufacturer must maintain the same Technical Representative for the duration of the Project.

2. Pre-Application Review: Prior to the start of work and the purchase of any materials, the Manufacturer=s Technical Representative, who is to certify each application, shall visit the Project Site, review existing conditions, and review the Contract Document for appropriateness of the requirements with the specified manufacturer=s system including, but not necessarily limited to membrane requirements, substrate preparation, membrane terminations, reinforcements, flashing conditions, penetrations, including multiple penetration requirements, joints required and treatment and protection of the membrane.

3. Certification: After the Manufacturer=s Technical Representative=s review, submit written certification of the appropriateness of the requirements, or submit other or additional specific recommendations, if any, to assure that the specified system is appropriate for the use intended and complete in scope to assure its intended performance. This should be coordinated with the Shop Drawing Submittal.

4. Substrate Certification: Submit the Technical Representative=s written certification of compliance that the prepared substrate is in conformance with requirements necessary for the system installation. Certification of the substrate is to be accomplished just prior to the start of application of the membrane system.

5. Technical Representative=s Field Review of Work:

a. Number of Site Visits: Submit the manufacturer=s recommended minimum number of times the Technical Representative is to field review the work to ensure success of the installation. Indicate when such visits are to be made.

b. Field Reports: For each visit, the Technical Representative shall submit a detailed Field Report assessing each application. Field Reports to indicate the date, time of day, length of each visit, weather condition during the visit, condition of the substrate at the time of application, application procedures, and other important aspects that affect success of the application. Submit Reports within seven (7) days after each Site visit.

F. Performance Requirements: It is required that the waterproofing membrane be watertight, and not deteriorate in excess of the limits published by the membrane manufacturer.

1.6 COORDINATION

A. Pre-Application Conference: Prior to start of the application of materials, meet at the Project Site with the Owner=s representative, Architect, Contractor, Applicator and subcontractors whose work penetrates the surfaces to be waterproofed. Review the conditions, methods and procedures necessary for application of the work, including inspections of the areas of work, requirements of the Specifications and the manufacturer=s literature; review submittals and schedules.

B. Tolerances / Finish of Substrates: Coordinate with other trades providing substrates over which the waterproofing is scheduled for the required tolerances, conditions and finish of the substrates necessary to ensure successful application of the work of this Section. Coordinate in a timely manner so other trades can implement their requirements in accordance with the Job Schedule. Submit documentation of the coordination, including the date of the coordination, with whom coordinated, and the requirements specified.

C. Control Joints: Control joints are indicated on the Drawings. Where additional or other configuration for control joints is required in substrates other than what is currently required to ensure success of each membrane application, submit the requirements to the Owner=s representative for review, and arrange with the substrate installer for installation of such control joints.

1.7 DELIVERY, STORAGE AND HANDLING

A. Section 01600 - Product Requirements. Transport, handle, store, and protect the products.

B. Deliver products to the Project Site in the manufacturer=s original, new and unopened packages or containers with seals and labels intact; dry and undamaged, bearing the product name, color, manufacturer=s lot number, directions for use and precautionary labels.

C. Store materials not in actual use, in tightly covered containers. Maintain containers used in the storage of materials, in a clean condition, free of foreign materials and residue.

D. Store materials in a well ventilated area, and in compliance with the manufacturer=s published instructions.

E. Store and handle materials to prevent deterioration and damage due to moisture, temperature changes, contaminants, and other causes.

F. Protect against fire hazards and spontaneous combustion.

G. Keep storage areas neat and orderly. Remove waste daily.

H. Take all precautions to ensure that workmen and the work areas are adequately protected from health hazards resulting from handling, mixing and application of the materials.

1.8 JOB CONDITIONS

A. Proceed with the waterproofing work only after the substrate construction and penetrating work has been completed.

B. Environmental Requirements: Do not apply products under any of the following conditions, except with the written recommendation of the manufacturer:

1. Substrate surfaces cured less than thirty (30) days.

2. Surfaces not dry for a minimum of 24 hours.

3. Rain predicted within 24 hours.

1.9 WARRANTY

A. Section 01780 - Closeout Submittals: Procedures for closeout submittals.

B. Special Warranty:

1. Provide a joint and severable written Warranty signed by the waterproofing materials manufacturer, Contractor and the Applicator, agreeing to repair or replace defective materials and workmanship, defined to include leakage of water, ruptures caused by cracking substrate up to 1/16", abnormal aging or deterioration of materials, and other failures of membranes to perform as required within the warranty period. Warranty shall include responsibility for removal and replacement of other work which conceals the waterproofing membrane.

2. During the warranty period, repairs and replacements required because of acts of God and other events beyond the Contractor=s / Applicator=s control, and which exceed the performance requirements, shall be completed by the Contractor / Applicator and paid for by the Owner at the prevailing rates.

3. Warranty Period: Five (5) years from the date of Substantial Completion of the waterproofing work.

PART 2 PRODUCTS

2.1 WATERPROOFING MATERIALS

A. WP-1 (for vertical and horizontal surfaces below grade, masonry backer walls and inside planters): Single component, fluid-applied, modified elastomeric waterproof membrane, UPI System BG-7011-90 Mil Polymers or approved equal; 90 mils thickness for walls and vertical surfaces.

B. WP-2 (for horizontal roof slabs supporting earth or paving and split slab construction): UPI System BG-7011-R-90 Mil or approved equal.

C. WP-3 (for exposed concrete parking and vehicular traffic decks): Single component, moisture-curing, polyurethane elastomeric membrane for parking stalls; or approved equal for entrances, ramps and drives.

D. Caulking Compound: Single component, polyurethane as recommended by the primary waterproofing materials manufacturer.

E. Aggregate: As recommended by the manufacturer and approved by the Owner=s representative.

F. Other materials as recommended by the manufacturer of the prime materials.

2.2 PROTECTION / DRAINAGE BOARD

A. Composite structure of a molded, three-dimensional, high impact-resistant polymeric sheet with a filter fabric bonded to the open side. or approved equal.

1. Attach panels to the substrate with an adhesive recommended by the manufacturer.

2.3 MISCELLANEOUS MATERIALS

A. Parge Coat: Where the manufacturer requires a portland cement parge coat over rough or porous substrates, the Contractor shall provide such parge coat as required at no additional cost. Failure of the parge coat or the absence of a parge coat will be considered as failure of the membrane system to perform as the parge coat is a required condition for the membrane=s success over substrates requiring a parge coat.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01700 - Execution Requirements: Verification of existing conditions before starting the work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive the work.

1. Verify that joint sealants are installed and cured.

2. Verify that surfaces to be coated are dry, clean, and free of efflorescence, oil, and other matter detrimental to application of the coating.

C. Report, in writing, prevailing conditions that will adversely affect satisfactory execution of the work of this Section. Do not proceed with the work until the unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate surfaces of projections and substances detrimental to the work, acid etch smooth surfaces, fill all voids to comply with recommendations of the prime materials manufacturer. Stripe coat all cracks up to 1/16" wide, rout and patch cracks larger than 1/16".

B. Moisture Content Testing: Just prior to application, test substrates with an electronic moisture meter. Do not proceed until the moisture content is within the manufacturer's acceptable tolerances.

C. Protection of Other Work: Do not allow liquid or mastic compounds to enter and clog drains, sleeves or conductors. Prevent spillage and migration onto other surfaces of the work by masking or otherwise protecting the adjoining work.

3.3 INSTALLATION

A. General: Comply with the manufacturer's instructions, except where more stringent requirements are shown or specified, and except where Project conditions require extra precautions or provisions to ensure satisfactory performance of the work.

B. Thickness Testing: Monitor mil thickness application by a monitoring method recommended by the Manufacturers Technical Representative for each specific system.

C. Reinforcement: Unless otherwise acceptable, or as otherwise recommended, in writing, by the Manufacturers Technical Representative, reinforcement is to be provided as follows and in the manner indicated:

1. Material: Manufacturer=s recommended elastomeric sheet and / or polyester fabric fully encapsulated in the primary membrane coating of a thickness equal to the total thickness required for the primary membrane, unless otherwise recommended by the manufacturer, and has been reviewed and approved on submittals.

2. Transitions: At transitions from vertical to horizontal, at inside and outside corners, and at other similar transitions that are not expansion / control joints, penetrations, or cracks, embed reinforcement of a width that extends 6", minimum, onto each surface on each side of the intersection.

3. Expansion / Control Joints: Embed reinforcement of a width necessary to extend the material 6", minimum, on each side of the joint, plus additional materials, as necessary, to accommodate movement of the joint. Small joints are to be bridged over backer rods placed in the joints. Reinforcement is to be looped down into the joints with backer rod placed in the loop.

4. Penetrations: 36" square reinforcement, but not less than necessary to extend out in all directions from the penetration a distance of 12", minimum, beyond the flange of each penetration.

a. Pipes, Conduits, and Similar Components: Construct a form fitting elastomeric boot 6", minimum, in height and with an integral elastomeric flange extending 6", minimum, onto the wall or deck. The boot shall be fully adhered to the penetrating element and fully encapsulated at the interface with the wall or deck. Apply 36" square reinforcement material over this, fully encapsulated in the primary membrane material.

b. Cracks: Encapsulated reinforcement of a width necessary to extend the material 6", minimum, on each side of the crack.

3.4 APPLICATION

A. WP-1: Prime coat the substrate surface at the rate of 250 - 300 sq. ft. / gallon. Apply with rollers, two or more coats of (30 dry mils) at the rate of 4.5 gallons / 100 sq. ft. to produce 90 dry mils total thickness at vertical surfaces. Allow 18 hours curing time between coats.

1. Attach Protection / Drainage Boards to all vertical and horizontal surfaces with adhesive per the manufacturer=s recommendations. Set panels with the fabric toward the earth side. Lap fabric a minimum of 2". Install at below grade walls and retaining walls. Lap fabric at the top of the highest course and embed in waterproofing to ensure that loose material cannot enter and accumulate behind the protection / drainage board. Backfill against boards with approved material.

B. WP-2: Apply a surface conditioner to concrete substrates in accordance with the manufacturer=s instructions. Apply membrane in three (3) applications at a rate to provide a continuous monolithic coating of 30 dry mils, average thickness per coat, and 90 mils total thickness. Provide flashing in accordance with the manufacturer=s standard details. Where protection board is required, embed into the membrane to ensure good bond. Place protection boards in a staggered pattern and butt boards tightly together.

C. WP-3: Prime and apply a 30 mil thick coating to cover and overlap shrinkage cracks, integral flashings, caulked expansion joints and construction joints. Apply a 25 mil base coat, 25 mil intermediate coat, and two (2) 10 mil top coats to produce 70 mils total thickness, exclusive of aggregate. Broadcast aggregate in the first top coat.

3.5 MEMBRANE TESTING

A. Water Test: Conduct water containment tests to ensure that the membranes are watertight.

B. Horizontal Membranes: For installations where the primary membrane is horizontal, contain waterproofed areas in a manner to prevent 2", minimum, depth of water from escaping by damming any open perimeters and sealing the drains.

C. Pan Membranes: For installations where the primary membrane forms a continuous container with the bottom and all vertical sides enclosed, such as planters, seal the drains and fill the container to within 1@ of the top termination of the membrane.

D. Method of Containment: Dams, seals, and other methods used to contain water should be capable of fully containing water for the period of time required. The method of containment should not damage the adjacent work.

E. Period of Containment: 48 hours without loss of water, except for that by natural evaporation, and without evidence of failure in the membrane in any manner.

F. Report: Submit a report of tests to the Owner=s representative indicting the location of the test, date and time of the test, weather conditions and results.

3.6 PROTECTION

A. Contractor=s Operations: The Contractor to verify the kinds of operations that will be conducted around or over installed membranes. The Owner=s representative will advise the Contractor of the measures that must be implemented to ensure that the membranes will be without damage at the time of Substantial Completion.

B. Buried Installations: At the time of backfill / fill, at the time of installation of irrigation and landscaping over buried membranes, and at any other time where the Contractor=s operations may have an adverse effect on a buried membrane system, the Manufacturer=s Technical Representative shall observe to ensure that the Contractor=s operations are being conducted in a manner that will protect the membranes from damage.

3.7 FIELD QUALITY CONTROL

A. Section 01450 - Quality Control: Field inspection.

B. Inspect installations for tight and waterproof joints and proper thickness of membrane applications.

3.8 CLEANING

A. Section 01700 - Execution Requirements: Cleaning the installed work.

B. Clean all spills. Do not leave splatters or drips.

C. Do not allow seepage of waterproofing through joints.

END OF SECTION

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07192 - VAPOR RETARDERS

PART 1 - GENERAL

1.01 SCOPE

A. Furnish materials, tools and perform the labor required to complete damp proofing vapor barrier applied on under slabs on grade and other purpose as indicated in the drawings.

1.02 DELIVERY

A. Deliver waterproofing materials to the site in original sealed containers or packages bearing the manufacturer's name and brand designation, specification number, type and class.

1.03 STORAGE AND PROTECTION:

A. Store and protect waterproofing materials from damage weather, moisture and extreme-temperature with extra-ordinary care.

1.04 SUBMITTAL

A. Meet the applicable requirements of Section 01300.

PART 2 - PRODUCTS

2.01 MATERIAL

A. Membrane damp proofing below slabs, use .006 Polyethylene or approved equal.

PART 3 - EXECUTION

3.01 DAMP PROOFING

A. Over clean, smooth level, and firmly tamped gravel fill or coral fill, apply one layer of .006 Polyethylene or equivalent, each sheet lapping at 12 inches. Lap in direction with concrete is to be spread. Use care in laying reinforcement bars and during pouring of concrete to prevent puncturing membrane.

END OF SECTION

Section 07560 - High Solids 100% Silicone Roof Coating System for Low Slope Membrane Roofs

Part 1—General

1.0 Summary

This specification is presented as a guide for coating and restoration of smooth-surfaced asphalt built-up, modified bitumen, EPDM, CSPE, TPO and aged PVC roof systems with the Lucas #8000 High Solids 100% Silicone Roof Coating.

1.1 Scope of Work

Applicator will provide all labor, equipment and materials necessary to install the coating system. The manufacturer's most current Product Data Bulletins and installation instructions shall be observed in conjunction with this specification.

1.2 Submittals

A. Submit Product Data Bulletins confirming physical and performance

properties of the products.

B. Submit Safety Data Sheets for all products to be used in the assembly.

C. Submit a roof survey including, substrate inspection report, roof type, measurements, descriptions of the conditions (seams, penetrations, drains, gutters) including known leaks. Determine moisture content of the existing substrate, insulation and deck with a moisture scan and core cuts (include with submission). A moisture content of 15% or greater indicates a potential problem and work shall not proceed until the cause is verified and the condition is corrected. Photographs of all shall be included in the submission.

D. Submit approved warranty terms and conditions. All items needed are in the Warranty Procedures & Application Bundle.

1.3 Quality Assurance

A. Supplier shall retain batch samples of all coating products used in the system

for a minimum of five years. C. Contractor must be an Approved Applicator for the

system being installed.

D. Contractor shall furnish all insurance, licenses, permits and certifications as required by local authorities and/or the property owner.

E. Contractor shall insure that all work performed at the site shall be in accordance with National Roofing Contractors Association (NRCA) Low Slope Roofing Manual's recommendations and all other pertinent guidelines issued by the NRCA in reference

to other types of construction present at the job site.

1.4 General Conditions

A. The roof must be free of areas of water, ice, snow, rain (or dew), oils, greases, particulate matter or other debris.

B. Roof insulation must be dry and/or vented according to manufacturer's building specific instructions.

C. The roof surface must be a minimum of 35ºF to ensure that frozen condensation is not present on the roof surface when using silicone products. The roof surface must be a minimum of 50ºF, ambient temperature must be a minimum of 40ºF when using water-based products. The roof surface should not exceed 120ºF during application to avoid blisters and pinholes.. Do not apply coating when the ambient temperature is within 5º F of the Dew Point.

1.5 Materials

A. Coatings require mixing immediately prior to application. All containers shall be thoroughly mixed with a mechanical mixing device for a minimum of five minutes each. Acrylic coatings shall be mixed no more than four hours prior to use. Remixing is permitted as is necessary. Silicone coatings and 2-part primers shall be mixed no more than one hour prior to use. Remixing of silicone is permitted as is necessary. Remixing of 2-part primers after expiration of its pot life is not permitted.

B. No products with a Flash Point below 100º F shall be permitted due to the associated fire hazard.

C. No products with chlorinated "Toxic Exempt" solvents including perchloroethylene, 111 trichloroethane, methylene chloride or isocyanates shall be utilized due to the associated health hazards to workers and building occupants.

D. No asphalt or vegetable-based oils may be used in the production of any product included in this specification.

E. Silicone coating must be a minimum of 98% solids by weight. No solvent diluted silicone coatings may be used in this specification.

F. Materials should be maintained at a minimum temperature of 50º F for 24 hours prior to application to ensure the optimal application qualities. Do not allow material to freeze.

Part 2—Products

2.0 Products

A. Universal Wash - a biodegradable detergent wash suitable for cleaning and preparing all types of roof systems.

B. -Part Epoxy Primer - a two-part water-based epoxy primer intended to promote adhesion (also in areas that retain water) and helps to prevent asphalt bleed through on smooth surface asphalt BUR and modified bitumen roofs. It is also an adhesion promote on metal (including rust), aged PVC and Hypalon roof systems.

C. Resin Base and Primer - a polymer emulsion resin intended as a general purpose primer for preparing (smooth surface asphalt BUR and modified bitumen roofs) to help prevent asphalt bleed-through.
D. TPO Primer - a primer intended for preparing new or aged TPO roofing systems.

E. Silicone Mastic - a high solids non-shrinking moisture cure silicone mastic intended for sealing metal roof seams & fasteners and miscellaneous repairs to roof membranes prior to coating.

F. (98% Solids) 100% Silicone Roof Coating - a 100% silicone based, single part roof coating that creates a barrier resistant to natural weathering, is durable, breathable and weatherproof.

G. 100% Silicone Skylight Coating – a 100% silicone based, single part skylight coating intended for sealing and restoring aged fiberglass skylight panels. It is an oxime neutral cure chemistry that is not corrosive to metals.

H. Lucas White Polyester Reinforcing Fabric (X-Firm, Firm & Soft).

I. EPDM Non-Slip Traffic Granules - a non-slip traffic surfacing for walkways and applications where foot traffic is expected.

J. Miscellaneous tools and equipment including 3/4” to 1” nap rollers with 6’ handles, 4” double-wide chip brushes, roofer’s trowels, scissors for cutting fabric, and a 1/2” power drill with mixing attachment.

K. Spray equipment (optional) Graco GH 933 Big Rig with a Monarch 5:1 pump, 3/4" lines, 1/2" whip, XTR 700 spray gun with tip size from 627 - 631. Please contact Lucas for more detailed information.

Part 3—Execution

3.0 Inspection

Prior to commencement of work, the roof shall be re-inspected. Any conditions not included in the roof survey shall be added and noted. All new information must be communicated to the manufacturer prior to starting work.

3.1 Conditions & Remedies

A. The roof assembly must be structurally sound and free of blisters, shrinkage, buckling, encapsulated moisture, delaminating of plies or other serious defects. Any serious defects shall be remedied prior to the installation of the coating system.

B. Drains must be installed as to allow positive drainage of the roof surface. No areas shall retain water more than 48 hours or at depths exceeding 1/4" at any time.

C. Fasteners shall be inspected for tenting or membrane damage. Replace as necessary according to original manufacturer or NRCA guidelines.

D. Curbs and penetrations must not interrupt the flow of water off of the roof. If defects are present install crickets to divert water around the penetrations.

E. Insulation that is softened or water-soaked must be removed and replaced with the original or new compatible membrane.

F. Flashings shall be properly terminated according to NRCA guidelines. Defective terminations shall be remedied. Flashings that are shrunken, taught or tented shall be replaced prior to installation of the coating system.

3.2 Surface Preparation

A. Mechanically remove all loose coatings and/or patching material as is possible. On metal surfaces, wire brush

to remove any areas of scaly rust.

B. The roof surface shall be cleaned with Universal Wash according to manufacturer's most current Product Data Bulletin. Dilute the material with water at the rate of four parts water to one part to a wet roof surface with a mop, pump sprayer or other suitable low-pressure sprayer at the rate of one gallon per 100 square feet. Do not let cleaner dry on the roof, keep wet at all times. Avoid contact with painted surfaces or vinyl siding. Allow wet contact with the roof surface for a minimum of 15 minutes. Agitate roof surface with stiff bristle broom or orbital scrubber.

C. Rinse the roof surface thoroughly with clean water and a minimum 2000 psi power washer until noresidue remains. Use caution to avoid saturating roof. Allow roof to dry completely prior to system installation.

D. TPO roofs must be primed with at the rate of 1 gallon per 800-1,000 square feet. Complete coverage of all TPO to be coated is required but should be as thin as possible.

E. Aged PVC and CSPE roofs must be primed with L-part epoxy primer at the rate of 1 gallon per 400 square feet.

F. Asphalt and modified bitumen roofs must be primed with -part epoxy primer. Apply on smooth asphalt and granular modified bitumen roofs at the rate of 1 gallon per 200 square feet and smooth modified bitumen roofs at the rate of 1 gallon per 400 square feet. Alternatively, Resin Base and Primer may be substituted as an asphalt bleed blocker. Applied 1 coat at a rate of 1 gallon per 100 square feet.

G. Adhesion tests are required for unknown roof types, roofs with existing coatings and for systems that require primer but a primerless system is requested. Full documentation of the cohesive failure is required. Submit pictures of before, during & after and a video of the pull test. Documentation of the adhesion test must be included with the Warranty Procedures & Application Bundle.

H. Allow 24 hours before top coating.

3.3 Waterway, Penetration, Flashing and Field Reinforcement

A. Remove any contamination or debris that has accumulated.

B. All field seams shall be sealed with Silicone Mastic applied at a rate of 1/8"-3/16" thickness x 4" wide (taper all edges) minimum.

C. All field defects, flashing defects or previous repairs must be reinforced with white polyester reinforcing fabric. Available widths for field reinforcement include 6", 12", 20" and 40". All rolls are 300' long, except 40" rolls which are 324' long. Apply at 1 gallon per 100 square feet and immediately embed fabric. Dry brush the fabric smooth. Allow a minimum of one hour dry time. Apply an additional 1 gallon of on top of the fabric to fully encapsulate it.

D. All waterways and ponded water areas must be reinforced with 40" white polyester reinforcing fabric. Apply

at 1 gallon per 100 square feet and immediately embed fabric. Dry brush the fabric smooth. Allow a minimum of one hour dry time. Apply an additional 1 gallon of on top of the fabric to fully encapsulate it.

E. All drains must be reinforced with 40” white polyester reinforcing fabric. Apply at 1 gallon per 100 square feet and immediately embed a 40” x 40” white polyester reinforcing fabric over all drains, after removing the clamping ring if present. Dry brush the fabric smooth. Allow a minimum of one hour dry time. Apply an additional 1 gallon of on top of the fabric to fully encapsulate it.

F. Penetrations that can not be sealed with reinforcing fabric due to their shape or location shall be reinforced with Silicone Mastic. Apply with a brush or trowel 1/8” to 1/4" thick and taper all edges.

G. Allow 4-6 hours before top coating.

3.4 Coating Installation

A. Remove any contamination or debris that has accumulated on the roof after cleaning.

B. To restore existing skylights, apply one coat of 100% Silicone Skylight Coating at a rate of 1 gallon per 100 square feet. Allow 2-4 hours dry time. Apply a second coat of 100% Silicone Skylight Coating at a rate of 1 gallon per 100 square feet.

C. cures through absorption of moisture from both the substrate and the air. Avoid entraining air when mixing. Cure time will be faster in humid conditions and on substrates that hold moisture such as concrete. Open and partially full containers will skin over quickly. If this occurs, remove the skin and continue using the remaining product.

D. : Apply two coats of Silicone Roof Coating at the rate of 2 gallons per 100 square feet each coat each(32 wet mils, a single pass of a heavily applied material can cause severe wrinkling in the coating). Use two applicators rolling at 90 degree angles for best results. The first applicator should distribute the material and the second should insure complete and even coverage. Material is fast drying. Do not distribute excessive amounts onto the roof prior to rolling. Do not over roll while drying or a textured finish will result. When spraying, use a multi-pass technique for even coverage. Protect unintended surfaces from overspray.

E. Optional for light traffic areas, apply coat of at a rate of 1 gallon per 100 sq. ft. and immediately apply EPDM Granules into wet coating at the rate of 15lbs. per 100 square feet. Do allow coating to skin over or the granules will not adhere. Vacuuming is recommended once coating is cured in order to remove loose granules to avoid accumulation in gutters and drains.

3.5 Inspection

Inspect the roof for even and adequate coverage. Dry film thickness of the coating (fabric reinforcement not included) should be a minimum 60 mils DFT for a 20 year system. Areas of under-application shall receive additional coating to meet the minimum film thickness requirements. Any vapor pockets, fish mouths or loose bond in reinforced areas shall be split, flattened and reinforced a second time.

Part 4—Warranties

SECTION 07920 - JOINT SEALANTS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Provide joint sealing, including but not limited to the following:

1. Sealing joint in exterior and interior walls.

2. Sealing wherever required to provide a watertight building.

3. Sealing of joints where indicated in paving, slabs and flat work.

B. This section contains general specifications pertaining to joint sealing and caulking throughout the project and establishes quality of products and installation for joint sealing work specified in other sections. Specific requirements in other sections supercede general or conflicting requirements of this section.

1.02 REFERENCE STANDARD: The publications listed below form a part of this specification to the extend referenced. The publications are referred to in the text by the basic designation only.

A. Federal Specification (Fed. Spec.):

TT-S-00227E & Am 3	Sealing compound, elastomeric type, multi-component (for caulking, sealing, and glazing to buildings and other structures)
TT-S-00230C & Am 2	Sealing compound, elastomeric type, multi-component (for caulking, sealing, and glazing to buildings and other structures)

B. American Society for Testing and Materials (ASTM)

Publications: C834-76	Latex sealing compound
C920-79	Elastomeric joint sealant

1.03 QUALITY ASSURANCE: Use only licensed joint sealing specialty contractor experienced in the application of sealant and employing skilled experienced workmen.

1.04 DELIVERY AND STORAGE:

A. Meet the applicable requirements of Section 01600.

B. Deliver materials to the job site in the manufacturer's external shipping containers, unopened, with brand names, date of manufacture, color and material designation clearly marked thereon. Label containers of elastomeric sealant as to type, class, grade and use. Carefully handle and store all materials to prevent inclusion of foreign materials, or subjection to sustained temperatures exceeding 100 degrees or less than 40 degrees F.

PART 2 - PRODUCTS

201 MATERIALS: Conform to the reference documents listed for each use. Color of sealant and caulking shall match adjacent surface color unless specified otherwise. For ASTM C920 sealant, use a sealant that has been tested on the type of substrate to which it will be applied.

A. Interior Caulking or Sealant: ASTM C 834, ASTM C920, Type S or M, Grade NS, class 12.5, use NT. Color of caulking or sealant shall be as selected.

B. Exterior sealant: For joints in vertical surfaces, provide ASTM C 920 Type S or M, Grade NS, Class 25, use NT. For joints in horizontal surfaces, provide ASTM C 920, type S or M, grade P, class 25, use T. Color of sealant as selected.

C. Floor joint sealant: ASTM C920, Type S or M, Grade P, Class 25, Use T. Color or sealant as selected.

D. Primer for sealant: Non-staining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application.

E. Bond breakers: Type and consistency recommended by the sealant

manufacturer for the particular application.

PART 3 - EXECUTION

3.01 INSPECTION: Examine the substrates and conditions under which work of this section will be performed. Do not proceed until unsatisfactory conditions detrimental to timely and proper completion of the work have been corrected.

3.02 SURFACE PREPARATION

A. Surfaces clean, dry to the touch, and free from moisture, grease, oil, wax, lacquer, paint or other foreign matter that would tend to destroy or impair adhesion.

B. Where adequate grooves have not been provided, clean out grooves to a depth of ½ inch and grind to a minimum width of ¼ inch without damage to the adjoining work. No grinding is required on metal surfaces.

C. Steel Surfaces: Remove loose mill scale by sandblasting or, if sand blasting is impractical or would damage finish work, scraping and wire brushing. Remove protective coatings by sandblasting or using a solvent that leaves no residue.

D. Aluminum Surfaces: Remove temporary protective coatings from surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive just prior to sealant application. Use non-staining solvents recommended by the item manufacturer.

3.03 SEALANT PREPARATION: Do not modify the sealant by addition of liquids, solvents, or powders. Mix multi component elastomeric sealant in accordance with manufacturer's printed instructions.

3.04 APPLICATION

A. Primer: Just prior to the application of the sealant or caulking compound, clean out all loose particles from joints. Apply primer in accordance with compound's manufacturer's directions. Do not apply primer to exposed finish surfaces.

B. Bond Breaker: Provide bond breakers as recommended by the sealant manufacturer for each type of joint and sealant used.

C. Sealant: Use a compound that is compatible with the material to and against which it is applied.

Do not use a compound that has exceeded its shelf life or has become too jelled to be discharged in a continuous flow from the gun. Apply the compound in accordance with the manufacturer's printed instructions. Force

the compound into joints with sufficient pressure to fill the joints solidly. Compound uniformly smooth and free of wrinkles.

1. Interior Sealant: Provide at all exposed joints in the building and at all joints indicated to receive sealant or caulking.

2. Exterior Sealant: Provide sealant at joints around the perimeter of openings and at exposed joints on the building and at joints indicated to receive sealant.

3. Floor Joint Sealant: Provide sealant in control joints and in other floor joints indicated or specified.

3.05 PROTECTION AND CLEANING

A. Protection: Protect areas adjacent to joints from compound smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.

B. Cleaning: Immediately scrape off fresh compound that has been smeared on masonry and rub clean with a solvent as recommended by the compound manufacturer. Upon completion of compound application, remove remaining smears and stains resulting there from and leave the work in a clean and neat condition.

END OF SECTION

SECTION 08100

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel doors.

2. Steel door frames.

3. Door vision panels.

4. Louvers.

5. Accessories.

B. Related Documents: The Contract Documents, as defined in Section 01010 - Summary of Work, apply to the work of this Section. Additional requirements and information necessary to complete the work of this Section may be found in other Documents.

C. Related Sections:

1. Section 03300 - Cast-In-Place Concrete: Substrate for anchorage.

2. Section 04200 - Reinforced Unit Masonry: Substrate for anchorage.

3. Section 08710 - Door Hardware: Hardware coordination.

5. Section 08800 - Glass and Glazing: Glass installed in vision panels in doors and steel window frames.

6. Section 09900 - Painting: Field painting and finishing of frames and doors.

1.2 DESCRIPTION OF WORK

A. The extent of standard steel doors and frames work is indicated on the Drawings and Schedule and as specified herein, and includes providing and installing exterior entrance and storefront assemblies, designed and fabricated to comply with the requirements for system performance characteristics below, as demonstrated by testing of the manufacturer=s corresponding stock systems in compliance with the test methods designated.

B. Door hardware is specified in Section 08710.

1.3 REFERENCES

A. The publications listed below form a part of this Specification to the extent referenced. Publications are referred to in the text by basic designation only.

B. American Society of Civil Engineers (ASCE):

1. ASCE / SEI 7 - Minimum Design Loads for Buildings and Other Structures.

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

1. ASTM A 153 / A 153M - Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

2. ASTM A 568 / A 568M - Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.

3. ASTM A 653 / A 653M - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.

4. ASTM A 1008 / A 1008M - Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

5. ASTM A 1011 / A 1011M - Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

6. ASTM D 2201 - Practice for Preparation of Zinc-Coated and Zinc-Alloy-Coated Steel Panels for Testing Paint and Related Coating Products.

7. ASTM E 90 - Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

8. ASTM E 330 - Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

9. ASTM E 413 - Classification for Rating Sound Insulation.

D. Americans with Disabilities Guidelines (ADAAG):

1. Accessibility Guidelines for Buildings and Facilities.

E. Door Hardware Institute (DHI):

1. DHI - The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.

F. International Code Council:

1. International Building Code (IBC), 2009.

G. Steel Door Institute (SDI):

1. SDI-100 - Standard Steel Doors and Frames.

2. SDI-105 - Recommended Erection Instructions for Steel Frames.

H. National Fire Protection Association (NFPA):

1. Standard No. 80 - Standard for Fire Doors and Other Opening Protectives.

1.4 SUBMITTALS

A. Section 01330 - Submittal Procedures: Procedures for submittals.

1. Product Data: Identify door and frame materials, gauges, configurations, location of cutouts, hardware reinforcement, fire-rating and finish.

2. Shop Drawings: Include elevations of each door type, details of each frame type, conditions at openings, details of construction, location and installation requirements of reinforcements and finish hardware, and details of joints and connections. Show anchorages and accessory items. Indicate door elevations, internal reinforcement, closure method, sidelights, and cutouts for louvers and vision panels.

3. Schedule: Provide for doors and frames using the same reference numbers for details and openings as those used on the Drawings.

4. Samples: Full range of color samples for selection. Two (2) 6" x 6", minimum, of each color and texture selected from factory-finished doors and frames.

5. Assurance / Control Submittals:

a. Certificates:

1) Manufacturers Certificate that the products meet or exceed the specified requirements.

2) Manufacturers certification that hot-dip galvanizing for doors and frames comply with the requirements.

3) Manufacturers certification that oversized fire-rated frame and door assemblies have been constructed with materials and methods equivalent to the requirements for labeled construction.

b. Calculations indicating that exterior doors, frames and anchorages satisfy the performance requirements.

c. Documentation of experience indicating compliance with the specified qualifications requirements.

B. Section 01780 - Closeout Submittals: procedures for closeout submittals.

1. Warranty: Submit a written special Warranty with forms completed in the name of the Owner and registered with the manufacturer.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Company specializing in manufacturing the products specified with a minimum of five (5) years documented experience.
2. Installer: Company experienced in performing work of this Section with a minimum of five (5) years documented experience.
3. Provide frames and doors complying with Steel Door Institute, SDI-100 ARecommended Specifications: Standard Steel Doors and Frames@ and as specified herein.

B. Performance Requirements:

1. Provide the capacity to withstand the following loading requirements for exterior units:
   a. Design and install to resist combined positive and negative windloading in accordance with IBC 2009, Section 1609 with a Vmph of 170, qs of 74.0 psf, exposure [B] [C] [D],and importance factor [1.0] [1.25] [1.5], as applicable per ASCE 7.
2. Fire-Rated Assemblies: Provide fire-rated doors investigated and tested as fire door assemblies, complete with type of hardware to be used. Identify each fire door with recognized testing laboratory labels indicating the applicable fire-rating. Construct and install assemblies to comply with NFPA, Standard No. 80, and as herein specified.

1.6 DELIVERY, STORAGE AND PROTECTION

A. Section 01600 - Product Requirements: Transport, handle, store, and protect the products.

B. Deliver hollow metal work cartoned or crated for protection during transit and storage.

C. Provide additional sealed plastic wrapping for factor-finished doors.

D. Deliver products to the Project Site in the manufacturers original, unopened packages, dry and undamaged with seals and labels intact.

E. Inspect products for damage. Minor damages may be repaired provided the finish items are equal, in all respects, to new work, and acceptable to the Owner=s representative; otherwise remove and replace the damaged items.

F. Store under cover in dry, weathertight conditions. Place units on 4" high wood sills or store otherwise in a manner to prevent rust and damage. Provide 1/4" space between stacked doors to allow for air circulation. Avoid the use of non-ventilated plastic or canvas shelters. If

the cardboard wrapper becomes wet, remove the carton immediately.

G. Break seals to permit ventilation.

1.7 WARRANTY

A. Section 01780 - Closeout Submittals: Procedures for closeout.

B. Special Warranty:

1. Provide a written Warranty, signed by the door manufacturer, and the door installer agreeing to repair or replace doors that do not meet the requirements, or that fail in materials or workmanship.

2. Warranty Period: Two (2) years from the date of Substantial Completion.

2.1 MATERIALS

A. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 1011 / A 1011M and ASTM A 568 / A 568M.

B. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 1008 / A 1008M and ASTM A 568 / A 568M.

C. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 653 / A 653M, ASTM D 2201, G60 zinc coating, mill phosphatized.

D. Supports and Anchors: Fabricate of not less than 18 gage galvanized sheet steel.

E. Inserts, Bolts and Fasteners: Manufacturer=s standard units, hot-dip galvanized complying with ASTM A 153 / A 153M, Class C or D, as applicable.

2.2 FABRICATION

A. Fabricate units rigid, neat in appearance, and free from defects, warp, twist and buckle. Fit and assemble units in the manufacturer=s plant. Fabricate KD or welded. Clearly identify work that cannot be permanently factory-assembled before shipment to assure proper assembly at the Project Site.

B. Weld the exposed surface of joints continuously; grind, dress, and make joints smooth, flush and invisible. When prime painted, the use of metallic filler to conceal manufacturing defects is not acceptable.

C. Fabricate exposed faces of doors and panels, including stiles and rails of non-flush units from only cold-rolled steel.

D. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and molding from either cold-rolled or hot-rolled steel (fabricator=s option); galvanized.

E. Fabricate doors, panels and frames from galvanized sheet steel. Close top and bottom edges of doors as an integral part of the door construction or by the addition of inverted steel

channels.

F. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat Phillips head for exposed screws and bolts; galvanized.

G. Sound-Rated (Acoustical) Assemblies:

1. Where shown or scheduled, provide frame and door assemblies which have been fabricated as sound-reducing type, tested in accordance with ASTM E 90 and classified in accordance with ASTM E 413.

2. Unless otherwise indicated, the minimum sound rating for acoustical assemblies shall be STC 33.

H. Door Hardware Preparation:

1. Prepare doors and frames to receive mortised and concealed finish hardware in accordance with final Finish Hardware Schedule and templates provided by the hardware supplier. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.

2. For concealed overhead door closers, provide space, cutouts, reinforcing and provisions for fastening in the top rail of doors or heads of frames, as applicable.

3. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at the Project site.

4. Locate finish hardware as shown on final Shop Drawings or, if not shown, in accordance with ARecommended Locations for Builder=s Hardware, Apublished by the Door and Hardware Institute and ADA Accessibility Guidelines.

I. Prepare frame for silencers. Provide three single rubber silencers for single doors; two single silencers on the frame head at double doors without mullions.

J. Equip frames with one welded-in floor anchor in each jamb. Furnish a minimum of three (3) steel jamb anchors and two (2) head anchors for field insertion at a maximum of 24" o.c. Anchors shall be of the proper type for particular construction involved (i.e., masonry, concrete, metal framing, etc).

K. Factory install louvers and vision panels in prepared openings.

L. Shop Painting:

1. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.

2. Clean, treat and paint exposed surfaces of steel doors, louvers and frames including galvanized surfaces.

3. Apply one shop coat of rust-inhibitive enamel or primer paint, either air-dryed or baked-on, of even consistency, and suitable as a base for the specified

finish paint.

2.3 STANDARD STEEL FRAMES

A. Provide galvanized steel frames for doors, transoms, sidelights, borrowed lights, windows and other openings of the types and styles shown on the Drawings.

B. Exterior Frames including sidelights, if required:

1. Cold-rolled steel; factory mitered corners and full-welded construction; 2" face, jamb dept as required or as shown on the Drawings; galvanized to ASTM D 2201.

2. 14 gage for exterior frames and other frames wider than 48".

3. 18 gage for all other frames.

C. Interior Frames:

1. Cold-rolled steel; 2" face, jamb depth as required or as shown on the Drawings.

2. 16 gage.

3. Fire-rated frames per NFPA, Standard No. 80.

D. Silencers: Except on weatherstripped frames, drill stops to receive three (3) silencers on the strike jambs of single-swing frames and two (2) silencers on the heads of double-swing frames. Install plastic plugs to keep holes clear during construction.

E. Plaster Guards: Provide 26 gage, steel plaster guards or mortar boxes welded to the frames at the back of door hardware cutouts where mortar or other materials might obstruct hardware operation.

F. Anchors: Equip frames with one welded-in floor anchor in each jamb. Furnish a minimum of three (3) steel jamb anchors and two (2) head anchors for field insertion at a maximum or 24" o.c.. Anchors shall be of the proper type for the particular construction involved, i.e., concrete, masonry, metal framing, etc. Conceal fastenings unless indicated otherwise.

2.4 STANDARD STEEL DOORS

A. Exterior Doors: Extra Heavy-Duty, Grade III per SDI-100, 1-3/4" thick, types and styles as indicated on the Drawings; top edge closed flush; 14 gage cold-rolled steel, galvanized to ASTM D 2201; insulated core.

B. Interior Doors: Standard-duty, Grade I per SDI-100, 1-3/4" thick, types and styles as indicated on the Drawings; top edge closed flush; 16 gage cold-rolled steel. Fire-rated UL labeled where indicated or required by the Building Code.

C. Fire-Rated Doors: Per NFPA, Standard No. 80.

D. Vision Panels: Laminated glass in metal frames as required by the fire-rating. Install removable steel stops on the room side of the doors.

E. Louvers:

1. Exterior: Weatherproof, stationary, where shown on the Drawings. Construct of AZ@ shaped, 16 gage, hot-dip galvanized steel blades. Space blades not more than 1-1/2" o.c.. Provide removable 1/4" stainless steel wire mesh screen at the interior face of doors, in formed metal frame with removable clips. Provide insect screens at lovers in exterior doors.

2. For fire-rated openings, provide tightly fitted, spring-loaded, automatic closing louvers with operable blades equipped with a fusible link; arranged so metal overlaps metal at every joint.

3. Provide louvers complying with UL or NFPA standards only, and factory-applied in doors.

4. Interior (Non-fire-rated): Roll-formed, 20 gage, galvanized steel, inverted AY@ blades; sight-proof; prime painted for field applied finish paint; size as indicated on the Drawings.

2.5 CORE CONSTRUCTION

A. Provide one of the following types of core construction (Contractor=s option):

1. Kraft Honeycomb: Phenolic treated.

2. Polyurethane: Foamed-in-place or laminated. 20 psi strength, 1.8 pcf density, 1/2" maximum voids in any direction. Strength of bond between the core and the steel face sheets shall exceed strength of core so delamination will not occur during operating conditions.

3. Polystyrene: Rigid core of polystyrene foam board, 1500 psf compressive strength, 18 psi shear strength. Strength of the bond between the core and the steel face sheets shall exceed strength of core so that delamination will not occur under operating conditions.

4. Vertical Steel Stiffeners: 22 gage vertical steel stiffeners, spaced 6" apart and spot welded to the face sheets at 6" on center. Insulate the spaces between stiffeners with loose fill insulation the full height of the door.

2.6 PROTECTIVE COATINGS

A. Bituminous Coating: Apply fibered asphalt emulsion at grout filled frames.

B. Primer: Exposed surfaces shall be cleaned, treated with Bonderite chemical and given one baked-on shop coat of grey synthetic primer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01700 - Execution Requirements: Verification of existing conditions before

starting the work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive the work.

C. Report in writing, prevailing conditions that will adversely affect satisfactory execution of the work of this Section. Do not proceed with the work until the unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install standard steel doors, frames and accessories in accordance with the final Shop Drawings, the manufacturer=s published instructions, as herein specified, and at the locations shown on the Drawings.

B. Door Installations:

1. Fit hollow metal doors accurately in frames, within clearances specified in SDI-100.

2. Install fire-rated doors with the clearances specified in NFPA, Standard No. 80.

C. Frame Installations:

1. Comply with the provisions of SDI-105 ARecommended Erection Instructions for Steel Frames@, unless indicated otherwise.

2. Except for frames located at in-place concrete or masonry and at drywall installations, place frames prior to construction of the enclosing walls. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After the wall construction is completed, remove temporary braces and spreaders leaving the surfaces smooth and undamaged.

3. At in-place concrete construction, set frames and secure to adjacent construction with machine screws and masonry anchorage devices.

4. In masonry construction, locate wall anchors at the hinge and strike levels. Building-in of anchors and grouting of frames is specified in Division 4 and as shown on the Drawings..

5. In steel framed partitions, install wall anchors at the hinge and strike levels. In open steel stud partitions, place studs in wall anchor notches and wire tie. In closed steel stud partitions, attach wall anchors to studs with tapping screws.

6. Install fire-rated frames with clearances specified in NFPA, Standard No. 80.

D. Field Finish: Field paint door, frames, louvers and vision panel frames as specified in Section 09900 - Painting.

3.3 CONSTRUCTION

A. Interface with Other Work:

1. Coordinate frame installations for size, location, and the particular construction involved.

2. Coordinate with the door opening construction, door frames, door hardware, door louver and vision panel glazing installation.

B. Site Tolerances:

1. Maximum Diagonal Distortion: 1/16" measured with straight edge from corner to corner.

3.4 ADJUSTING

A. Section 01700 - Execution Requirements: Adjusting the installed work.

B. Immediately after installation, sand smooth any rusted or damaged areas of the prime coat and touch-up with a compatible air-drying primer.

C. Check and readjust operating door hardware items. Leave steel doors and frames undamaged and in complete and proper operating condition.

D. Adjust hardware for smooth and balanced door and window movement.

3.5 FIELD QUALITY CONTROL

A. Section 01450 - Quality Control: Field inspection.

B. Inspect metal door, frame and window installations, alignment, attachment to structure, and operation.

3.6 CLEANING

A. Section 01700 - Execution Requirements: Cleaning installed Work.

B. Immediately prior to final inspection, remove protective plastic wrappings from prefinished doors.

C. Wipe down all doors and frames before final acceptance inspection.

END OF SECTION

SECTION 08310 ACCESS DOORS AND PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access door and frame units.

2. Wall- and ceiling-mounted locations.

B. Related Documents: The Contract Documents, as defined in Section 01010 - Summary of Work, apply to the work of this Section. Additional requirements and information necessary to complete the work of this Section may be found in other Documents.

C. Related Sections:

1. Section 03300 - Cast-In-Place Concrete: Substrate for anchorage.

2. Section 04200 - Reinforced Unit Masonry: Substrate for anchorage.

3. Section 05600 - Non-Load Bearing Steel Framing: Wall and ceiling framing for attachment of units.

4. Section 09250 - Gypsum Board: Adjacent wall and ceiling finish material.

5. Section 09900 - Painting: Field painting of door and frame units.

1.2 DESCRIPTION OF WORK

A. The extent of access door work is indicated on the Architectural, Mechanical, Plumbing and Electrical Drawings and as specified herein, and includes providing and installing access doors where access to mechanical, plumbing and electrical items is required, whether or not the access doors are shown on the Drawings.

1.3 REFERENCES

A. The publications listed below form a part of this Specification to the extent referenced. Publications are referred to in the text by basic designation only.

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

1. ASTM A 153 / A 153M - Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

2. ASTM A 568 / A 568M - Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.

3. ASTM A 653 / A 653M - Specification for Steel Sheet, Zinc-Coated

(Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.

4. ASTM A 1008 / A 1008M - Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

5. ASTM A 1011 / A 1011M - Specification for Steel, Sheet and Strip, Hot-Rolled,
Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

6. ASTM D 2201 - Practice for Preparation of Zinc-Coated and Zinc-Alloy-Coated Steel Panels for Testing Paint and Related Coating Products.

C. National Fire Protection Association (NFPA):

1. Standard No. 80 - Standard for Fire Doors and Other Opening Protectives.

1.4 SUBMITTALS

A. Section 01330 - Submittal Procedures: Procedures for submittals.

1. Product Data: Manufacturer=s technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions and directions for installation of anchorage devices.

2. Shop Drawings: Indicate the location, size, type, finish, hardware, and details of adjoining work for all access door units.

3. Schedule: Indicate all doors by type, size, rating and location keyed to the Drawings.

3. Assurance / Control Submittals:

a. Manufacturer's certificate that products meet or exceed the specified requirements.

b. Documentation of experience indicating compliance with the specified qualifications requirements.

B. Section 01780 - Closeout Submittals: Procedures for closeout submittals.

1. Project Record Documents: Accurately record the location of all access units.

2. Warranty: Submit a written special Warranty with forms completed in the name of the Owner and registered with the manufacturer.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Company specializing in manufacturing the products specified

with a minimum of five (5) years documented experience.

B. Fire-Resistance Ratings: In all Corridor walls, rated partitions and ceilings, provide access door assemblies with panel door, frame, hinge, and latch from a manufacturer listed in Underwriter=s Laboratories, Inc; AClassified Building Materials Index@ for 90 minutes rating.

1. Provide UL label on each fire-rated access door.

C. Size Variation: The selected manufacturer=s standard units may vary in size slightly from the sizes indicated herein. Secure the Owner representative=s approval for sizes that differ from the units specified.

D. Coordination: Furnish inserts and anchoring devices which must be built into other work for the installation of access doors. Coordinate delivery with other trades to avoid delaying the work.

1.6 DELIVERY, STORAGE AND HANDLING

A. Section 01600 - Product Requirements: Transport, handle, store, and protect the products.

B. Deliver products to the Project Site in the manufacturer=s original, unopened packaging, dry and undamaged with seals and labels intact.

C. Handle and store to prevent damage to frames, panels and operating mechanisms.

1.7 WARRANTY

A. Section 01780 - Closeout Submittals: Procedures for closeout.

B. Special Warranty:

1. Provide a written Warranty, signed by the manufacturer, and the Installer agreeing to repair or replace doors and panels that do not meet the requirements, or that fail in materials or workmanship.

2. Warranty Period: Two (2) years from the date of Substantial Completion.

2.1 ACCESS DOORS

A. General: Manufacturers standard fully-welded steel construction. Provide units with means for anchoring properly to the adjacent construction.

B. Non-Fire-Rated Units:

1. Doors:

a. Flush Units: 14 gage, minimum.

b. Recessed Units: 18 gage, minimum.

2. Hinges: Stainless steel, piano or pin type, concealed and continuous, 175 degrees opening, constant force closure, spring type.

3. Operation: Flush screw driver slot for quarter turn cam latch with welded steel access sleeves at recessed panel doors.

C. Fire-Rated Units: As required for the fire-rating, but not less than the following:

1. Doors: Steel-faced, insulated core panel, 20 gage minimum.

2. Hinges: Stainless steel, piano or pin type, concealed and continuous, 175 degrees opening, constant force closure with spring or other self-closing mechanism.

3. Operation: Flush screw driver slot for quarter turn cam latch.

D. Unit Construction Types:

1. Non-Fire-Rated:

a. Flush: Flush door with bead to give the unit a frameless appearance.

b. Recessed: Recessed door to allow installation of acoustical tile, gypsum board or similar finish into the recess to provide a concealed appearance. Units for plaster or mortarbed to have integral expanded metal lath.

c. Universal: Flush door with exposed frame, Exposed flange of frame not to exceed 1" in width.

2. Fire-Rated: Flush insulated door with exposed frame. Exposed flange of frame not to exceed 1" in width, unless approved otherwise.

2.2 FABRICATION

A. General: Fabricate each access door assembly as an integral unit, complete, with all necessary parts, and ready for installation.

B. Steel Access Doors and Frames: Fabricate units of continuous welded steel construction. Fill and grind welds smooth and flush with adjacent surfaces. Fabricate units square. Furnish attachment devices and fasteners of the type required to secure the units to the adjacent substrate. All doors in fire-rated assemblies shall have been tested and have a Class B, 1-1/2 hour fire-rating label attached.

C. Frames and Flanges:

1. Fabricate frames from 16 gage steel, minimum, with exposed flanges approximately 1" in width around the perimeter of the frame for units to be installed in the following construction types, except as noted:

a. Exposed concrete.

b. Exposed masonry.

c. Gypsum board.

d. Plaster.

e. Ceramic tile.

f. Wood paneling, flush type with wood inlay to match the adjacent panel.

2. For installation in masonry construction, fabricate frames with adjustable metal masonry anchors.

3. For installation in plaster finish, fabricate frames with galvanized expanded metal lath, and exposed casing bead welded to the perimeter of the frame.

D. Access doors and frames for installation in concrete, masonry, plaster and ceramic tile shall be flush, stainless steel; #4 satin finish: Model DSC-214M by Karp Associates or approved equal.

E. Access doors for installation in gypsum board shall be concealed frame, recessed; finish as selected:

F. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets. Install in a hole cut thru the finish material.

G. Finish: Phosphate treated and shop painted with the manufacturer=s standard rust inhibitive primer.

2.3 ACCESSORIES

A. Anchorage Devices:

1. Devices of the type required to secure units to the abutting structure.

2.4 SCHEDULE

A. General: Where not otherwise indicated, provide access doors in accordance with the following:

1. Size: As required to comfortably achieve the purpose for which access is required.

2. Types:

a. Flush: In non-public areas that are not restrooms, conference rooms or offices.

b. Recessed: In all public areas, restrooms, conference rooms and offices.

c. Universal: In exposed concrete and masonry surfaces.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01700 - Execution Requirements: Verification of existing conditions before starting the work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive the work.

1. Verify that rough openings for the units are correctly located and properly sized.

C. Report, in writing, prevailing conditions that will adversely affect satisfactory execution of the work of this Section. Do not proceed with the work until the unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install units in accordance with the manufacturer's published instructions, where indicated on Drawings, and where required for access.

B. Coordinate with mechanical, plumbing and electrical trades and other work requiring access.

C. Position units to provide convenient access to concealed work requiring access.

D. Set frames in position accurately and securely attached to supports with face panels plumb and level in relation to the adjacent finish surfaces.

E. Field paint surfaces exposed to view. See Section 09900 - Painting.

F. Built-in anchors and grouting of frames in concrete and masonry is included in Sections of Divisions 3 and 4.

3.3 PROTECTION

A. Institute and maintain protective measures and take other precautions necessary to ensure that all assemblies will be without damage and deterioration at the time of final acceptance.

3.4 ADJUSTING

A. Section 01700 - Execution Requirements: Adjusting the installed work.

B. Adjust hardware and panels after installation for proper operation.

C. Remove and replace panels and frames that are warped, bowed, twisted or otherwise damaged.

3.5 FIELD QUALITY CONTROL

A. Section 01450 - Quality Control: Field inspection.

B. Inspect installed units for location, alignment, plumb, level, attachment to framing, and operation.

3.6 CLEANING

A. Section 01700 - Execution Requirements: Cleaning the installed work.

B. Clean the units before final acceptance inspection.

END OF SECTION

SECTION 08400

WINDOWS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aluminum and glass exterior and interior entrances.
2. metal flush doors.
3. Aluminum windows, fixed and operable.
4. Glass and glazing in-fill and vision panels.
5. Door hardware.
6. Window hardware.
7. Perimeter sealants.

B. Related Documents: The Contract Documents, as defined in Section 01010 - Summary of Work, apply to the work of this Section. Additional requirements and information necessary to complete the work of this Section may be found in other Documents.

C. Related Sections:

1. Section 03300 - Cast-In-Place Concrete: Substrate for anchorage.
2. Section 04230 - Reinforced Unit Masonry: Substrate for anchorage.
3. Section 07900 - Joint Sealers: Sealants for a weatherproof installation.
4. Section 08710 - Door Hardware: Hardware not specified in this Section.
5. Section 08800 - Glass and Glazing: Glazing for entrances, storefronts, sidelites, doors and windows including those specified herein to be factory-glazed.
6. Section 09110 - Non-Load Bearing Steel Framing: Non-structural framing for adjacent wall and ceiling finishes.
7. Section 09250 - Gypsum Board: Adjacent wall and ceiling finish material.
8. Section 09900 - Painting: Field painting of components.

1.2 DESCRIPTION OF WORK

A. The extent of the work of this Section is indicated on the Drawings and Schedules and as specified herein, and includes providing and installing aluminum exterior and interior doors, entrances, storefronts, sidelites, flush doors, tempered glass doors, sliding doors and operable and fixed windows; tubular aluminum sections, shop-fabricated, factory-finished; glass and glazing in-fill; related flashings; anchorage and attachment devices; hardware; sealants.

B. Provide complete operating door assemblies including door curtains, guides, hardware, operators, motors, and installation accessories. Coordinate with other hardware requirements in Section 08700.

C. The systems are standard units to the shapes indicated, combined with extruded sections to create the profiles indicated.

D. Provide assemblies that have been designed and fabricated to comply with requirements of the system performance characteristics below, as demonstrated by testing the manufacturer=s corresponding stock systems in accordance with the test methods designated.

E. Preparation of openings, structural support, access panels, finish and trim for openings, construction of storage pockets and painting shall be furnished and installed under other Sections herein.

1.3 REFERENCES

A. The publications listed below form a part of this Specification to the extent referenced. Publications are referred to in the text by basic designation only.

B. Aluminum Association (AA):

1. AA DAF45 - Designation System for Aluminum Finishes.

C. American Architectural Manufacturers Association (AAMA):

1. AAMA 101 - Specification for Windows, Doors and Skylights.

2. AAMA 501.1 - Methods of Test for Exterior Walls.

3. AAMA 605.2 - Specification for High Performance Organic Coating on Architectural Extrusions and Panels.

4. AAMA 607.1 - Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.

5. AAMA 608.1 - Specification and Inspection Methods for Electolytically Deposited Color Anodic Finishes for Architectural Aluminum.

6. AAMA 611 - Specification for Anodized Architectural Aluminum.

7. AAMA 701.2 - Specifications for Pile Weatherstripping and Replaceable Fenestration Weatherseals.

8. AAMA 1503.1 - Test Method for Condensation Resistance of Windows.

9. Manual #10 - Care and Handling of Architectural Aluminum From Shop to Site.

10. SFM-1-87 - Aluminum Storefront and Entrance Manual- AAMA Technical Reference Manual - Volume III.

D. American National Standards Institute (ANSI):

1. ANSI A 117.1 - Safety Standards for the Handicapped.

2. A156.4 **-** Door Controls - Closers.

3. ANSI A 156.5 - Standard for Auxiliary Locks and Associated Products.

4. ANSI Z97.1 - Safety Glazing Materials Used in Buildings - Methods of Test.

E. American Society of Civil Engineers (ASCE):

1. ASCE / SEI 7 - Minimum Design Loads for Buildings and Other Structures.

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

1. ASTM A 36 / A 36M - Specification for Carbon Structural Steel.

2. ASTM B 209 - Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

3. ASTM B 221 - Specification for Aluminum and Aluminum-Alloy Extended Bars, Rods, Wire, Profiles, and Tubes.

4. ASTM B 308 / B 308M - Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.

5. ASTM E 283 - Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Difference Across the Specimen.

6. ASTM E 330 - Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

7. ASTM E 331 - Test Method for Water Penetration of Exterior Windows, Skylight, Doors, and Curtain Walls by Uniform Static Pressure Difference.

8. ASTM E 547 - Test Method for Water Penetration of Exterior Window, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference.

9. ASTM E 1996 - Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.

10. ASTM F 588 - Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact.

11. ASTM F 842 - Test Methods for Measuring the Forced Entry Resistance of Sliding Door Assemblies, Excluding Glazing Impact.

G. Americans with Disabilities Act Accessibility Guidelines (ADAAG).

H. American Welding Society (AWS):

1. AWS A5.10 / A5.10M - Specification for Bare Aluminum and Aluminum-Alloy Welding Electrodes and Rods.

2. AWS D1.1 / D1.1M - Structural Welding Code - Steel.

I. Code of Federal Regulations:

1. 16 CFR 1201 - Safety Standards for Architectural Glazing Materials.

J. Glass Association of North America:

1. Glazing Manual.

K. International Code Council:

1. International Building Code (IBC), 2009.

L. International Organization for Standards (ISO):

1. ISO 9001 - Quality Management Systems.

M. National Association of Architectural Metal Manufacturers (NAAMM):

1. Metal Finishes Manual for Architectural and Metal Products.

N. SSPC: Society for Protective Coatings (formerly Structural Steel Painting Council):

1. Paint 12 - Cold-Applied Asphalt Mastic (Extra Thick Film).

1.4 PERFORMANCE TESTING

A. General:

1. Perform tests on complete assembly mock-ups. Comply with the requirements indicated below. Perform tests prior to the start of fabrication.

2. Where the manufacturer=s standard system complies with the requirements, and has been tested in accordance with the specified tests, provide certification by the manufacturer showing compliance with such tests.

B. Air Infiltration: Air infiltration rate shall not exceed 0.15 cfm / sq. ft. and 0.37 cfm / ft. of crack length when tested at a static air pressure differential of 6.24 psf when tested per ASTM E 283.

C. Static Water Resistance: Specimen shall be subjected to a static pressure of 10.0 psf with a water spray application rate of 5 gph / sq. ft. for a duration of 15 minutes. No uncontrolled leakage is allowed. Tested per ASTM E 331.

D. Seismic Performance at Design Displacement:

1. For buildings 4-stories and higher.

2. The middle row of the anchors shall be shifted parallel to the plane of the wall for a distance of 0.75" in one direction, held for 10 seconds, then back to center, then the other direction 0.75", held for 10 seconds, then back to center. Visual observations shall be made at 1/4" displacements in both directions.

3. The test shall be repeated two additional times with no failure or gross permanent distortion of the anchors, frames or glass. Glazing gaskets may not disengage and weather seals shall not fail.

E. Cyclic Water Resistance: Sliding doors shall be subjected to four (4) test cycles, with each cycle consisting of a static pressure of 12.0 psf with a water spray application of 5 gph / ft for a duration of 5 minutes each, and a 1 minute duration with pressure released but water application continuously applied. No uncontrolled leakage is allowed. Tested per ASTM E 547.

F. Forced Entry Resistance: ASTM F 588 or ASTM F 842, performance level 10.

G. Uniform Load: No deflection in excess of L / 175 of the span of any framing member at a structural test load equal to 1.5 times the specified design windload; no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans with a static air design load of 20 psf applied in the positive and negative directions in accordance with ASTM E 330.

H. Component Structural Tests: Perform operating, hardware, sash rail rigidity and other tests called for by AAMA AVoluntary Guide Specification for Aluminum Architectural Windows".

1.5 SUBMITTALS

A. Section 01330 - Submittal Procedures: Procedures for submittals.

1. Product Data: Manufacturer=s technical product data, specifications, standard details, and installation recommendations for the components required. Provide component dimensions; describe components within the assembly, anchorage and fasteners, glass and glazing in-fill, hardware, and internal drainage details.

2. Shop Drawings: Drawings for fabrication and installation of the required systems; indicate the system dimensions, framed opening requirements, tolerances, and affected related work; include plans, elevations, detailed sections of typical composite members, hardware mounting heights, reinforcement, and expansion and contraction joint locations. Show anchors, hardware and other components not included in the manufacturer=s Product Date; include glazing details.

3. Samples:

a. Aluminum Extrusions: Two (2) samples of each required aluminum finish on 12" long sections of the extrusion shapes required for the system.

b. The Architect reserves the right to require additional samples which show fabrication techniques, workmanship of component parts, design of the hardware and other exposed auxiliary items.

c. Glazing: Submit samples per Section 08800 - Glass and Glazing.

4. Assurance / Control Submittals:

a. Manufacturer's certification or test reports certifying that the products have been tested and comply with the performance testing requirements.

b. Calculations indicating that the system and anchorages meet the Performance Requirements and the Building Code indicate anchor spacing. Indicate the number and placement of weld-in anchors and supplemental steel jamb and frame reinforcing, as necessary.

c. Certification that the door system meets the performance design criteria in accordance with the following:

i. ANSI A 156.10.

ii. NFPA 101.

iii. UL 325.

iv. IBC - 2009.

d. Documentation of experience indicating compliance with the specified qualifications requirements.

f. Manufacturer=s Operation and Maintenance Data..

B. Section 01780 - Closeout Submittals: Procedures for closeout submittals.

1. Manufacturer=s Operation and Maintenance Manual.

2. Warranty: Submit a written special Warranty with forms completed in the name of the Owner and registered with the manufacturer.

1.6 COORDINATION

A. Pre-Installation Meeting: Convene a Pre-Installation Meeting at the Project Site prior to beginning the work of this Section.

1. Require attendance of the Contractor, Owner=s representative, Architect, and representative of the Installer.

2. Review the coordination required for proper installation.

3. Review preparation and installation procedures, and the coordination and scheduling required with other related work.

B. Check Shop drawings for other work to confirm that adequate provisions are made for locating and installing doors in compliance with the requirements.

1.7 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer:

a. Company specializing in manufacturing the products specified with a minimum of five (5) years documented experience.

b. Company capable of providing field service representation during installation, approving an acceptable installer, and approving the installation.

2. Installer:

a. Company experienced in performing the work of this Section with a minimum of five (5) years documented experience.

b. Company with supervisory staff trained and approved by the door manufacturer and with the trained supervisory personnel observing and directing the work.

c. Company capable of providing field service after installation.

B. Performance Requirements:

1. Provide assemblies capable of withstanding the wind loads and thermal movements based on testing of the manufacturer=s standard units in assemblies similar to those indicated for this Project.

2. Provide the capacity to withstand the following wind loading requirements:

a. Design, fabricate and install to resist combined positive and negative windloading in accordance with ASCE 7, Chapter 6 with a Vmph of 170, qs of 74.0 psf, exposure C and Importance Factor of 1.0.

3. Thermal Movement:

a. Provide for thermal movement resulting from the following maximum change in ambient and surface temperatures to prevent buckling, opening of joints, over stressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculations on surface temperatures of the materials due to both solar heat gain and nighttime heat loss.

i. Ambient temperature range: 120□ F.

ii. Materials surface: 180□ F.

C. Furnish complete units produced by a single manufacturer, including hardware, accessories, tracks, mountings, and installation components.

D. Unless otherwise acceptable to the Architect, furnish all units and assemblies for the entire Project by one manufacturer.

E. Design Criteria: The Drawings are based on Kawneer=s standard aluminum entrance, storefront, sidelite, sliding door and operable and fixed window systems. Other manufacturer=s standard system of similar and equivalent nature may be acceptable when the difference does not materially detract from the design concept or required performance, as judged solely the Architect. The plans, elevations and details show the spacing of members as well as profiles and similar dimensional requirements, and the entrance, storefront, sidelights, and door and windows work.

1.8 DELIVERY, STORAGE AND HANDLING

A. Section 01600 - Product Requirements: Transport, handle, store, and protect the products.

B. Protect finished aluminum surfaces with a strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

C. Pack, box, ship, unload, store and protect products in a manner to avoid breakage, abuse, damage and defacement.

D. Deliver products to the Project Site in the manufacturer=s original, unopened protective packaging.

E. Store inside, protected from weather.

F. Stack vertically on edge to provide for water drainage and air circulation.

G. Break seals to permit ventilation.

1.9 WARRANTY

A. Section 01780 - Closeout Submittals: Procedures for closeout submittals.

B. Special Warranty:

1. Provide a joint and severable written Warranty signed by the manufacturer, Contractor and Installer, certifying that the products and installation is free of defective materials and workmanship, and agreeing to repair or replace any defective component, or the system, in whole or in part, as necessary, to restore the product to its original intended state and integrity. Warranty shall include responsibility for removal and replacement of other work which may conceal door parts.

2. Warranty Period: Two (2) years from the date of Substantial Completion.

A.

2.2 MATERIALS AND ACCESSORIES

A. Aluminum Members: Alloy and temper as recommended by the manufacturer for strength, corrosion resistance, and application of the required finish; ASTM B 221 for extrusions, ASTM B 209 for sheets and plates.

B. Steel Sections: ASTM A 36 / A 36M; shaped to suit the mullion sections.

C. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125" thick, reinforce the interior with aluminum or non-magnetic stainless steel to receive the screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.

D. Brackets and Reinforcements: Manufacturer=s high-strength aluminum units where feasible, otherwise, non-magnetic stainless steel. Steel reinforcing shapes to be stainless steel or hot-dip galvanized steel complying with ASTM A 123 / A 123M.

E. Concealed Flashings: Dead-soft stainless steel, 26-gauge minimum, or extruded aluminum, 0.062" minimum, of an alloy and type selected by the manufacturer for compatibility with other components.

F. Anchors: Drill-in expansion bolts or weld-in type with in-place steel anchors welded to steel plates anchoring the frame.

G. Fasteners:

1. Aluminum, non-magnetic stainless steel, or other materials warranted by the manufacturer to be non-corrosive, and compatible with aluminum components.

2. Do not use exposed fasteners for the attachment of hardware, except where unavoidable and where clearly noted on submittal shop drawings.

3. Provide Phillips flat-head machine screws for exposed fasteners. Finish shall match the finish of the adjoining metal.

H. Glass and Glazing Materials: Provide glass and glazing materials which comply with the requirement of Section 08800 - Glass and Glazing, including for doors and windows specified to be factory-glazed.

I. Weatherstripping: Provide compression-type weatherstripping at the perimeter of each operating sash; manufacturer=s standard replaceable stripping of either molded neoprene gaskets complying with ASTM D 2000, or molded PVC gaskets complying with ASTM D 2287, or molded neoprene gaskets complying with ASTM C 509, Grade 4.

J. Sealant and Backing Materials: Unless otherwise indicated for sealants required within fabricated window units, provide a type recommended by the product manufacturer for the joint size and movement, to remain permanently elastic, non-shrinking and non-migrating. Comply with Section 07900 - Joint Sealers, for installation of sealants and backing

materials.

2.3 FABRICATION

A. Sizes and Profiles: The sizes for units, including profile requirements, shall be as indicated and as required to meet the Performance Requirements. Any variable dimensions are indicated, together with maximum and minimum dimensions required to achieve the design requirements and coordination with other work.

B. Field Measurement: Wherever possible take field measurements prior to the preparation of Shop Drawings and fabrication to ensure proper fitting of the work. Proceed with fabrication and coordination, as necessary, when the taking of field measurements might delay the work.

C. Prefabrication: To the greatest extent possible, complete fabrication, assembly, finishing, hardware application, and other work before shipment to the Project Site. Disassemble components only as necessary for shipping and installation.

1. Pre-glaze door and window units to the greatest extent possible, in coordination with the installation and hardware requirements.

2. Do not drill and tap for surface-mounted hardware items until the time of installation at the Project Site.

3. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work in a manner to prevent damage to exposed finish surfaces. For hardware, perform these operations prior to the application of finishes.

4. Fabricate framing for glazing from the inside, except for large plates of glass which may be glazed from the outside.

D. Glazing: Provide for the following edge clearances:

	Single Glazed
Nominal edge cover (bite)	5/16"
Minimum nominal edge clearance	1/8"
Minimum face clearance	1/8"

1. Glass must be edge blocked to prevent contact with the metal framing.

E. Reinforcing: Install reinforcing, as necessary, to meet the Performance Requirements.

F. Welding: Comply with AWS recommendation to avoid discoloration; grind exposed welds smooth and restore mechanical finish.

G. Continuity: Maintain accurate relationship of planes and angles, with hairline fit at contacting members.

H. Fasteners: Conceal fasteners wherever possible.

I. Weatherstripping: For exterior doors and windows, provide compression weatherstripping

against fixed stops, at other edges provide sliding weatherstripping retained in adjustable strip mortised into door edges.

J. Structural Silicon Sealant: As recommended by the manufacturer.

K. Door Hardware:

1. Section 01310 - Project Management and Coordination: Verification of hardware components specified in Section 08710 - Door Hardware.

2. Door Hinges: Door manufacturer=s standard butt hinges, US32D finish.

3. Offset Pivots: Where indicated provide top**,** intermediate and bottom offset pivots; assemblies complying with ANSI A 156.4, Grade 1 requirements; cast aluminum-alloy, baked epoxy finish to match the door finish; door manufacturer=s standard.

4. Concealed Overhead Closers: Single-acting manual, with built-in door stop, 105% hold open; door manufacturer=s standard. ADAAG compliant.

    a. Force for pushing or pulling open interior doors shall not exceed 5-pounds.

    b. For push button operated openers see 08710.

5. Push / Pulls and Panic Hardware: Standard to the door manufacturer, directly mounted on the glass.

    a. CP-II Push and CO-9 Pull by Kawneer. Finish to match door. Use where an exit device and / or exterior trim is not specified.

6. Deadlocks: Three-point locks, located in the bottom rail.

7. Door Locking Devices (where noted in Section 08710): Adams Rite MS+1890 deadbolt / latch, double cylinder operation. Finish: 628.

8. Exit Devices: Concealed vertical rods with crash bar doggable; exterior mortise trim. Clear #17 finish for exterior / exit doors.

    a. Latch shall release when subject to a 15-pound force.

9. Three-point Lock: #4015 foot bolt and #4085 head bolt by Adams Rite.

10. Flush Bolt: Top and bottom flush; surface-mounted in the nose of the door stile.

11. Automatic Door Bottoms: 3/4" mortise type; Pemko #420 AVL.

12. Floor-Mounted Holder: Rubber cushioned stop with door-mounted holder; door manufacturer=s standard.

13. Weatherstripping (Exterior doors only): As selected from the manufacturer=s standards.

a. Head and Jamb: Replaceable wool, polypropylene, or nylon wool pile with aluminum strip backing, recessed in the frame; AAMA 701.2.

b. Sill: Semi-rigid polymeric material on aluminum anodized to match the door; EPDM sweep strip; 38-560 by Kawneer.

14. Thresholds: Weatherproof, 4" or 6", as detailed, mill-finished aluminum, standard for offset pivots; cut as required for carpet or tile adaptation as detailed. ADAAG compliant.

15. Other Hardware: As described in the door manufacturer=s literature, as specified or as required.

16. Section 01600 - Product Requirements: Product Options: Substitutions permitted.

2.4 ALUMINUM WINDOWS

A. General: The drawings and following paragraphs define the operating arrangement for the types of sash (ventilators) required in the window units, and specify the minimum provisions for each type. The Drawings indicate which panels of each window unit are operable sash and which are fixed. Where two or more types of operating sash are included in the same window unit, the operation of each is indicated, and the unit is considered a "Combination Window".

Provide the following:

1. High rise sill with subsill sill pan at each sliding door and window.

2. Swing limiters set at 4" at all operating sashes.

3. Insect screens with maximum opening at the lock side of the operating sashes unless indicated otherwise.

B. Projecting Window Units: Out-swinging, top-hinged, unless otherwise noted, 2-1/4" frame depth; horizontal pivoting with extruded 360 degree aluminum pivots; concealed limit stop and removable key handle lock at each vent; interior glazed. 7225 Non-Thermal,

C. Horizontal Sliding Window Units: Commercial high performance quality, stainless steel roller assemblies, locks and keepers, two-piece compensating head detail; 4" frame depth with interior insect screens; interior glazed.

D. Hardware:

1. Locking handles, cases, keepers, catches and fasteners shall be of a corrosion-resistant material compatible with aluminum.

2. Hardware shall meet AAMA tests and be suitable for its intended use.

2.5 GLASS AND GLAZING MATERIALS

A. Glazing: As specified in Section 08800 - Glass and Glazing.

B. Double wet glaze with Dow 995, or approved equal.

2.6 SEALANT

A. Sealant and Backing Materials:

1. Perimeter Sealant: Type as specified in Section 07900 - Joint Sealers.

2. Sealant Used Within the System (Not for Glazing): Type as specified in Section 07900 - Joint Sealers.

2.7 HARDWARE

A. General: Provide the manufacturer=s standard heavy-duty hardware units, as indicated, scheduled, or as required for the operation of each door and window, as recommended by the manufacturer for the service required; finish to match the frame unless otherwise indicated.

2.8 FINISHES

A. Exposed Aluminum Surfaces:

1. Clear anodized or as selected fromthe manufacturer=s standard finishes.

2. Polyvinylidine fluoride, or equal as selected from manufacturers standard colors.

B. Maintain same color range on doors, frames and other components. Do not mix light and dark shades within an assembly.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01700 - Execution Requirements: Verification of existing conditions before starting the work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive the work.

1. Verify that related work performed under other Sections has been completed, and is in accordance with approved Shop Drawings.

2. Verify that openings are dimensionally within allowable tolerances, plumb, level, clean and provide for proper anchoring.

C. Report in writing, prevailing conditions that will adversely affect satisfactory execution of the work of this Section. Do not proceed with the work until the unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install doors and windows, complete, with all necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports in accordance with approved Shop Drawings, manufacturer's instructions, to meet the Performance Requirements, and as specified herein.

B. Attach to the structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Anchor and weld securely in place; provide alignment attachments and shims to permanently fasten systems and units to the building structure. Anchorages shall be concealed.

D. Comply with AWS recommendation to avoid discoloration; grind exposed welds smooth and restore the mechanical finish.

E. Align assemblies and units plumb, level and true to line, without warp or rack of framing members, doors, windows and panels. Maintain assembly dimensional tolerances; align with adjacent work.

F. Install sill flashings with turned up edges and ends; seal to adjacent work to form a water tight dam.

G. Install compensating channels at door and window heads where indicated.

H. Ensure water drainage away from glazing.

I. Coordinate the attachment and seal of perimeter air and vapor barrier materials.

J. Provide thermal isolation where components penetrate or disrupt the building insulation. Pack fibrous insulation in shim spaces at the perimeter of assemblies and units to maintain continuity of the thermal barrier.

K. Install hardware using templates provided, and in accordance with the installation requirements in Section 08710 - Door Hardware.

L. Drill and tap frames, doors and windows and apply surface-mounted hardware items in compliance with the hardware manufacturer=s instructions and templates. Use concealed fasteners wherever possible.

M. Set sill members, thresholds and other members in a bed of sealant, as indicated, or with joint fillers or gaskets, as indicated, to provide a weathertight installation. Coordinate the installation with wall flashings and other components of the work. Comply with the requirements of Section 07900 - Joint Sealers.

N. Apply sealants to provide a watertight installation at all joints and intersections and at all opening perimeters. Install perimeter sealants and backing materials in accordance with the installation requirements of Section 07900 - Joint Sealers.

O. Set thresholds in a bed of mastic, and secure.

P. Refer to Section 08800 - Glass and Glazing for the installation of glass and other panels shown to be glazed into doors, windows and framing, and not pre-glazed by the manufacturer.

Q. Separate aluminum and other corrodible metal surfaces from sources of corrosion and electrolytic action at points of contact with other metals. Isolation Requirements:

1. Dissimilar Metals: Where aluminum surfaces are in contact with, or fastened to dissimilar metals except stainless steel, zinc or zinc coating, protect aluminum from the dissimilar metal. Where aluminum contacts another metal, paint the dissimilar metal with epoxy paint. Where drainage from a dissimilar metal passes over aluminum, paint the dissimilar metal with a non-lead pigmented paint.

2. Cementitious Materials: Paint aluminum where in contact with mortar, concrete or other cementitious material, with an alkali-resistant coating such as heavy-bodied bituminous paint or epoxy paint.

3. Wood Contact: Isolate aluminum from cedar, redwood, oak and acid-treated lumber by means of unbroken 6-mil polyethylene construction sheet or a heavy coating of metal-protective paint.

4. Surfaces in contact with sealants after installation shall not be coated with any type of protective material.

3.3 ADJUSTING

A. Section 01700 - Execution Requirements: Adjusting installed work.

B. Adjust operating hardware to function properly, without binding, and to prevent tight fit at contact points and weatherstripping.

C. Doors operation shall meet ADAAG requirements for opening force.

D. Repair damaged finishes to match the original finish.

3.4 FIELD QUALITY CONTROL

A. Section 01450 - Quality Control: Field testing and inspection.

B. Inspect installations for alignment, level, plumb, secure attachment to the structure, and smooth and proper operation.

C. On-Site Tests:

1. If the units do not appear to meet air or water infiltration requirements, the Owner, may require on-site tests shall be conducted for both air and water infiltration, with the door manufacturer=s representative present. The Owners representative will select the unit(s) to be tested. If such unit(s) fail to meet the specified air and water requirements, the reason for failure shall be jointly determined.

2. Tests shall be conducted in accordance with AAMA 101-88.

3. The responsible Contractor shall correct tested units that do not meet the specified requirements, and all units with similar deficiencies, at no additional cost to the Owner.

4. The cost for all successful tests, both original and retest shall be paid by the Owner. All unsuccessful tests, both original and retest, shall be paid for by the responsible Contractor.

5. The testing shall be done by an AAMA-accredited testing agency, selected by the Owner=s representative and the manufacturer, and shall be employed by the responsible Contractor.

3.5 CLEANING

A. Section 01700 - Execution Requirements: Cleaning the installed work.

B. Remove protective material from pre-finished aluminum surfaces.

C. Promptly after the installation of glass and sealants, clean the completed system, inside and out, exercise care to avoid damage to coatings and finishes.

D. Remove excess glazing and joint sealants, dirt, and other substances from aluminum surfaces by a method acceptable to the sealant manufacturer.

E. Wash down exposed surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean and dry.

3.6 PROTECTION

A. Implement and maintain protective measures, and take other precautions necessary to ensure that all assemblies will be without damage and deterioration at the time of Substantial and Final Completion.

END OF SECTION

SECTION 08560 STORM PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Removable storm panels.

2. Accordion shutters.

3. Hinged aluminum shutters.

B. Related Documents: The Contract Documents, as defined in Section 01010 - Summary of Work, apply to the work of this Section. Additional requirements and information necessary to complete the work of this Section may be found in other Documents.

C. Related Sections:

1. Section 03300 - Cast-In-Place Concrete: Substrate for supporting storm protection.

2. Section 04230 - Reinforced Unit Masonry: Substrate for supporting storm protection.

1.2 DESCRIPTION OF WORK

A. The extent of storm protection work is indicated on the Drawings and Schedules and as specified herein, and includes providing and installing products applied to exterior doors, windows, storefronts and open areas in buildings.

B. Take field measurements prior to the preparation of Shop Drawings and fabrication of the protection units**.**

1.3 REFERENCES

A. The publications listed below form a part of this Specification to the extent referenced. Publications are referred to in the text by basic designation only.

B. American Society of Civil Engineers (ASCE):

1. ASCE / SEI 7 - Minimum Design Loads for Buildings and Other Structures.

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

1. ASTM B 633 - Specification for Electrodeposited Coatings of Zinc on Iron and Steel.

2. ASTM B 766 - Specification for Electrodeposited Coatings of Cadmium.

3. ASTM E 330 - Test Method for Structural Performance of Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

4. ASTM E 1996 - Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.

D. International Code Council:

1. International Building Code (IBC), 2009.

1.4 SYSTEM PERFORMANCE

A. Provide storm protection units with materials and assemblies to conform to the Building Code, Wind Load requirements for storm panels / shutters for external application, except where more stringent requirements are indicated.

B. Performance Requirements:

1. Provide the capacity to withstand the following loading requirements:.

a. Design and install to resist combined positive and negative windloading in accordance with IBC 2009, Section 1609 with a Vmph of 170, qs of 74.0 psf, exposure [B] [C] [D], and importance factor of [1.0] [1.25] [1.5], as applicable per ASCE 7.

2. Heights above ground level are indicated on or can be calculated from the Drawings.

1.5 SUBMITTALS

A. Section 01330 - Submittal Procedures: Procedures for submittals.

1. Product Data: Manufacturer's product literature and specifications describing the storm protection products, including color selections and finishes.

2. Shop Drawings: Show elevations of units, full size profiles of frame and track members; thickness of metal; sizes, types, materials, finishes, and location of fasteners; type, material and location of operating hardware, mullion details; and details of installation, including connection and relationship to other work.

a. Include a schedule showing the location of units for each size and type.

3. Samples: Submit two (2) each pieces of the assemblies, and the required finish on 6" long sections of typical frame members, plus a 12" x 12" sample of the panel itself.

4. Test Reports: Submit certified laboratory test reports evidencing that storm panels of the type indicated comply with the performance requirements.

2.1 MATERIALS

A. Provide alloys complying with ANSI / AAMA 1002.10 and as recommended by the aluminum producer for the forming and fabricating process used by the manufacturer and for the type of finish required.

B. Other Materials: Where metals other than aluminum are standard with the manufacturer for concealed reinforcing, concrete inserts, fasteners and hardware, use stainless steel or other non-corrosive materials which are compatible with aluminum. Electroplate steel, if used for reinforcing members, with zinc or cadmium coating complying, respectively, with ASTM B 633 or B 766. For exposed fasteners match the color and finish of the metal material being fastened.

C. Non-Metalic Spacers: Provide the manufacturer's standard vinyl, rubber or high density polyurethane spacers, not less than 1/8" thick, to separate storm shutters from contact with metal prime windows.

2.2 REMOVABLE STORM PANELS

A. Headers and Sills: Slip-in type, and made of extruded aluminum alloy 6063-T5.

B. Structural Panels: Roll-formed from aluminum alloy 3003-H16, of a thickness to withstand the positive and negative forces applied on the spans required, but not less than 0.065". Panels shall be designed to allow nesting for storage with T&G edges for interlocking of erected panels at 12"o.c..

C. Clips and Wing Nuts: Stainless steel, standard with the manufacturer.

D. Reinforcing Tubes and Frames, Door Angel Frames and Stops: Sizes and shapes, and fabricated as detailed, extruded aluminum alloy 6063-T5.

E. Aluminum Mill Finish: For panels, angles, tubes, embedded items, and removable base and head members.

F. Anodized Finish: Match the finish of the adjacent windows for base and head members which are to remain permanently in-place.

2.3 ACCORDION SHUTTERS

A. Headers and Sills: 0.125" thick extruded aluminum alloy 6063-TS.

B. Shutters: Extruded aluminum blades of extruded aluminum alloy 6063-TS with stainless steel carriage, nylon rollers and nylon guides; top and bottom locking rods with stainless steel thumb screws. Provide end closure pieces securely attached to the wall.

C. Finish: All aluminum materials to be finish color as selected by the Architect from the manufacturer=s standards.

2.4 HINGED ALUMINUM SHUTTERS

A. Provide hinged aluminum shutters as indicated and detailed on the Drawings. Aluminum panel doors shall be custom fabricated for exterior use.

B. Provide two (2) recessed flush bolts at the top and two (2) flush bolts at the bottom for each panel, with dust proof floor strikes. Track shall be standard to the manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01700 - Execution Requirements: Verification of existing conditions before starting the work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive the work.

C. Report, in writing, prevailing conditions that will adversely affect satisfactory execution of the work of this Section. Do not proceed with the work until the unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with the manufacturer's instructions for the installation of storm shutters.

B. Set storm units plumb, level and without distortion, securely fastened to, and aligned with the prime windows.

C. Fasten to allow for expansion and contraction without damage to the window members or pullout of fasteners. Fasten members required to be in a fixed position, as detailed; for those that are required to be removable, verify the connectors and inserts, and fabricate accordingly.

D. Position storm panels main frame so it does not contact the prime window frame, or install a non-metallic spacer between the prime window and the storm shutter and frame.

E. Provide weepholes in sill tracks. Size the holes to effectively permit the drainage of rain water collecting between closed storm shutters and the windows they protect.

F. Isolation Requirements:

1. Wood Contact: Isolate sheet metal from cedar, redwood, oak and acid-treated lumber by means of unbroken 6-mil polyethylene construction sheet or a heavy coating of metal-protective paint.

2. Dissimilar Metals: Insulate the juncture between dissimilar metals with a heavy coating of insulating film.

3. Concrete Contact: Coat the underside of sheet metal over horizontal concrete

surfaces with an ashpaltum cement.

3.3 FIELD QUALITY CONTROL

A. Section 01450 - Quality Control: Field inspection.
Inspect for plumb, level and secure attachment to substrates, where applicable.

3.4 ADJUSTING AND CLEANING

A. Section 01700 - Execution Requirements: Adjusting and Cleaning the installed work.

B. Adjust inserts, and hardware to provide a tight fit at contact points, for smooth operation, and for a weathertight closure.

C. Clean surfaces promptly after installation, exercising care to avoid damage to the finish of new and existing surfaces.

END OF SECTION

SECTION 08710 - FINISH HARDWARE

PART 1 - GENERAL

1.01 SCOPE

A. Furnish materials, tools, and equipment and perform labor required to complete:

1. Door lever or locksets
2. Door hinges
3. Door stops and closers
4. And other finish hardware and accessories

1.02 RELATED WORK

A. Section 08400-Aluminum entrance door

B. Section 08210-Wood doors

1.03 QUALITY ASSURANCE

A. Use adequate number of skilled workers thoroughly trained and experienced.

1.04 APPLICABLE PUBLICATIONS

A. National Fire Protection Association (NFPA)

Publication: 101 Life Safety Code (81)

B. Underwriter's Laboratory, Inc. (UL)

Publication: Building Materials Directory

(1983)

1.05 SUBMITTALS: Meet the applicable requirements of Section 01300.

A. Hardware list and catalog cuts: Submit hardware list, in triplicate, listing of each item of builder's hardware accompanied by manufacturer's catalog cuts for each different item of hardware.

B. Keying system submission: Before locks are delivered to the job site, submit keying system for approval by the Architect. Provide locks specified to be

keyed with keying bitting charts, which shall be submitted to and approved by the Architect prior to completion of the contract.

1.05 DELIVERY, STORAGE AND HANDLING

A. Meet the applicable requirements of Section 01300.

1.07 PACKAGING

A. Individually pack and deliver to job site in manufacturer's original container each finish hardware item required. All hardware shall have all the necessary screws. Keep instructions and installations template for spotting mortising tools. Furnish packing list to identify the quantity and type of hardware in every package.

PART 2 - PRODUCTS

2.01 MATERIAL

A. Door lock and locksets:. All door locks should be lever type (architect's approval).

1. Entrance lock, A10S lever design; stainless steel, satin, with dead locking latch bolt. Grade 1 chasis, heavy duty design, for metal doors and grade 2 light weight design for remaining doors. UL listed with 3 hrs. fire resistance rating.

2. Deadbolt lock-stainless steel, B463, ANSI E2171, deadbolt thrown or retracted from outside by key, inside turn until will retract bolt only. Refer to schedule of hardware for locations.

3. Door stops-door stops with holder, floor or wall mounted, with built- in hook, approved by Construction Manager.

4. Provide master key, grand master key and great grand master key.

B. Cabinet, closet, drawer hardware:

1. Drawer pulls - solid brass, 4”x1-3/8” thick by 7/8”.

2. Door latches - best quality approved by the Architect.

3. Drawer slides - light duty side mounted extension drawer slides, 20” long cold rolled zinc plated, 75 pounds capacity. For all drawers.

C. Hinges:

1. Full mortise hinges - Brass BHMA #A2112 or stainless steel BHMA #5112, Stanley or approved equal. Conformed to ANSI A1567, 4”x4” use for all wood flush doors. Number of hinges required in each door is described in the schedule of hardware.

2. Spring Hinges- Standard weight double acting spring hinges, dull brass finish, 6” leaf length, or approved equal.

3. Blank brass continuous hinges-width size to match cabinet doors. For all cabinet doors except as indicated in the drawings. Substitution - self-closing hinges,

D. Closers - 61356 PART 3 - EXECUTION

3.01 INSTALLATION, INSPECTION AND ACCEPTANCE

A. INSTALLATION: Install hardware following manufacturer’s instructions. Except indicated or specified otherwise, use fasteners furnished with hardware to fasten hardware in place. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Use machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Use toggle bolts where required for fastening to hollow core construction. Use through bolts where indicated or specified and where necessary for satisfactory installation.

B. INSPECTION: Examine the substrates and conditions under which work of this section will be performed. Do not proceed until unsatisfactory conditions detrimental to timely and proper completion of the work have been corrected.

C. ACCEPTANCE: After installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work. Submit notice of operation testing 7 days before scheduled so that the testing can be witnessed.

Hinges, locks, latches, bolts, holders, closer and other items shall be adjusted to operate properly. Also demonstrate that tagged keys operate respective locks. After hardware is checked, deliver tagged keys to construction

manager. Correct, repair, and finish as directed errors in cutting and fitting and damage to adjoining work.

END OF SECTION

SECTION 08800 GLASS AND GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glazing for entrances and storefronts.
2. Glazing for interior walls.
3. Glazing for pivot doors.
4. Glazing for window units.
5. Interior partitions relites.
6. Fire-rated glazing.
7. Low-E glazing
8. Glazing sealant installation.

B. Related Documents: The Contract Documents, as defined in Section 01010 - Summary of Work, apply to the work of this Section. Additional requirements and information necessary to complete the work of this Section may be found in other Documents.

C. Related Sections:

1. Section 01811 - Sustainable Design and Construction Procedures
2. Section 06200 - Finish Carpentry: Wood frames for interior glazing.
3. Section 07900 - Joint Sealers: Sealants for waterproofing glazing installations.
4. Section 08100 - Hollow Metal Doors and Frames: Glazing in metal doors and sidelites.
5. Section 08210 - Wood Doors: Glazing in wood doors, transoms and sidelites.
6. Section 08330 - Overhead Doors: Glazing in sectional doors.
7. Section 08400 - Entrances, Storefronts and Windows: Glazing installations.
8. Section 08420 - Aluminum Doors and Windows: Glazing in doors and windows.
9. Mirrors are specified in Section 10810 - Toilet Accessories.

1.2 DESCRIPTION OF WORK

A. The extent of glass and glazing work is indicated on the Drawings and Schedules and as specified herein, and includes providing and installing glazing for exterior and interior doors and windows, safety glass, interior relites, glass blocks, sealants and miscellaneous glazing materials.

1.3 REFERENCES

A. The publications listed below form a part of this Specification to the extent referenced. Publications are referred to in the text by basic designation only.

B. American Society of Civil Engineers (ASCE):

1. ASCE / SEI 7 - Minimum Design Loads for Buildings and other Structures.

C. American National Standards Institute (ANSI):

1. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.

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

1. ASTM C 920 - Specification for Elastomeric Joint Sealants.

2. ASTM C 1036 - Specification for Flat Glass.

3. ASTM C 1048 - Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.

4. ASTM E 1996 - Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.

5. ASTM F 1233 - Test Method for Security Glazing Materials and Systems.

E. Flat Glass Marketing Association (FGMA):

1. FGMA - Glazing Manual and Glazing Sealing Systems Manual.

F. National Fire Protection Agency (NFPA):

1. NFPA 257 - Standard on Fire Tests for Window and Glass Block Assemblies.

G. International Code Council:

1. International Building Code (IBC), 2009:

H. U. S. Consumer Product Safety Commission, CPSC 16 CFR, Part 1201 - Safety Standard for Architectural Glazing Materials.

1.4 CONSTRUCTION

A. Interface with Other Work: Coordinate glazing with the installation of exterior aluminum entrances, storefronts, curtain walls, doors and windows as specified in Section 08410 hollow metal doors and windows specified in Section 08100; wood doors and windows specified in Section 08210.

1.5 SUBMITTALS

A. Section 01330 - Submittal Procedures: Procedures for submittals.

1. Product Data:

a. Submit two (2) copies of the manufacturer=s catalogs, including specifications and installation instructions for all glass products to be used and for glazing sealant and compound, gasket and miscellaneous materials required.

b. Glass: For each type of glass provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

c. Glazing compound: Provide chemical, functional, and environmental characteristics, limitations and special application requirements.

d. Manufacturer=s engineering design to meet the performance requirements.

2. Calculations indicating glazing satisfaction of performance requirements

3. LEED Requirement: AActual light transmission level calculation to achieved LEED credit required for this project.@

a. Complete the LEED Materials Submittal Form as provided in Section 01340 - Submittals - LEED Submittals, for procedures in this section.

b. Complete the LEED VOC Submittal Form as provided in Section 01340 - Submittals - LEED Submittals, for products in this section.

4. Samples:

a. Glass: Two (2) samples 6" x 6" in size for each type of glazing, illustrating tinting, and finish of the glazing material. Label each sample indicating kind, quality and manufacturer as follows:

1) Tinted float glass.

2) Laminated glass.

3) Tempered glass.

4) Low-e glass.

5). Patterned glass.

b. Glass Blocks: Two (2) full size units.

c. Glazing Sealants: Three (3) copies of the manufacturer=s standard color selection.

5. Assurance / Control Submittals:

a. Manufacturer's certificate that the products meet or exceed the specified requirements.

b. Calculations indicating that the materials satisfy the performance requirements.

c. Documentation of experience indicating compliance with the specified qualifications requirements.

B. Section 01780 - Closeout Submittals: Procedures for closeout submittals.

1. Warranty: Submit a written Warranty with forms completed in the name of the Owner and registered with the manufacturer.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Company specializing in manufacturing the products specified with a minimum of five (5) years documented experience.

2. Installer: Company experienced in performing the work of this Section with a minimum of five (5) years documented experience.

B. Performance Requirements:

1. Provide the capacity to withstand the following loading requirements for exterior units:

a. Design and install to resist combined positive and negative windloading in accordance with IBC 2009, Section 1609 with a Vmph of 170, qs of 74.0 psf, exposure [B] [C] [D], and importance factor [1.0] [1.25] [1.5], as applicable per ASCE 7. Size for areas of discontinuity and worst case scenario to be experienced by the building.

b. Height of windows and door units above the ground level are indicated on the Drawings or can be calculated from the Drawings.

C. Identification: Provide labels where safety glazing is required. Each unit of tempered glass shall be permanently identified by the manufacturer. The identification shall be etched or ceramic fired on the glass and shall be visible after the glazing has been installed. Label

per NFPA 80.

D. Grading and Labeling: Grade and label each light stating the quality and grade of the glass and the manufacturer=s name and brand designation. Leave labels intact until removal is directed by the Owner=s representative. Label each individual glazing unit for fire-rated doors and windows in accordance with NFPA 80-1-7.4. Listing marks shall be visible after installation.

E. Perform the work in accordance with the FGMA, Glazing Manual.

F. All exterior glazing shall be wet sealed glazing gaskets and permited only for interior work.

1.7 DELIVERY, STORAGE AND HANDLING

A. Section 01600 - Product Requirements: Transport, handle, store, and protect the products.

B. Comply with the manufacturer=s instructions for shipping, handling, storing and protecting glass and glazing products.

C. Deliver products to the Project Site in the manufacturer=s original, unopened packaging or crates.

D. Exercise exceptional care to prevent edge damage to the glass, rainbowing, discoloration and damage to and deterioration of coatings, if any, on the glass.

1.8 JOB CONDITIONS

A. Pre-installation: Meet with the Glazier and other trades affected by the glass installation prior to beginning installation. Do not perform work under adverse weather or job conditions. Install liquid sealants only when the temperature is within the lower or middle one third of the temperature range recommended by the manufacturer.

1.9 WARRANTY

A. Section 01780 - Closeout Submittals: Procedures for closeout submittals.

B. Special Warranty:

1. Provide a manufacturer=s written Warranty against cracking, breakage, staining, rainbowing, discoloration and for replacement.

2. Warranty Period: Two (2) years from the date of Substantial Completion.

2.1 GLAZING MATERIALS

A. Standards:

4. Prime Glass: FS DD-G-451, ASTM C 1036.

5. Safety Glass: CPSC 16 CFR 1201.

6. Heat-Treated Glass: FS DD-G-1403, ASTM C 1048.

B. Float / Plate Glass: Type 1, quality q3, thickness as required to meet the performance requirements, but not less than 3/16", clear unless otherwise indicated. Curved or straight as indicated.

C. Laminated Safety and Security Glass: Standard two-ply laminated glass with minimum 0.060" Saflex interlayer. Thickness as required to meet the Performance Requirements or security criteria for the location, height and use or as indicated, but not less than 3/8". Where glazing is double pane, the laminate shall be installed as the exterior lite. Tint color as selected.

1. Impact Loads: Comply with South Florida Building Code, Section 2315 and 3513.

D. Tempered Glass: Heat treated to strengthen the glass in bending to not less than 4.5 times the annealed strength, edges seamed, thickness as required to meet the performance requirements (3/16" thick, minimum). Exposed edges in the finished work shall be polished. Tint color as selected.

1. Where indicated as AFree of Tong Marks@, provide tempered glass produced by manufacturer=s special process which eliminates tong marks.

E. Tempered Low-E: Hard coating on surface 4. Tint color as selected from manufacturer=s standards.

Polished Wired Glass or Patterned Wire Glass: Type II, minimum 1/4-inch thick, Class 1, Form 1,

quality q11, clear and polished both faces. Pattern as select

Fire Rating: Provide glass listed and labeled by UL Afire resistance@ complete steel channel

stops.

F. Interior Fire Rated: Fire glass/mullion glazing system with pyrostop safety rated glass.

G. Patterned Glass: Tempered glass with screen-printed, ceramic frit fused pattern.

2.2 GLASS BLOCKS

A. Glass Blocks: 8" x 8" x 4" thick or as indicated, partially evacuated hollow units. Style, pattern and color as selected from the manufacturer=s standards.

:

2.3 GLAZING SEALANT

A. Silicone: Single component, elastomeric, chemical curing; capable of water immersion without loss of properties; non-bleeding, non-staining, non-sag; cured Shore A hardness of 15 - 25. Color black.

2.4 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers and Sealers: Type recommended by the glazing sealant or gasket manufacturer.

B. Setting Blocks: Neoprene of EPDM, 70 to 90 Shore A durometer hardness; compatible with the glazing sealant used.

C. Spacers: Neoprene of EPDM, 40 to 50 Shore A durometer hardness; self adhesive on one side; compatible with the glazing sealant used.

D. Filler Rods: Closed cell or waterproof jacketed foam rod of polyethylene, butyl, neoprene, polyurethane, or vinyl; compatible with the glazing sealant used.

2.5 GLASS BLOCK GLAZING ACCESSORIES

A. Panel reinforcement: Two (2) parallel 9 gage wires either at 1-5/8" or 2" on center with electrically welded cross wires at regular intervals, galvanized after welding.

B. Expansion Strips: Fibrous glass or polyethylene foam, 3/8" thick.

C. Panel Anchors: 20 gage perforated steel strips, 24" long x 1-3/4" wide, galvanized after perforating.

D. Sealant: Sealant No. 1 or No. 3 per Section 07900.

E. Backer Rods: Polyethylene foam, neoprene or equal as approved by the sealant manufacturer.

F. Mortar Materials: Type S in accordance with ASTM C 270 with integral type water-repellant added to the mortar mix.

G. Portland Cement: Type 1 in accordance with ASTM C 150.

H. Lime: Type S in accordance with ASTM C 207.

I. Sand: Clean, white quartzite type, essentially free of iron compounds; for thin joints in accordance with ASTM C 144.

J. Integral Type Water-repellant: Stearate as recommended by the glass block manufacturer.

PART 3 - EXECUTION

3.1 STANDARDS AND PERFORMANCE

A. Watertight and airtight installation of each glass product is required, except as otherwise shown. Each installation must withstand normal temperature changes, wind loading, and impact loading (for operating sash and doors), without failure including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials, and other defects in the work.

B. Protect glass from edge damage during handling and installation, and subsequent

operation of glazed components of the work. During installation, discard units with significant edge damage or other imperfections.

C. Glazing channel dimensions, as indicated and specified, are intended to provide for the necessary bite on the glass, minimum edge clearances, and adequate sealant thickness with reasonable tolerances. Adjust as required by the job conditions at the time of installation. Do not reduce the manufacturer=s recommended minimum edge bite on the glass.

D. Comply with the combined recommendations and technical reports by manufacturers of the glass and glazing products used in each glazing channel, and with recommendations of the Flat Glass Marketing Association, AGlazing Manual@, except where more stringent requirements are indicated.

E. Inspect each piece of glass just prior to installation, and discard any which have observable edge damage or face imperfections.

F. Provide safety glass for all glazed panels within 48" of a door and where glazed panels are less than 60" above any floor or any walking surface and elsewhere where required by the Building Code, performance data or as indicated.

G. Clean glazing channels and other framing members to receive glass just prior to glazing. Remove coatings which are not firmly bonded to the substrate. Remove lacquer from metal surfaces where elastomeric sealants are used.

H. Apply primer or sealant to joint surfaces where recommended by the sealant manufacture.

3.2 EXAMINATION

A. Section 01700 - Execution Requirements: Verification of existing conditions before starting the work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive the work.

1. Verify that openings for glazing are correctly sized and within tolerance.

2. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement and that weeps are clear and ready to receive the glazing.

C. Report, in writing, prevailing conditions that will adversely affect satisfactory execution of the work of this Section. Do not proceed with the work until the unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

3.4 GLAZING INSTALLATION

A. Place setting blocks of the proper size in sill rabbet; locate at 1/4th the glass width from each corner; set blocks in a thin course of heel and toe compound, if any.

B. Install spacers of the proper size and spacing inside and out for glass sizes larger than 50 united inches, except where gaskets or pre-shimmed tape is used. Provide 1/8", minimum bite of spacers on the glass and use a thickness slightly less than the final compressed thickness of the tape.

C. Set each unit of glass in each series in uniformity with other pieces in pattern, draw, bow, and other visually perceptible characteristics.

D. Provide for the following edge clearances (bite):

	Single glazed
Nominal edge cover (bite)	5/16"
Minimum nominal edge clearance	3/16"
Minimum face clearance	3/16"

E. Glass must be edge blocked to prevent contact with metal framing.

F. Provide glazing sealant as required for the particular glazing application. Coordinate with other Sections herein for material compatibility. Glazing gaskets are permitted only for interior locations.

G. Prevent exudation of the sealant or compound by forming voids or installing filler rods in channels at the heel of jambs and heads, except as otherwise indicate and depending on the light size, thickness and type of glass, and in compliance with the manufacturer=s recommendations.

H. Provide filler rod where sealants are used in the following locations:

1. Head and jamb channels.

2. Tinted glass over 75 united inches in size.

3. Clear glass over 125 united inches in size.

I. Do not leave voids in sill channels except as specifically indicated or recommended by the glazing manufacturer. Force sealant into the channel to eliminate voids and to ensure complete Awetting@ or bond of the sealant to the glass and channel surfaces.

J. Do not allow the sealant to close the weeps of aluminum framing.

K. Tool exposed surfaces of glazing liquids and compounds to provide a substantial Awash@ away from the glass.

L. Clean and trim excess glazing materials from glass and stops or frames promptly after installation; eliminate stains and discolorations.

M. Install pressurized tape and gaskets to protrude slightly out of the channel to eliminate dirt and moisture pockets.

3.5 FIELD QUALITY CONTROL

A. Section 01450 - Quality Control: Field inspection.

B. Inspect the preparation for and installation of glazing.

3.6 CLEANING

A. Section 01700 - Execution Requirements: Cleaning the installed work.

B. Remove non-permanent labels after glazing has been completed and clean glass surfaces.

C. Wash and polish glass on both surfaces not more than four (4) days prior the date scheduled for inspections intended to establish the date of Substantial Completion for each area of the Project. Wash with a solution of mild detergent in warm water applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean and dry.

3.7 PROTECTION

A. Section 01700 - Execution Requirements: Protection of the installed work.

B. Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from the glass. Do not apply markers directly to the glass surface.

C. Remove and replace glass which has been broken, chipped, cracked, abraded or damaged in other ways during the construction period, including by natural causes, accidents and vandalism.

END OF SECTION

DIVISION 9 – FINISHES SECTION 09200 - PLASTER

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

A. This Section covers all labor, materials, accessories, scaffolding and appurtenances necessary for the complete re-installation of all plaster for the project. Items not mentioned specifically herein, which are necessary to make a complete installation shall also be included.

1.02 QUALITY ASSURANCE

A. Perform all work covered in this Section in conformance with the recommendations of the following as they pertain to the work involved except where specified contrary herein.

1. Portland Cement Association
2. American National Standards Institute

1.03 PRODUCT DELIVERY, HANDLING AND STORAGE

A. Delivery Of Materials:

Manufactured materials shall be used only if delivered in the original, unopened containers, cartons or bundles bearing the manufacturer's name, brand type and grade.

B. Storage of Materials, Equipment and Fixtures:

Materials will be kept dry unless ready to be used, off the ground, under cover, ventilated, and away from surfaces subject to dampness or condensation.

PART 2 – PRODUCTS

2.01 DESCRIPRION OF WORK:

A. Cement shall conform to ASTM C 150, and be type I or IA.
B. Aggregates for plaster shall conform to ASTM C 28
C. Water shall be clean, fresh, and potable.

2.02 MIXES:

A. Proportion of Plaster Mixes: Plaster mix shall be Class A, 1 Cement and 2 parts sand.

PART 3 – EXECUTION

3.01 INSTALLATION/APPLICATION/PERFORMANCE/ERECTION

A. Required plaster thickness are indicated herein.
B. Plastering
    1. Cement Plaster Base Coats. Divide cement plaster with control joints at a maximum spacing of 6 feet each way for exterior cement plaster and 20 feet each way for interior cement plaster.

3.02 ADJUSTMENT AND CLEANING

A. Repairing and Cleaning.
    1. Upon completion of carpentry and other work, repair any cracks, chipped places. Indented surfaces including patching; be careful not to injure or deface any of the finished work in the building. Make repairs by moistening plaster and filling in with new material, troweled or tamped flush with adjoining surfaces. Match in texture, all pointing and patching of plaster with existing plaster work. Joining previously applied plaster shall be perfectly flush.
    2. Do not allow visible joints, cracks, crazes, tool marks, waves or other defects to appear in the finishes work. Removal of dirt or stains on finished plaster surfaces shall be by a method, which will not damage the surface of the finished plaster.
    3. At the completion of the finish plaster work, clean all plaster from beads, screeds, base, and other trim. Repair walls and other surfaces, which have been stained, marred or otherwise damaged from the plastering work.
    4. Remove all rubbish, unused materials, containers, and equipment from building resulting from this work, leaving floors broom clean.

3.03 SCHEDULES

A. Thickness of Plaster. Apply plaster, unless otherwise noted, to thickness' as follows:
    1. Cement Plaster: Over masonry or concrete, 5/8 inch.

B. Number of Coats. Two Coats (double back method) over masonry.

END OF SECTION

SECTION 09250

GYPSUM BOARD and CEMENT BOARD

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Gypsum board.
2. Cement board.
3. Gypsum sheathing.
4. Accessories.
5. Joint treatment.
6. Finishing.

B. Related Documents: The Contract Documents, as defined in Section 01010 - Summary of Work, apply to the work of this Section. Additional requirements and information necessary to complete the work of this Section may be found in other Documents.

C. Related Sections:

1. Section 06100 - Rough Carpentry: metal framing and blocking for attachment of gypsum board.
2. Section 07210 - Building Insulation: Sound attenuation blankets.
3. Section 07900 - Joint Sealers: Acoustical sealants.
4. Section 09110 - Non-Load Bearing Steel Framing: Metal framing for attachment of gypsum board and cement board.
5. Section 09200 - Lath and Plaster: Finish for gypsum sheathing.
6. Section 09300 - Tile: Ceramic wall finish on gypsum board and cement board.
7. Section 09900 - Painting: Field paint finish on gypsum board.

1.2 DESCRIPTION OF WORK

A. The extent of gypsum board work is indicated on the Drawings and Schedules and as specified herein, and includes providing and installing gypsum board for all applications,

cement fiber board, gypsum sheathing, galvanized and PVC trim, accessories and the finishing of installations exposed to view.

B. REFERENCES

The publications listed below form a part of this Specification to the extent referenced. Publications are referred to in the text by basic designation only.

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

1. ASTM C 475 - Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

2. ASTM C 630 - Specification for Water-Resistant Gypsum Backing Board.

3. ASTM C 840 - Specification for the Application and Finishing of Gypsum Board.

4. ASTM C 954 - Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 inches (0.84 mm) to 0.112 inches (2.84 mm) in Thickness.

5. ASTM C 919 - Practice for Use of Sealants in Acoustical Applications.

6. ASTM C 1002 - Specification for Steel Self-Piercing Topping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

7. ASTM C 1280 - Specification for Application of Gypsum Sheathing.

8. ASTM C 1325 - Specification for Non-Asbestos Fiber-Mat Reinforced Cement Substrate Sheets.

9. ASTM C 1396 - Specification for Gypsum Board.

10. ATM D 3678 - Specification for Rigid Poly (Vinyl Chloride) (PVC) Interior-Profile Extrusions.

11. ASTM E 119 - Test Methods for Fire Tests of Building Construction and Materials.

D. Gypsum Association (GA):

1. GA-201 - Gypsum Board for Walls and Ceilings.

2. GA-214 - Recommended Specification for Levels of Gypsum Board Finish.

3. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.

4. GA-600 - Fire Resistance Design Manual.

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E. International Code Council:

1. International Building Code (IBC), 2009.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Procedures for submittals.

1. Product Data: Manufacturer=s product specifications and installation instructions for each gypsum drywall component, including other data required to show compliance with these specifications.

12. Assurance / Control Submittals:

a. Manufacturer=s certificate that the products meet or exceed the specified requirements.

b. Documentation of experience indicating compliance with the specified qualifications requirements.

c. Test Reports from recognized testing laboratories, upon request.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Company specializing in manufacturing the products specified with a minimum of five (5) years documented experience.

2. Installer: Company experienced in performing the work of this Section with a minimum of five (5) years documented experience.

B. Fire-Resistance Ratings: Where gypsum drywall systems with fire-resistance ratings are indicated, provide materials and installations which are identical to those of applicable assemblies tested per ASTM E 119 by a fire testing laboratory acceptable to the authorities having jurisdiction.

1. Provide fire-resistance rated assemblies identical to those indicated by reference to GA File No. S in GA AFire Resistance Design Manual@ or to design designations in U.L. AFire Resistance Directory@ or in listing of other testing and agencies acceptable to the authorities having jurisdiction.

C. Single-Source Responsibility: Obtain gypsum board products from a single manufacturer, or from manufacturer=s recommended by the prime manufacturer of the gypsum board.

1.5 DELIVERY, STORAGE AND HANDLING

A. Section 01600 - Product Requirements: Transport, handle, store and protect the products.

B. Deliver products to the Project Site in the manufacturer=s original, unopened, undamaged packages, containers, or bundles bearing the brand name with identification labels intact.

B. Store materials inside and under cover; keep dry; protect from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.

D. Neatly stack gypsum boards flat to prevent sagging.

E. Handle to prevent damage to edges, ends and surfaces.

F. Protect corner beads and trim from being bent and damaged.

1.6 JOB CONDITIONS

A. Environmental Requirements, General: Comply with requirements of the referenced gypsum board application standards and recommendations of the gypsum board manufacturer for environmental conditions before, during and after installation.

B. Ventilation: Ventilate building spaces as required to remove water in excess of that required for the drying of joint treatment materials immediately after application. Prevent drafts during hot, dry weather to avoid excessively rapid drying.

2.1 GYPSUM BOARD MATERIALS

A. General:

1. Provide boards where called for on the Drawings in lengths to minimize the number of end-to-end butt joints.

2. United States Gypsum designations are used in this Section to identify gypsum board and accessory types, unless otherwise noted.

B. Standard Gypsum Board: ASTM C 1396; natural finish, paper faces, 1/2" at ceilings and over wall furring, 5/8" thick at walls unless noted otherwise, 48" width, maximum practical length to meet conditions; ends square cut, tapered edges.

1. Provide where gypsum board is called for unless otherwise indicated.

C. Fire-Resistant Gypsum Wallboard: Type X, ASTM C 1396; paper faces, 2" at ceiling, or 5/8" thick at walls, 48" width, maximum practical length to meet conditions; ends square cut, edges tapered; providing at least 1-hour fire-retardant rating when tested in accordance with ASTM E 119.

1. Provide where a fire-resistance rating is required.

D. Water-Resistant Gypsum Backing Board: ASTM C 630; 2" at ceiling and over wall furring, and 5/8" thick at walls, 48" width, maximum practical length to meet conditions; ends square cut; edges tapered; ends and edges straight and solid. Board consisting of a non-combustible water-resistant gypsum core, surfaced on face and back with green treated water-repellent paper bonded to the core. Suitable for receiving paint or wallpaper and in compliance with IBC.

1. Provide at ceilings and walls in showers, toilets and other wet areas not scheduled

for tile finish.

E. Impact / Penetration-Resistant Gypsum Board: Type X, ASTM C 1396, 5/8" thick, 48" width, maximum practical length to meet the conditions, ends square cut; edges tapered; gypsum core with additives to enhance fire resistance; 1-hr fire-retardant rating when tested in accordance with ASTM E 119; surfaced with paper on the front, back and long edges; 0.30" GE Lexan film bonded to the back side to enhance impact / penetration resistance without penetration.

1. Provide at Corridor walls where indicated and other locations subject to high abuse.

F. Tile Backing Board: 5/8" thick; inorganic fiberglass mat with moisture-resistant gypsum core; paperless; heat-cured acrylic coating; DensShield Tile Backer by Georgia-Pacific, or approved equal.

1. Provide at shower and toilet room walls scheduled to receive ceramic tile finish.

G. Cement Board: High density, glass fiber reinforced, 5/8" thick x 26" or 48" width; Durock Cement Board as manufactured by United States Gypsum or approved equal.

1. Provide at shower and toilet room walls scheduled to receive ceramic tile finish, and
at ceilings and walls exposed to the weather.

H. Gypsum Sheathing: ASTM C 630, 5/8" thick x 48" width x maximum practical length to meet conditions; ends square cut; edges tapered; ends and edges straight and solid. Weather and sag resistant for exterior applications, water repellent paper faces suitable for painting or plastering.

1. Provide at ceilings and walls exposed to the weather.

I. Solid Shaftliner: 1" thick x 23-7/8" or 47-3/4" width, Type X core, ASTM C 1396, moisture-resistant paper faces.

1. Provide at fire-rated shaft and chase walls, as indicated.

2.2 FASTENERS

A. Metal Framing: ASTM C 1002, Type S, Phillips-head recess, bugle head, corrosion-resistant, self-drilling, self-tapping, fine thread steel screws.

1. One Layer 1/2@ board: 1" long.

2. One Layer 5/8" board: 1-1/8" long.

2.3 TRIM ACCESSORIES

A. General: Install vinyl plastic accessories at exterior work and work in high humidity and non-air-conditioned spaces. Use galvanized accessories at interior air conditioned, normally humidity areas.

B. Plastic Accessories: High-Impact PVC plastic; ASTM D 3678, including corner beads, stop beads, casing beads, trim beads, baseboard and ceiling beads; as manufactured by Plastic Components, Inc. or approved equal.

C. Galvanized Accessories:

1. Edge Trim: Galvanized steel casing.

   a. AL@ shape for tight abutment at edges; Sheetrock Brand, No. 200-B.

   b. AJ@ shape at other locations; Sheetrock Brand, No. 200-A.

2. Corner Beads: Galvanized steel corner beads, Sheetrock Brand, Dur-A-Bead Metal Corner Bead.

3. Control Joint: Roll-formed zinc; Sheetrock Brand, Zinc Control Joint.

D. Pre-finished Corners: Pre-finished inside corner reinforcement as manufactured by ULTRAFLEX or approved equal.

2.4 JOINT TREATMENT MATERIALS

A. General: Type recommended by the gypsum board manufacturer for the application, except as otherwise indicated; ASTM C 475.

B. Reinforcing Tape: Cross-fibered paper with high tensile strength, roughened surface, accurate center crease; Heavy Drywall Joint Tape.

C. Joint Compound:

1. Single Grade: Multi-purpose grade for the entire application.

2. Two Grades:

   a. Interior and Exterior Work: Use chemically-setting, powder compound type for bedding and filling;

   b. Topping: Use ready-mixed, lightweight, vinyl formulation or vinyl powder;

D. Water-Resistant Joint Compound: Special water-resistant type for treatment of joints, fastener heads and cut edges of water-resistant backing boards.

2.5 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials of the type and grade recommended by the gypsum board manufacturer.

B. Adhesives: Commercial adhesives; ASTM C 557.

1. Laminating: Special adhesive or joint compound specifically recommended by the gypsum board manufacturer for laminating gypsum boards.

2. Water-Resistant: Type I, organic adhesive for ceramic tile; ANSI A136.1.

C. Blocking and backing Plates: Provided by the trade responsible for Section 09110; located by the appropriate trade or as indicated below.

1. Casework and Other Trades: 14 gage galvanized steel, minimum; 3" wide x length required.

2. Plumbing: Size as required for the relevant wall-hung fixture.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01700 - Execution Requirements: Verification of existing conditions before starting the work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates, blocking and backing plates and conditions are as required, and ready to receive the work.

C. Report, in writing, prevailing conditions that will adversely affect the satisfactory execution of the work of this Section. Do not proceed with the work until the unsatisfactory conditions have been corrected.

3.2 PRE-INSTALLATION MEETING

A. Prior to commencing work, meet on-site with the Owners representative and all concerned trades to review the work required by this Section.

3.3 GENERAL REQUIREMENTS

A. Install in accordance with reference standards, manufacturers instructions, product technical bulletins, product catalog and product carton instructions and as required to comply with seismic requirements.

B. Install supplementary framing, blocking and bracing at terminations in gypsum board assemblies to support fixtures, equipment, heavy trim, grab bars, toilet accessories, cabinetry, furnishings and similar construction.

C. Install metal framing and gypsum board to enclose all pipes, ducts, conduit, etc. which would otherwise be exposed in finished areas, regardless of whether or not furring is shown or indicated on the Drawings.

D. Enclosures to receive recessed light fixtures in fire-rated ceilings shall conform to U.L. requirements for materials and assemblies. Provide U.L. Design No. P251 enclosures over all types of recessed lights.

E. Defects which appear in the work due to faulty workmanship and / or materials, shall be repaired and refinished with materials and in a manner to meet the requirements of this Section.

3.4 GYPSUM BOARD INSTALLATION REQUIREMENTS

A. Application and Finishing Standards: Install in accordance with manufacturers published instructions, GA-201, GA-216 and ASTM C 840.

B. Install sound attenuation blankets as indicated, prior to the application of gypsum boards unless the blankets can be readily installed after the boards have been installed.

C. Locate exposed end-to-end butt joints as far as possible from the center of walls and ceilings, and stagger not less than 1'-0" in alternate courses.

D. Install ceiling boards in the direction and in a manner that will minimize the number of end-to-end butt joints and avoid end joints in the central area of each ceilings. Stagger end joints at least 1'-0".

E. Install wall / partition boards vertically to avoid end-to-end butt joints to the extent possible. Use boards of maximum practical lengths; where applicable stagger end joints. Cut and saw all openings; do not core and punch. Apply edge bead to all exposed edges and outside corners.

F. Install exposed gypsum board with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16" open space between boards. Do not force boards into place.

G. Locate either edge or end joins over supports, except in horizontal applications or where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so both tapered edge joints abut, tapered edges against tapered edges and mill-cut ends against mill-cut or field-cut ends. Do not place tapered edges against cut edges or ends.

H. Stagger vertical joint over different studs on opposite sides of partitions.

I. Attach gypsum boards to supplementary framing and blocking provided for additional support at openings and cutouts.

J. Isolate perimeter of non-load bearing gypsum board partitions at structural abutments. Provide 1/4" to 1/2" space and trim edges with AJ@ type, semifinished, edge trim. Seal joints with acoustical sealant.

K. Form control joints and expansion joints with space between edges of boards prepared to receive trim accessories.

L. Space fasteners in boards in accordance with referenced standards and manufacturer=s recommendations, except as otherwise indicated.

3.5 GYPSUM BOARD INSTALLATION METHODS

A. Single Layer Applications:

1. Install single layer gypsum board in the most economical direction, with edges and ends attached to firm bearing surfaces; panel ends aligning and parallel with

framing members.

2. Apply gypsum board on walls and partitions vertically unless indicated otherwise, and provide sheet lengths that will minimize the number of end-to-end butt joints.

3. Apply gypsum board on furring with no end joints. Locate edge joints over furring members.

4. Apply gypsum board on ceilings prior to application on walls and partitions, to the greatest extent possible.

5. Treat cut edges, holes, fastener heads and joints, including those at angle intersections in water-resistant gypsum board, cement board and gypsum sheathing at exterior ceilings and soffits with the specified joint compound. Treat prior to installation.

6. Do not align panel joints with edges of openings.

B. Wall Tile Base: Where gypsum board is the base for thin-set ceramic tile and similar rigid applied wall finishes, install paperless tile backing boards.

C. Showers, tubs and similar Awet@ areas: Install paperless tile backing boards. Apply with uncut long edges at the bottom of the work, and space 1/4" above fixture lips. Seal ends, cut edges and penetrations of each piece with water-resistant adhesive or, where recommended by the backing board manufacturer, with water-resistant joint compound.

D. Double Layer Applications: Install gypsum backing board as the base layer and exposed gypsum board for the face layer.

1. Apply base layer on ceilings prior to application of the base layer on walls / partitions; apply face layers in the same sequence. Offset joints between layers at least 10". Apply base layers at right angles to supports unless indicated otherwise.

2. Apply base layer and face layer on walls / partitions [vertically] [horizontally] with joints of the base layer over supports and face layer joints offset at least 10" with base layer joints.

3. Apply base layer on furring members [vertically] [horizontally] and the face layer either [vertically] [horizontally] with vertical joints offset at least one furring member. Locate edge joints of the base layer over furring members.

E. Single Layer Fastening Methods: Secure boards to supports as follows:

1. Install fasteners from the center of the panel field toward the ends and edges. Install fasteners 3/8" from ends and edges of panels, and as follows:

a. Ceiling: 12" on center, perimeter and field.

b. Walls: 12" o.c. in the field of walls and 8" o.c. at vertical joints.

F. Double Layer Fastening Methods: Apply base layer of gypsum board and face layer to the

base layer as follows:

1. Fasten both the base layer and face layer to supports separately with screws.

G. One-Hour Fire-Rated Chase Walls: Install framing studs, shaftliner and face layers in strict accordance with the manufacturer=s instructions and the Building Code

H. Sound-Rated Walls: Where work is indicated, including double layer work and work on resilient furring, seal the work at perimeters, control and expansion joints, openings and penetrations with a continuous bead of acoustical sealant including a bead at both faces of partitions.

1. Comply with the manufacturer=s recommendations for location of beads, and close off sound-flanking paths around and through the work, including sealing of partitions above acoustical ceilings. Provide sound insulation at ceilings where walls do not extend to the slab above.

I. Acoustical Sealant Application: Comply with the details indicated or if not indicated, comply with applicable published recommendations of the AGypsum Construction Handbook@ by the United States Gypsum Company.

J. Inspection of Acoustical Partitions: Gypsum board partitions with a STC rating of 52 or higher shall not be closed and finished until inspected and approved by the Owner=s representative.

K. Shower Room Ceilings: Install paperless gypsum board in accordance with the manufacturer=s instructions. Reinforce all joints with glass mesh tape and coat the entire surface with a recommended compound to provide a smooth, even finish over the entire surface.

3.6 GYPSUM BOARD TRIM INSTALLATION

A. General: Where feasible, use the same fasteners to anchor trim accessory flanges as used to fasten the gypsum boards to supports. Otherwise, fasten flanges by nailing or stapling in accordance with the manufacturer=s instructions and recommendations.

B. Install plastic corner beads at external corners. Use the longest practical lengths. Place edge trim where panels abut dissimilar materials.

C. Install plastic edge trim wherever the edge of gypsum board would otherwise be exposed or semi-exposed. Provide the type with face flanges to receive joint compound except where semi-finishing type is indicated. Install AL@ trim where work is tightly abutted to other work and install special kerf-type where other work is kerfed to receive the long leg of AL@ trim. Install AJ@ trim where the edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints).

D. Install semi-finishing trim where indicated, and where exterior gypsum board edges are not covered by applied moldings or indicated to receive trim with face flanges covered with joint compound.

E. Install plastic edge trim or pre-finished internal corners where indicated on wall panels at

junctures with ceilings.

F. Install control joints where indicated.

3.7 GYPSUM SHEATHING INSTALLATION

A. Install gypsum sheathing in accordance with the manufacturers instructions, GA-201, GA-216 and GA-600.

1. Install single layer gypsum sheathing horizontally, with edges butted tight, tongue up with attachment to firm bearing.

B. Provide construction control joints at a maximum of 30 feet o.c., at inside corners and at all intersections.

1. Install sheathing with 1/4" space between the edge of the sheathing and adjacent walls, beams, columns, and fascia construction.

C. Install screws at 12" o.c., maximum, to secure sheathing to the supporting substrate.

D. Protect all exposed gypsum cores at perimeter edges and penetrations by covering the core with trim.

E. Place edge trim where sheathing abuts dissimilar materials. Use longest practical lengths.

3.8 JOINT TREATMENT

A. Reinforce interior and exterior corners at ceiling and wall surfaces.

B. Apply 2" wide coated glass fiber tape at cement backer board corner joints.

C. Install control joints the full height of partitions consistent with the lines of building spaces, with 1/4" gap between panels. Apply sealant at the back of the joint and a control joint accessory at the face.

D. Apply 3" wide initial coating of joint compound, press tape firmly into the compound; wipe off excess compound. Apply a second coat of joint compound with tools of sufficient width to extend beyond the joint center approximately 4". Draw the joint compound down to a smooth even plane.

E. Sand after the second and third applications of joint compound. Do not raise the nap of the paper when sanding.

F. Feather coats onto adjoining surfaces with a maximum camber of 1/32" in 12".

G. After drying or setting, sand or sponge joints, edges, and corners, eliminating high spots and excessive compound to produce a smooth finish surface.

H. Prepare surfaces to receive subsequent finishes to a height of 6" above the finished ceiling.

3.9 GYPSUM BOARD FINISHING

A. General:

1. Refer to Sections on painting, coatings and interior design documents for decorative finishes to be applied to gypsum board work. Apply treatment at gypsum board joints (both directions), flanges of trim accessories, penetrations, fastener heads, surface defects and elsewhere as required to prepare the work for decoration.

2. Prefill open joints and rounded or beveled edges, if any; use the type of compound recommended by the manufacturer.

3. Apply joint tape at joints between gypsum boards except where a trim accessory is indicated. Apply joint compound in three (3) coats (not including prefill of openings in the base); sand between the last two coats and after the last coat.

B. Skim Coat: Wherever gypsum board is to receive eggshell, semigloss or gloss paint finish, apply a thin skim coat of joint compound over the entire gypsum board surface, after the three-coat joint and fastener treatment has been completed and is dry.

C. Base for Acoustical Tile: Where gypsum board is indicated as the base for adhesively-applied acoustical tile, install tape and two (2) coats compound treatment, without sanding.

D. Paperless Tile Backing Board or Cement Board Base for Ceramic Tile:

1. Comply with recommendations of the backing board manufacturer for the treatment of joints behind ceramic tile.

2. In areas to be tiled, treat fastener heads with water-resistant joint compound. Fill tapered edges in gypsum panels with water-resistant joint compound, embed joint tape firmly and wipe off excess compound; follow immediately with a second coat of water-resistant joint compound over the taping coat; do not crown the joint. Fold and embed tape in all interior corners to form true angles.

3. In areas not to be tiled, treat fastener heads and embed tape as indicated above using water-resistant joint compound but finish with two (2) coats of the joint compound used for regular gypsum board work.

3.10 GYPSUM BOARD FINISH LEVELS

A. Apply finish in accordance with the manufacturer's published instructions and GA-214 Finish Levels.

1. Level 1: All joints and interior angles shall have tape embedded in joint compound. Surfaces shall be free of excess joint compound. Tool marks and ridges are acceptable.

a. Application: In plenum areas above ceilings, in attics, in mechanical rooms, in areas where the assembly is generally concealed and in other areas not normally exposed to view. Accessories not required unless shown or required by the rating. Where a fire-resistance rating is required for the gypsum board assembly, the details of construction shall be in

accordance with reports of the fire tests of assemblies that have met the fire-rating requirement.

2. Level 2: Embed tape and apply a separate first coat of joint compound to the tape, fasteners and trim flanges.

   a. Application: Where panels are the substrate for tile.

3. Level 3: Embed tape and apply separate first and fill coats of joint compound to the tape, fasteners and trim flanges.

   a. Application: At surfaces scheduled to receive medium- or heavy-textured finishes or heavy wall coverings before painting.

4. Level 4: Embed tape and apply separate first, fill and finish coats of joint compound to the tape, fasteners and trim flanges.

   a. Application: At panel surfaces in mechanical and electrical spaces not exposed to public view.

5. Level 5: Embed tape in joint compound at all joints and interior angles and apply three (3) separate coats of joint compound over all joints, angles, fastener heads and accessories. A thin skim coat of joint compound or a material manufactured especially for this purpose shall be applied to the entire surface. The surface shall be smooth and free of tool marks and ridges. Prepared surfaces shall be coated with a primer / sealer prior to the application of finish paint. Refer to Specification Section 09900 - Painting.

   a. Application: For use where gloss, semi-gloss, enamel and non-textured flat paints are specified, or where severe lighting conditions occur. Generally in all public areas exposed to view, except where noted otherwise, to provide a uniform surface and minimize the possibility of joints telegraphing and fasteners showing.

3.11 CONSTRUCTION

A. Interface with Other Work:

1. Coordinate the installation of firestopping materials specified in Section 07840 at penetrations through fire-resistive rated gypsum board walls, partitions and ceilings.

2. Coordinate the installation of joint sealers specified in Section 07900 at penetrations of non-fire-restive rated walls, partitions and ceilings.

3.12 PROTECTION

A. Protect other work and finishes from damage by the gypsum board work.

B. Provide protection and maintain conditions which will ensure that the gypsum board work will be without damage and deterioration at the time of Substantial Completion.

3.13 FIELD QUALITY CONTROL

A. Section 01450 - Quality Control: Field inspection.

B. Inspect the installed work for alignment, attachment to the structure, backing plates and openings for installations by other trades.

3.14 CLEANING

A. Section 01700 - Execution Requirements: Cleaning the installed work.

B. Clean and remove all debris from the Project Site.

C. Leave the entire Project clean.

END OF SECTION

SECTION 09310 - CERAMIC TILES

PART 1 - GENERAL

1.01 SCOPE

A. The work contemplated under this section includes all materials, tools, equipment and services necessary for and reasonably incidental to the completion of all ceramic tiles as shown on the drawings and as specified herein.

1.02 QUALITY ASSURANCE

A. Use adequate number of skilled workers thoroughly trained and experienced.

1.03 SUBMITTALS: Meet applicable requirements of Section 01300.

A. Contractor shall submit samples of ceramic tile for Construction Manager's approval.

   A. 12" x 12" ceramic tiles-unglazed (for Lab, Counter and Toilets)

   B. 2" x 2" mosaic tiles (for Shower Stall)

B. Submit a Master Grade Certificate for tile, certifying the grade, type and quality of material. The covered by Master Grade Certificates shall bear certification marks on cartons and labels.

1.04 DELIVERY, STORAGE AND HANDLING

A. Meet the applicable requirements of Section 01600.

B. Meet requirements of ANSI A108.1, A108.5 and TCA A137.1. Deliver manufacturer's original unopened tile containers with grade seals unbroken, and labels or certification marks intact.

1.05 WARRANTY

A. Installation: Upon completion of this work, and as a condition of its acceptance, jointly execute with the installer a warranty that floor tile has been installed in strict accordance with the specification and that the

complete installation will not loosen, deteriorate or crack up under normal usage for a period of 5 years from date of installation. Replace loose tile, grout, sealant, and mortar at no additional cost.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Ceramic tiles:

1. Floor tiles- shall be unglazed,24”x24” standard grade not less than ¼” thick.

2. Trim-compatible with type, color, thickness, face size and finish of specified wall tiles.

3. Mortar-shall be pre-sanded, dry set, conforming to ANSI A108.1.

4. Adhesive

5. Grout-shall be commercial cement, waterproof, non-shrinking and shall conform to ASTM 1107.

PART 3 - EXECUTION

3.01 PREPARATION

A. Surfaces to receive tile shall be clean, free of paint oil, wash grease or other substances and shall have no variation in the place exceeding ¼” in 10 feet. Concrete slabs should be thoroughly cured before tile application is started. Concrete masonry surfaces shall be saturated with water before installation begins.

3.02 INSTALLATION

A. Setting tile:

1. Thoroughly soak in clean water mortar-set tile. Do not soak later-Portland cement mortar-set or adhesive-set tile.
2. Solidly set tile in mortar beds. Float adhesive set tile into place, beat in and level. Set with joints of uniform width as appropriate for size of tile. Rake joints if tile full depth of tile for grouting.

3. Set tile complete with complete angles, bull-nose caps and trim with joints of uniform width. Provide cove base between floor and walls.

4. Install wall tile before floor tile is laid.

5. Remove and reset any tile that is loose or that rings hollow.

B. Ceramic tiles shall be laid such that tiles against opposite walls are of equal with but not less than half of a tile in width. Align all floor joints to give straight uniform grout lines parallel to walls. Make joints between pre- grouted sheets same width as joints within sheets. Tile sheets shall be placed on freshly laid mortar or adhesive while surface is tile plastic and tamped to ensure solid bedding. Trim units shall be installed along all finished edge of tile work.

3.03 WORKMANSHIP

A. Tile shall be laid by mechanics experienced in the trade. Tile cuts shall be made clean and without ragged edges. Cut edges shall be ground to ease edges to match edges of white tiles. Fit work carefully at all corners, edges and around pipes and other built-in fixtures so escutcheons, covers, plates and collar will completely cover tile edge.

3.04 CLEAN UP AND PROTECTION

A. After installation is complete, tile work shall be thoroughly cleaned in accordance with manufacturer's recommendations. Acid shall not be used for cleaning glazed tiles. Rinse tile work thoroughly before and after use of chemical cleaners. Polish tile with soft cloth.

B. A protective coat of neutral cleaner solution shall be applied to all clean tile work. Floors shall be covered with clean, heavy duty building paper before traffic permitted. Prior to final acceptance inspection, building paper shall be removed and the protective coating rinsed from all the tile work.

END OF SECTION

SECTION 09510 ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Suspended metal grid ceiling system.

2. Perimeter trim.

3. Acoustical ceiling panels, suspended.

4. Acoustical ceiling panels, adhered to substrate.

B. Related Documents: The Contract Documents, as defined in Section 01010 - Summary of Work, apply to the work of this Section. Additional requirements and information necessary to complete the work of this Section may be found in other Documents.

C. Related Sections:

1. Section 07900 - Joint Sealers: Caulking of joints between perimeter trim and vertical surfaces.
2.

3. Section 16100 – basic electrical materials and methods

1.2 DESCRIPTION OF WORK

A. The extent of acoustical ceilings work is indicated on the Drawings and as specified herein, and includes providing and installing suspended metal ceiling grid, perimeter trim, acoustical panels, hanger devices, sealants and accessories for complete adhered and suspended ceiling systems.

1.3 REFERENCES

A. The publications listed below form a part of this Specification to the extent referenced. Publications are referred to in the text by basic designation only.

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

1. ASTM A 641 - Specification for Zinc-Coated (Galvanized Carbon Steel Wire.

2. ASTM C 635 - Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

3. ASTM C 636 - Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

4. ASTM D 1779 - Specification for Adhesive for Acoustical Materials.

5. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.

6. ASTM E 400 - Test Method for Analysis of Ores, Minerals, and Rocks by the Fire Assay Preconcentration Optical Emission Spectroscopy.

7. ASTM E 413 - Classification for Rating Sound Insulation.

8. ASTM E 580 - Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Seismic Restraint.

9. ASTM E 795 - Practices for Mounting Test Specimens During Sound Absorption Tests.

10. ASTM E 1264 - Classification for Acoustical Ceiling Products.

C. International Building Code (IBC):

1. Applicable edition in the Project jurisdiction.

1.4 SUBMITTALS

A. Section 01330 - Submittal Procedures: Procedures for submittals.

1. Product Data: Manufacturers product specifications and installation instructions for each suspension system and type of seismic brace, and each acoustical ceiling material required; certified laboratory test reports and other data as necessary to show compliance with these Specifications.

2. Shop Drawings: Four (4) sets of accurate layout drawings based on actual field measurements. Indicate all mechanical and electrical items, access panels and other items to be installed in the finished ceiling including seismic bracing locations.

3. Samples:

a. Two 6" x 6" square samples of each acoustical unit required, showing the full range of exposed pattern, texture and color to be expected in the finished work.

b. Two 12" long samples of each exposed runner.

c. Two 12" long samples of each edge molding.

4. Assurance / Control Submittals.

a. Manufacturers certificate that the products meet or exceed the specified requirements.

b. Documentation of experience indicating compliance with the specified qualifications requirements.

5. Maintenance Information: Manufacturer=s recommendations for cleaning and refinishing acoustical units, including precautions against materials and methods which may be detrimental to finishes and acoustical performance.

B. Section 01780 - Closeout Submittals: Procedures for closeout submittals.

1. Warranty: Submit a written special Warranty with forms completed in the name of the Owner and registered with the manufacturer.

1.5 COORDINATION

A. Coordinate layout and installation of the suspension system components and acoustical ceilings with other work supported by or penetrating through the ceilings, including light fixtures, HVAC equipment, fire-suppression system components, and partition systems, if any.

B. Furnish layouts for inserts, clips and other supports required to be installed by other trades for support of acoustical ceilings.

1. Furnish concrete inserts, steel deck hanger clips and similar devices to other trades for installation well in advance of the time needed for the coordination of other work.

C. Interface with Other Work:

1. Schedule the installation of acoustical units after all interior wet work has been completed.

2. Install after all major above ceiling work has been completed.

3. Coordinate the location of hangers with other work.

4. Do not install acoustical units until after the building has been enclosed, dust generating activities have ceased, overhead work is complete, tested and approved and the air conditioning system is operational.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Company specializing in manufacturing the products specified with a minimum of five (5) years documented experience.

2. Installer: Company experienced in performing the work of this Section with a minimum of five (5) years documented experience; acceptable to the manufacturer as shown by a current written statement from the suspension system manufacturer.

C. Fire Performance Characteristics: Provide acoustical ceiling components identical to those tested for the following fire performance characteristics, according to the ASTM test method indicated, by UL or other testing and inspecting agency acceptable to authorities having

jurisdiction. Identify the acoustical ceiling components with appropriate marking by the testing and inspecting agency.

1. Surface Burning characteristics: Tested per ASTM E 84.

a. Flame Spread: 25 or less.

b. Smoke Developed: 50 or less.

D. Fire Resistance Ratings: As indicated by reference to the design designation in UL AFire Resistance Directory@ or AFM Approval Guide@ for floor, roof or beam assemblies in which acoustical ceilings function as a fire protective membrane, tested per ASTM E 119.

E. Fire-Rated Ceilings: Provide protection materials for lighting fixtures and air ducts to comply with the requirements indicated for a rated assembly; conform to UL requirements for materials and assemblies. Provide UL Design No. P 251 enclosures over all types of recessed lights.

F. Limitations: The ceiling and suspension system shall be installed with vertical and lateral seismic bracing as required by the building code. Ceilings shall not support materials or other building components. Ductwork, grilles, light fixtures, plumbing and like work shall have their own support system and shall not use the ceiling system or ceiling suspension wires for support.

1.7 DELIVERY, STORAGE AND HANDLING

A. Section 01600 - Product Requirements: Transport, handle, store and protect the products.

B. Deliver products to the Project Site in the manufacturer=s original, unopened containers, dry and undamaged, with the brand name and type clearly marked.

C. Store under cover in dry, weathertight conditions.

D. Protect against damage from moisture, direct sunlight, surface contamination and other causes.

E. Handle acoustical ceiling units carefully to prevent chipping of edges and damage to the units in any way.

1.8 JOB CONDITIONS

A. Do not install acoustical ceiling units until the space has been enclosed and weatherproof, wet work in the space is completed and nominally dry, work above the ceiling is complete, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

B. Maintain a uniform temperature range of 60□ - 85□ F and relative humidity of no more than 70%, continuously, prior to, during and after installation.

1.9 WARRANTY

A. Section 01780 - Closeout Submittals: Procedures for closeout submittals.

1.10 MAINTENANCE

A. Section 01780 - Closeout Submittals: Procedures for closeout submittals.

B. Extra Materials: Provide not less than 5% of each type, size and color of acoustical ceiling panels, from the same manufacturer as the materials installed.

2.1 METAL CEILING GRID SUSPENSION SYSTEMS, GENERAL

A. Standard for Metal Suspension Systems: Intermediate duty, hot-dipped galvanized steel suspension grid of the type and finish indicated; comply with applicable requirements of ASTM C 635.

B. Edge Moldings and Trim: Metal or extruded plastic of the types and profiles indicated, or if not indicated, provide manufacturer=s standard molding for edges and penetrations of the ceiling which fits with the type of edge detail and suspension system indicated.

1. For lay-in panels with reveal edge details, provide a stepped edge molding which forms a reveal of the same depth and width as that formed between the edge of panels and flanges at exposed suspension members.

2. For circular penetrations of the ceiling, provide edge moldings fabricated to the diameter required to fit the penetration exactly.

C. Finishes and Colors: Provide manufacturer=s standard finish for the type of system indicated, unless otherwise required. For exposed suspension members and accessories with painted finish, provide the color indicated or, if not otherwise indicated, as selected from the manufacturer=s full range of standard colors.

1. High Humidity Finish: Comply with ASTM C 635 requirements for ACoating Classification for Severe Environment Performance@.

D. Attachment Devices: Size for five (5) times the design load indicated in ASTM C 635, Table 1, Direct Hung.

1. Concrete Inserts: Inserts formed from hot-dipped galvanized sheet steel and designed for attachment to concrete and for embedment in concrete, with holes or loops for attachment of hanger wires.

2. Surface Devices: Standard, hot-dipped galvanized, angle hangers, shot stud attached to concrete ceilings.

E. Hanger Wire: Galvanized carbon steel wire, ASTM A 641, soft temper, prestretched, Class 1 coating, sized for three (3) times the hanger design load indicated in ASTM C 635, Table 1, Direct Hung; not less than 12 gage for vertical hangers and lateral sway bracing.

F. Stiffner Braces: Manufacturer=s standard vertical struts or attachment to hanger wires to hold the suspension system in place during seismic events.

G. Hold-Down Clips for Non-Fire-Rated Ceilings: For exterior ceilings and for interior ceilings with lay-in panels weighing less than one pound per square foot, provide hold-down clips spaced at 2'-0" o.c. on all cross tees.

2.2 CONCEALED METAL CEILING GRID SYSTEM

A. Intermediate duty, hot-dipped galvanized steel, concealed, 15/16" wide, one-hour fire rated; plug-in positive lock connections, locking tee ends; ASTM C 635.

1. Moldings: [Angle] [Shadow].

2. Section 01600 - Product Requirements: Product Options: Substitutions permitted.

2.3 ACOUSTICAL CEILING UNITS, GENERAL

A. Standard for Acoustical Ceiling Units: Provide manufacturers standard units of the configuration indicated which are prepared for the mounting method designated and which comply with the requirements of ASTM E 400, including those indicated by reference to type, form, pattern, grade, noise reduction coefficient (NRC), ceiling attenuation class (CAC), light reflectance (LR), edge detail, and joint detail, if any.

1. Mounting Method for Measuring NRC: No. 7 (mechanically mounted on special metal support), ASTM E 400 mounting per ASTM E 795.

B. Sound Attenuation Performance:

1. Provide acoustical ceiling units with ratings for ceiling attenuation class (CAC) values of the range indicated as determined in accordance with ASTM E 413.

2. Provide acoustical ceiling units with ratings for ceiling sound attenuation class (STC) of the range indicated as determined according to AMA 1-II ACeiling Sound Transmission Test by Two-Room Method@ with ceilings continuous at partitions and supported by a metal suspension system of a type appropriate for ceiling units of the configuration indicated (concealed for tile, exposed for panels).

C. Colors, Textures, and Patterns: Provide products to match the appearance characteristics indicated or, if not otherwise indicated, as selected from the manufacturer=s standard colors, surface textures, and patterns available for acoustical ceiling units and exposed metal suspension system members of the quality designated.

2.4 ACOUSTICAL CEILING UNITS

A. General: The following product type numbers in parenthesis are those used on the Drawings.

B . (ACT-1): Mineral fiber, fire-resistant, Class A: flame spread 25 or less per ASTM E 1264,

R-1.6, weight 1.0 lbs / sf, factory-applied vinyl latex paint finish, medium texture, non-directional, NRC .50 -.60, CAC 30 - 40, LR 0.80, angled tegular edge, 24" x 24" x 5/8". Color as selected.

C. (ACT-2): Mineral fiber, fire-resistant, Class A: flame spread 25 or less per ASTM E 1264, R-1.6, weight 0.9 lbs / sf, factory-applied vinyl latex paint finish, medium texture, non-directional, NRC .45-.55, CAC 30 - 40, LR 0.80, beveled edge, for concealed spline installations, 12" x 12" x 5/8". Color as selected.

D. (ACT-3): Ceramic and mineral fabric composite, fire resistant, Class A: flame spread 25 or less per ASTM E 1264, R-1.4, weight 1.40 lbs / sf, scrubbable factory-applied vinyl plastic paint, sag resistant, fine fissured, perforated, NRC .50 -.60, CAC 35 - 39, LR 0.80, square edge, lay-in, 24" x 24" x 5/8". Color white.

2.5 MISCELLANEOUS MATERIALS

A. Tile Adhesive: Type recommended by the tile manufacturer, bearing UL label of Class 0 - 25 flame spread; comply with ASTM D 1779.

B. Tile Fasteners: Cadmium plated, type recommended by the tile manufacturer, length for not less than 1/2" penetration of substrate.

C. Acoustical Sealant: Resilient, non-staining, non-shrinking, non-hardening, non-skinning, non-drying, non-sag sealant intended for interior sealing of concealed construction joints.

1. .

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01700 - Execution Requirements: Verification of existing conditions before starting the work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive the work.

1. Verify that the layout of hangers will not interfere with other work.

C. Report, in writing, prevailing conditions that will adversely affect satisfactory execution of the work of this Section. Do not proceed with the work until the unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Layout:

1. Locate the system on room axes according to the Reflected Ceiling Plan, as indicated on the Drawings, or establish layout to balance the border tile widths at

opposite edges of each ceiling. Avoid the use of less than 1/2 width units at borders.

2. Where the acoustical ceiling continues thru a wall opening, continue the established pattern without interruption. One row of panels may be cut to less than full size, if necessary, to establish the pattern in the adjoining room.

B. Substrate Testing: Before installing adhesively applied tile on wet-placed substrates such as cast-in-place concrete or plaster, test and verify that the moisture level is below the tile manufacturer=s recommended limits.

C. Prior to installation, store acoustical units for 24 hours, minimum, at the same temperature and relative humidity as the space where the materials are to be installed.

3.3 INSTALLATION - GENERAL

A. Install materials in accordance with the manufacturer=s printed instructions, ASTM C 635 and ASTM C 636, in compliance with governing regulations, fire-resistance rating requirements as indicated, and industry standards applicable to the work.

3.4 INSTALLATION - CEILING SUSPENSION SYSTEM

A. General:

1. Install the suspension system with hangers supported only from the building structural members. Locate hangers not less than 6" from each end and spaced at 4'-0" o.c. along each carrying channel or direct-hung runnner, unless otherwise indicated.

2. Install metal hanger tabs and clips attached to the structure above where required for the attachment of suspension wires.

3. Secure wire hangers by looping and wire-tying, either directly to the structure or to inserts, eye-screws, or other devices which are secure, appropriate for the substrate, and which will not deteriorate or fail with age or temperature change.

4. Install hangers plumb and free from contact with insulation, ductwork and other objects within the ceiling plenum which are not part of the supporting structure or ceiling suspension system. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance. Splay hangers only where required to miss obstructions and offset resulting horizontal force by bracing. Where carrying members are spliced, avoid visible displacement of the face plane of adjacent members.

5. Install edge molding of the type indicated, at the perimeter of acoustical ceiling areas, at the intersection of the ceiling and vertical surfaces and at locations where necessary to conceal the edges of acoustical units. Use the longest practical lengths. Provide edge molding at junctions with other interruptions. Secure at 16" o.c., maximum.

6. Screw-attach moldings to the substrate at intervals not over 16" o.c. and not more than 3" from ends; level with the ceiling suspension system. Miter corners accurately and connect securely.

7. Rivet cross tee's to the edge molding at 48" o.c., typical.

8. In areas larger than 144 sq. ft., rivet the cross tees on two adjacent walls per ASTM E 580.

9. Do not support components on the main runners or cross runners if the weight causes the total dead load to exceed the allowable limits. Do not eccentrically load the system or produce rotation of runners.

10. Install the system level, in a uniform plane, and free of twists, warp, dents, scratches, stains and other defects. Variation from Flat and Level Surface: 1/8" in 12 feet.

11. Caulk between the edge molding and adjacent vertical surfaces.

B. Vertical Support System:

1. Suspension wires shall be 12 gage, minimum, galvanized, attached to main runners at 4'-0" o.c., maximum, spacing in both directions.

2. Each wire shall be anchored to the structure above with a device capable of supporting 75 pounds, minimum.

3. Wires supporting fixtures shall be capable of supporting four (4) times the fixture weight.

4. Suspension wires shall not hang more than 1:6 out of plumb, unless counter sloping wires are provided.

5. Wires shall not be attached to or bend around interfering work such as piping, conduits or ductwork. Trapeze or equivalent devices shall be used where obstructions interfere with direct suspension. Trapeze shall be suspended back-to-back, 1-1/2" cold formed channels, minimum, for spans up to 6 feet.

C. Horizontal Support System:

1. Lateral support systems for ceilings shall be shown in detail on the Shop Drawings.

2. Adequacy of the system shall be demonstrated by calculations, and / or test results, including adequacy of main runner intersection connections. Tests shall show a capacity of twice the calculated load to provide a safety factor.

3. Provisions shall be made for possible differential movement between ceilings and side walls. The terminal ends of each main and each cross runner shall be wire supported. Wall trim angles shall not provide the primary support for runners.

4. Lateral support of ceilings shall not be provided by the angle trim, and runners shall not be riveted to the wall trim.

D. Lateral Force Bracing: Provide cross-bracing for ceilings greater than 144 sq. ft. in area.

1. Where substantiating calculations are not provided, horizontal restraints shall be provided by four No. 12 gage wires secured to a main runner within 2" of a cross runner intersection and splayed 90 degrees from each other at an angle not exceeding 45 degrees from the plane of the ceiling. A strut fastened to the main runner shall extended up to and be fastened to a structural member supporting the roof or floor above. The strut shall be adequate to resist the vertical force induced by the bracing wires. These horizontal restraint points shall be placed 12 feet o.c. in both directions with the first point within 6 feet of each wall. Attachment of the restraint wires to the structure shall be adequate for the load imposed.

3.5 INSTALLATION - ACOUSTICAL PANELS

A. Arrange acoustical units and orient directionally patterned units, if any, in the manner shown on the Drawings. If not indicated, install units with the pattern running in one direction only, as approved by the Owner=s representative.

B. Fit the acoustical units in place free of damaged edges, dents, scratches, stains and other defects; install level and in a uniform plane.

C. Hold Down Clips: For fire-rated and security areas, install clips spaced at 2'-0" o.c. on all cross tees. Do not install clips at panels for access and at one panel in each corner of a room.

D. Mark access panels with a black adhesive dot.

3.6 INSTALLATION - ACOUSTICAL PANELS ADHERED TO SUBSTRATE

A. Install acoustical panels in accordance with the panel manufacturer=s recommendations.

B. Apply adhesive in accordance with the adhesive manufacturer=s printed directions, unless directed otherwise.

C. Spread only enough adhesive to permit the installation of acoustical panels before initial set.

D. Scribe panels to walls, columns, junction boxes, and other appurtenances as necessary to produce tight joints.

3.7 FIELD QUALITY CONTROL

A. Section 01450 - Quality Control: Field inspection.

B. Inspect the ceiling grid suspension system installation, connections to the structure, edge moldings and acoustical panel placement.

3.8 ADJUSTING

A. Section 01700 - Execution Requirements: Adjusting the installed work.

B. Adjust the grid for alignment and level.

C. Adjust the acoustical panels for proper fit within the grid.

3.9 CLEANING

A. Section 01700 - Execution Requirements: Cleaning the installed work.

B. Clean exposed surfaces of the ceiling grid, perimeter trim, and acoustical panels.

C. Comply with the manufacturer=s instructions for cleaning and touch-up of minor finish damage.

D. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09800 SPECIAL COATINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Special coating systems.

B. Related Documents: The Contract Documents, as defined in Section 01010 - Summary of Work, apply to the work of this Section. Additional requirements and information necessary to complete the work of this Section may be found in other Documents.

C. Related Sections:

1. Section 07900 - Joint Sealers: Sealants.

2. Section 09900 - Painting: Field application of special coatings.

1.2 DESCRIPTION OF WORK

A. The extent of special coatings work is indicated on the Drawings and Finish Schedule and as specified herein, and includes cleaning and preparation of all interior and exterior surfaces to be coated or finished and the application of coating on all interior and exterior surfaces scheduled.

B. Apply special coating on all exterior concrete, masonry and cement plaster including fascia, soffits, walls of building, exposed concrete beams, exposed concrete retaining wlls and fences;, both horizontal and vertical surfaces.

C. Provide sealants for all joints covered by or touching the special coating material. See Section 07900 - Sealants.

1.3 REFERENCES

A. The publications listed below form a part of this Specification to the extent referenced. Publications are referred to in the text by basic designation only.

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

1. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.

1.4 GENERAL

A. It is the intent of this Section to outline requirements for the use of special coatings, but not to cover all details of the materials, preparation and application. The manufacturer's approved specifications, details and instructions shall govern the materials and application. The coating system provided and applied shall be appropriate for the construction

materials, conditions of the Project, and its location.

1.5 SUBMITTALS

A. Section 01300 - Submittal Procedure: Procedures for submittals.

1. Product Data: Submit for each type of coating specified.

a. Manufacturer=s technical information including coating analysis, and application instructions for each material proposed for use.

b. Schedule listing the surfaces to be coated with cross reference to the specific coating and finishing system, and application. Identify each coating material by manufacturer's catalog number and general classification.

2. Samples:

a. Prior to beginning the coating work, provide color chips for the surfaces to be coated. Use representative colors when preparing samples for review. Submit samples of the color and texture only for the Architect=s review. Provide a listing of materials and application for each coat of each finish sample.

b. Provide two (2) - 12" x 12" samples of each finish, color and texture on hardboard, using the same tools and techniques as for the actual application. Re-submit samples, as requested by the Architect, until acceptable color, sheen, and texture is achieved.

3. Mock-Up: On actual wall surfaces and other exterior building components, duplicate the paint finish matching the prepared samples. Provide full-coat finish samples on at least 100 sq. ft. of surface, as directed, until the required color, sheen and texture is obtained.

4. Assurance / Control Submittals:

a. Manufacturer's certificate that the products meet or exceed the specified requirements.

b. Manufacturer's Material Safety Data Sheets (MSDS) for each coating type to be provided.

c. Manufacturer=s certification that the products supplied comply with applicable federal and local regulations controlling the use of volatile organic compounds (VOC).

d. Manufacturer's instructions indicating procedures and conditions requiring special attention, and cautionary procedures required during application.

e. Documentation of the applicator=s experience indicating compliance with the specified qualifications requirements.

B. Section 01780 - Closeout Submittals: Procedures for closeout submittals.

1. Warranty: Provide a written Warranty with forms completed in the name of the Owner and registered with the manufacturer.

1.6 COORDINATION

A. Pre-Application Meeting: Convene a Pre-Application Meeting at the Project Site prior to beginning the coating work.

1. Require attendance of the Contractor, Owners representative, Architect, representatives of the coating subcontractor and other finish products, and the mechanical and electrical trades.

2. Review the coordination and environmental controls required for proper application of the coatings and ambient conditions in the areas to receive coatings.

3. Review preparation and installation procedures, and the coordination and scheduling required with the coating work.

1.7 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Company specializing in manufacturing the products specified with a minimum of five (5) years documented experience.

2. Authorized Applicator: Company specialized in, and has successfully completed applications of the same or similar type of materials for not less than five (5) years.

a. Applicator shall be specifically approved as a factory-licensed Applicator of the primary materials, in writing, by the coating system manufacturer.

b. Submit the manufacturer=s written approval and certification of the Applicator.

c. Applicator=s equipment and training shall conform to the manufacturer=s standards.

e. Applicator shall conform strictly to the manufacturer=s AQuality Assurance Program@ requirements.

B. Regulatory Requirements:

1. Provide coating materials that conform to Federal, and local Government limits for Volatile Organic Compounds (VOC) content.

C. Single Source Responsibility: Provide primers and other undercoat products by the same manufacturer as the finish coats. Use only thinners approved by the coating manufacturer, and use only within the recommended limits.

D. Coordination of Work: Review other Section of these Specifications in which prime paints are to be provided to ensure compatibility of the total coating system for the various

substrates. Upon the request of other trades, furnish information or characteristic of the finish materials, to ensure that compatible prime coats are applied.

E. The owner reserves the right to engage the services of an independent testing agency to sample the coating material being used. Samples of material delivered to the project will be taken, identified, sealed and certified in the presence of the contractor.

1. The testing agency will perform appropriate tests for the following characteristics as required by the Owners representative.

a. Quantitative material analysis

b. Abrasion resistance

c. Apparent reflectivity

d. Flexibility

e. Washability

f. Absorption

g. Accelerated weathering

h. Dry opacity

i. Accelerated yellowness

j. Recoating

k. Skinning

l. Color retention

m. Alkali and mildew resistance

2. The Owner=s representative may direct the contractor to stop coating work if test results show material being used does not comply with specified requirements. This contractor shall remove noncomplying coating from the site, pay for testing and recoat surfaces previously coated with rejected coating. The contractor may be required to remove rejected coating from previously coated surfaces if, upon application of specified coating, the two (2) coatings are incompatible.

1.8 DELIVERY, STORAGE AND HANDLING

A. Section 01600 - Product Requirements: Transport, handle, store and protect the products.

B. Deliver products to the Project Site in the manufacturer=s original, new and unopened packages and containers bearing the following information:

1. Manufacturers name.

2. Name or title of the material.

3. Manufacturers lot number and date of manufacture.

4. Contents by volume for major pigment and vehicle constituents.

5. Color name and number.

6. Thinning or reducing instructions.

7. Application instructions including surface preparation and coverage.

8. Drying time.

9. Cleanup requirements.

C. Store products, not in actual use, in tightly covered containers, off the ground and under cover. Maintain containers used in the storage of coatings, in a clean condition, free of foreign materials and residue.

D. Store coating materials at a minimum ambient temperature of 45□ F and a maximum of 90□ F, in a ventilated area, and in compliance with the manufacturer's published instructions.

E. Keep storage areas neat and orderly. Remove rags and waste daily.

F. Protect against fire hazards and spontaneous combustion.

G. Take all precautions to ensure that workmen and the work areas are adequately protected from health hazards which might result from handling, mixing and application of coatings.

1.9 JOB CONDITIONS

A. Environmental Requirements:

1. Do not apply coating during rain, fog or mist when the relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted by the coating manufacturer=s printed instructions.

2. Apply coating finishes only when the moisture content of the surfaces to be coated is within the manufacturer's acceptable range for the type of finish to be applied.

3. Coating may be continued during inclement weather if the areas and surfaces to be coated are enclosed and within the humidity limits specified, and allowed by the coating manufacturer during application and drying periods.

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4. Do not apply coatings in areas where dust is being generated.

1.10 WARRANTY

A. Section 01780 - Closeout Submittals: Procedures for closeout submittals.

B. Special Warranty:

1. Submit a written joint and severable Warranty, signed by the coating materials manufacturer, Contractor and the Applicator, agreeing to repair or replace defective materials and workmanship due to failure of the coating to perform as required within the warranty period.

2. During the warranty period, repairs and replacements required because of acts of God and other events beyond the Contractor's / Applicator's control, and those which exceed performance requirements, shall be completed by the Contractor / Applicator and paid for by the Owner at the prevailing rates.

3. Warranty Period: Five (5) years from the date of Substantial Completion.

1.11 MAINTENANCE

A. Section 01780 - Closeout Submittals: Procedures for closeout submittals.

B. Extra Materials: Provide a stock of maintenance materials. Furnish maintenance materials matching the products installed, packaged with protective covering for storage, and identified with appropriate labels.

1. Finish Coat: Ten (10) gallons of each color.

C. Maintenance Data: Submit three (3) copies of the manufacturer=s recommended maintenance practices for each type of coating applied, recommended maintenance materials, methods of repair, and suggested schedule for cleaning.

A. Characteristics:

1. Type: Acrylic Latex.

2. Surface: Texture: High Profile (coarse).

3. Solids by volume: 53% minimum.

4. Dry film thickness (DFT): 18-20 Mils (minimum)

B. .

C. Accessory Materials:

1. Sealant: Manufacturers recommendation..

2. Joint backing, cleaner / primer / sealer, bond breaker tape: As recommended by the manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01700 - Execution Requirements: Verification of existing conditions before starting the work.

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive the work.

1. Verify that substrate surfaces are durable, free of matter detrimental to adhesion and application of the coating materials.

3. Verify that substrate surfaces are smooth, free of honeycomb and pitting, and not detrimental to full contact bond of the coating materials.

4. Verify that items which penetrate surfaces to receive the coating are installed and secured in-place.

C. Report, in writing, prevailing conditions that will adversely affect satisfactory execution of the work of this Section. Do not proceed with the work until the unsatisfactory conditions have been corrected.

D. Starting of coating work will be construed as the Applicator's acceptance of the surfaces and conditions within any particular area.

3.2 PREPARATION

A. Perform preparation and cleaning procedures in accordance with the manufacturer's instructions and as herein specified, for each particular substrate condition.

B. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be coated, or provide surface-applied protection prior to surface preparation and coating applications. Following the completion of coating of each space or area, re-install all removed items.

C. Cementitious Materials: Prepare cementitious surfaces of concrete, and cement plaster to be coated by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze. All cement plaster surfaces must cure at least 30 days prior to application of the coating.

1. Determine alkalinity and moisture content of surfaces to be coated by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of the finish coat, correct the condition before application. Do not apply over surfaces where moisture content exceeds that permitted in the manufacturer's printed directions.

D. Existing Surfaces:

1. Remove all loose and deleterious material including previous coatings which are not fully adhered and acceptable to the manufacturer. Thoroughly clean by water blast or other suitable method as recommended by the manufacturer.

2. If directed by the manufacturer, provide barrier coats over incompatible primers or coatings or remove and re-prime as required. Notify the Owner=s representative, in writing, of any anticipated problems with using the specified coating systems on

substrates previously coated.

E. Materials Preparation:

1. Mix and prepare coatings and finish materials in accordance with the manufacturer's directions.

2. Maintain containers used in mixing and application of coating in a clean condition, free of foreign materials and residue.

3.3 INSPECTION

A. After cleaning remove defective concrete, honeycombs, cavities, joint crack voids and other defects by routing to sound material. To repair small areas in concrete, use a uitable epoxy mortar. For larger areas, use cementitious patching materials which are compatible with the system. Patching should be finished flush with the surrounding concrete. All patched areas should be given a light brush blast prior to painting.

B. Verify the porosity of the concrete substrate using a pump-up sprayer and water. The water should uniformly soak into and darken the surface and not Abead up@. Failure to do so is an indication that additional surface preparation is required.

C. Check using a pH pencil, check the pH of the concrete panels, as well as, concrete patches and sacking materials. PH level must be 10.0 or lower.

3.4 APPLICATION

A. Apply coating system in accordance with the manufacturer's instructions and directions. Apply primer if recommended by the coating materials manufacturer for conditions at the time of application.

B. Use applicators and techniques best suited for the substrate and type of material being applied.

C. Do not apply coating over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable finish.

D. Apply materials at rate not exceeding that recommended by coating manufacturer for surface being coated, less ten percent for losses.

E. Comply with manufacturer=s recommendations for drying time between coats.

F. Apply two (2) coats, using airless spray, at the rate of not more than 100 square feet per gallon, per coat. The total dry mil thickness of two coats shall be not less than 18 mils.

G. Finished surface shall be uniform in finish and color and free of pinholes, sagging, missed areas, corduroy brush marks, streaks, laps or pile-up, and other imperfections.

H. The edges of special coatings adjoining other materials or colors shall be sharp and clean without overlapping.

I. Match the approved mock-up for color, texture and coverage.

J. Remove, re-finish or re-coat work not in compliance with the specified requirements and approved mock-up.

3.4 FIELD QUALITY CONTROL

A. Section 01450 - Quality Control: Field inspection.

B. Inspect coating applications for the scheduled materials, color, sheen, texture, thickness, and coverage.

3.7 CLEANING

A. Section 01700 - Execution Requirements: Cleaning the installed work.

B. As work proceeds, and upon completion, promptly remove coating where spilled, splashed, and spattered.

C. During progress of the work, keep the premises free from any unnecessary accumulation of tools, equipment, surplus materials, and debris. Remove discarded coating materials, rubbish, cans and rags from the site at the end of each work day.

D. Collect waste, cleaning cloths, and materials which may constitute a fire hazard, place in closed metal containers, and remove from the site daily.

E. Upon completion of the work leave the premises neat and clean. Clean metal door and window frames, glass, and other coating-spattered surfaces. Remove spattered coatings by proper methods of washing and scraping, taking care to not scratch or otherwise damage finished surfaces.

3.8 PROTECTION

A. Protect the work of other trades, whether to be coated or not, against damage by the coating and finishing operations.

B. Place AWet Paint@ signs, as required, as a warning of newly coated surfaces.

C. Remove temporary protective wrappings provided by other trades for the protection of their work, after completion of the coating operations.

D. Upon completion of the work of other trades, touch-up and restore all damaged or defaced coated surfaces.

E. Correct any damage by cleaning, repairing or replacing and re-coating, as acceptable to the Owner=s representative.

F. Repair any damage resulting from inadequate or unsuitable protection.

G. Touch-ups shall blend with surrounding surfaces and be indistinguishable from the original work.

END OF SECTION

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.01 SCOPE

A. The work contemplated under this section shall include materials, labor, equipment and services necessary for and reasonably incidental for painting as specified, both exterior and interior walls, wood, hardboard, metal, plaster, or other surfaces as specified to make a thoroughly complete job in every respect, whether every item is specifically mentioned or not.

B. Work not included: There shall be no painting of copper, aluminum or other finish materials unless otherwise directed by the Construction Manager.

1.02 DELIVERY

A. All materials shall be delivered to the job site in original unbroken manufacturers packages with the labels intact and be kept in a locked room to which the Architect shall have access at all times.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All paint materials shall be approved manufacturer's best quality paint.

2.02 PAINT DESIGNATION:

Surface	Prime	Final
a. Exterior concrete	Acrylic base paint	Elastomeric paint
b. Interior concrete	Flat wall primer	Semi-gloss latex
c. Wood doors	Spackled/Flat	Gloss Enamel
d. Jambs and Frame	Spackled/Flat	Gloss Enamel
e. Metals	Anti-rust red oxide paint	Enamel

f.	Ceilings	ceiling flat primer	Flat

latex PART 3 - EXECUTION

3.01 CLEANING:

A. At the end of each workday, all combustible rags and empty container shall be removed, taking every precaution to prevent fire. At completion of the work, remove all surplus materials and debris. All paint spots, stains, spattering, etc., shall be removed from adjacent surfaces and the job left in a clean and finished condition.

3.02 FINISH SCHEDULE

A. Surfaces shall be finished in accordance with the schedule for the surface material and finish desired as specified and indicated in drawings “schedule of finishes”.

Except as otherwise directed by the Construction manager, apply three (3) coats after one coat of primer.

3.03 SUBMITTALS:

A. Test panels: The contractor shall prepare and submit sample panels of selected colors or shade in 12 inch square plywood panels for approval by the Architect.

SECTION 15400 - PLUMBING

PART 1 - GENERAL

1.01 SCOPE:

A. Provide materials that are new and conform to the standard of Underwriter Laboratories and shall conform to the latest edition of National Standard Plumbing Code and applicable local plumbing standard.

B. The work includes building plumbing (water and sanitary lines), materials, equipment, tools, fixtures, installation and workmanship in accordance with National Plumbing Code.

C. For other miscellaneous required materials not specifically mentioned, shall be provided of best quality of their respective kind.

1.02 RELATED WORK

A. Section 15010 - General requirement
B. Section 02200- Earthwork: Excavation, Trenching and Backfilling

1.03 QUALITY ASSURANCE:

A. The quality control provisions of General requirement apply to this section. Approvals except those required for field tests and applications shall be obtained before application is started.

B. Use adequate numbers of skilled workers that are thoroughly trained and experienced.

1.04 SUBMITTALS - Meet the requirements of Section 15010 General Requirements.

A. Manufacturer's Data and Compliance

1. Pipe and Fittings
2. Plumbing Fixtures and Accessories

3. All valve
4. Strainer
5. Drains

C. And accessories

1.05 DELIVERY AND STORAGE

A. Delivery and store materials and equipment in manner as specified in section 15010.

PART 2 - PRODUCTS

2.01 WATER, WASTE AND VENT PIPING: All pipes and materials for various services to be standards.

A. Polyvinyl Chloride (PVC) pressure rated (SDR Series) ASTM D2241-

B. Polyvinyl Chloride (PVC) plastic pipe schedule 40, 80 and 120 ASTM D1785.

C. Polyvinyl Chloride (PVC) pipe and fittings schedule 40/80 ASTM D2466.

D. Copper Tubing - Type L and Type K ASTM B88 or ASTM B306. Solder joint fittings ASTM B32.

E. Galvanized Pipe - schedule 40 hot-dip threaded ends and threaded ends and threaded fittings- ASTM A120, ANSI B16.12

F. CPVC PIPES for hot water lines

2.02 CLEAN OUTS: Shall be provided as indicated in the drawings.

A. Clean Out Thru Ground (COTG) - cast-iron or PVC Clean out and counter sunk plugs, provide concrete collar as indicated in the drawings.

B. Clean Out Thru Floor (FCO) - cast-iron clean out with secure floor plate with counter sunk screw, polished bronze or nickel bronze, refer to drawings for details.

2.03 DRAINS - cast-iron floor drain with round adjustable height nickel-bronze strainer, reversible clamping collar and threaded strainers allow strainer height

adjustment. For pipe size 2”0 or as indicated in the drawings. METMA, model 229 or equal.

For shower floor drains - provided as indicated in the drawings.

2.04 VALVES - provide valves with a minimum working pressure of 125 PSI and minimum of 180 degrees Fahrenheit hot water. Valves size ½” to 3” shall be threaded connections unless otherwise indicated. Check valves, angle valves, gate valves and etc.

For Valves use the following types:

Valve type	Diameter serviced
Globe	¾” and smaller
Solid wedge type with screwed ends	3” and
smaller Iron body with flange ends	4” and larger

2.05 VALVE BOXES - buried valves shall be provided a valve box, cast-iron or PVC as indicated in the drawings.

2.06 MISCELLANEOUS PIPING MATERIALS

1. Union - Hot dip galvanized ANSI B16 for copper tubing FEDWW-U-516; schedule 80 for PVC.

2. Pipe Nipples - Hot dip galvanized schedule 80; copper alloy, FEDWW-N- 351; schedule 80/120 for PVC.

3. Pipe Sleeves - shall be hot dip galvanized steel or as approved equal. Pipe sleeve shall be use where pipes passes thru concrete floor, walls, on partitions, refer to drawings for details.

4. Pipe Insulation - provide insulation, plastic tape for copper tubing, gooseneck and other components.

E. Hose Bibb - PP, cast brass, with check valve.

PART 3 - EXECUTION

3.01 PLUMBING FIXTURES: Includes all plumbing fixtures shown in the drawings and specified herein by the Architect in all bids to be considered.

A. Install all plumbing fixtures in accordance with the manufacturer's recommendations for installation. Furnish with brackets, cleats, plates and anchors required to support the fixtures rigidly in place.

B. After installation, fixtures shall be kept clean and working order. Any fixtures shall be strictly not to use until the building has been turned over and accepted by the Owner.

C. Contractor shall be responsible for providing those portions of the fixtures, fittings, which are not provided with fixture but are required for the complete installation.

D. Make all plumbing fixtures "Saniware standard" or "Central Gard" or approved equal.

3.02 WATER PIPES, FITTINGS, AND CONNECTIONS

A. Install all piping in strict accordance with the manufacturer's specifications and instructions.

B. Polyvinyl Chloride (PVC) and fittings shall conform to ASTM D1785 schedule 40/80; ASTM D2246.

C. Copper pipe as indicated in the drawings Type L and Type K underground or slabs on grade. Soldering fluxes shall be non-corrosive type. Never heat all soldered joint to more than 230 degrees C.

D. Cut all pipes accurately to measurements and work into place without wrinkling or forcing, nor causing structured portions of the buildings to weaken. Whenever possible, run all piping to ground parallel with the lines of the building unless otherwise noted on the drawings.

E. Provide shut-off valve and drains. Install the cold water line with fall toward a main shut-off valve and drain.

F. Extend the piping to all fixtures, outlets and equipment from required gate valves installed in each branch near risers.

G. Cap or plug ends of pipes and outlet and leave ready for future connection.

H. Upon completion of the water system, flush out lines to clear system of particles and dirt and clean all valve seats.

I. Sizes of main, risers, branches and connections shall be as indicated in the drawings, where size of connections to individual fixtures are not indicated, use the following sizing:

Fixtures	Cold Water supply
Hose Bibbs	1”

J. All hot water line piping and fittings shall be schedule 80 and other lines indicated in the drawings.

K. Unions - provide unions that are extra heavy, PVC, schedule 80, galvanized hot-dip and copper.

Provide unions in long runs of piping for water supply and intervals as directed by the contracting officer. Provide in bypasses around equipment. No unions conceal in wall, partition and slabs.

3.03 WASTE, DRAIN, AND VENT PIPING AND OTHER RELATED WORKS

A. Installation of pipe and fittings shall be in accordance with the applicable requirement of the latest edition of National Plumbing Code.

B. Excavation, Pipe laying and Backfilling

1. Excavate to required depths and grades all excavation required for installation of plumbing and waste and drainage system. Keep them

open trench condition until the piping has been inspected, tested and approved.

Provide bell-holes so that pipe will rest as well tamped solid

bedding along its entire length.

Lay pipes in trench true to line and grade. Lay water line and sewer in separate trenches.

2. Backfilling - after pipe lines has been tested, inspected and approved by the contracting officer and prior to backfilling, remove all sheeting, branching and the excavation of all trash and debris.

Place backfilling carefully and tamp under and around the pipe in such a manner that the pipeline and joint are not disturbed.

Bring backfill to suitable elevation above grade to provide for anticipated settlement and shrinkage.

C. Testing- tests all plumbing pipelines in accordance with applicable requirement of National Plumbing Code.

Test all water line by hydrostatic pressure, pressure test shall be 50 PSI in excess of maximum working pressure of the system, or shall not less than
150 PSI and shall hold at least 2 hours period. No allowable leak is considered.

END OF SECTION

SECTION 16000 BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Safety considerations for outdoor substations.
2. Raceways.
3. Building wire and connectors.
4. Supporting materials for electrical components.
5. Concrete equipment bases/pads.
6. Touchup painting.
7. Sleeves for raceways & cables.
8. Sleeve seals.
9. Electrical identification.

1.2 ACRONYMS & ABBREVIATIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. RSC: Rigid steel conduit.

D. LFMC: Liquidtight flexible metal conduit.

E. RNC: Rigid nonmetallic conduit, Unplasticized Polyvinyl Chloride.

F. NEC: National Electrical Code

G. NFPA: National Fire Protection Association

H. ANSI: American National Standards Institute

I. IMC: Intermediate metal conduit

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver components in factory-fabricated water resistant packaging.

B. Handle components carefully to avoid damage to components, enclosures and finish.

C. Store components in a clean, dry space and protect from weather.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NEC, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Compliant with the Latest Edition of National Electrical Code.

1.6 WORK COORDINATION

A. Coordinate chase block-outs, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

1. Set inserts and sleeves in poured-in-place concrete, masonry, and other structural components as they are constructed.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

C. Coordinate electrical service connections to components furnished by utility companies.

1. Coordinate installation and connection of underground or overhead utility and service, including provision for electric-metering facility.

2. Comply with requirements of the local government and of the utility company.

D. Coordinate location of access for electrical equipment that are concealed/recessed. Access doors and panels as specified Architectural Schedule.

E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

F. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

PART 2 - PRODUCTS

2.1 SAFETY CONSIDERATIONS FOR OUTDOOR SUBSTATIONS

A. Signage: Provide warning signage in English, and/or pictograph indicating "DANGER — HIGH VOLTAGE" according to signage requirements of Section 11.8.

B. Metal Enclosures: Use metal enclosures around all live parts.

C. Locks: Provide key interlocks on switchgear doors to prevent access to live parts.

D. Clearances: Refer to the Latest Edition of the National Electrical Code and National Electrical Safety Code (ANSI C.2) for adequate clearances.

2.2 RACEWAYS/CONDUITS & FITTINGS

A. EMT: ANSI C80.3, zinc-coated steel, with compression fittings and/or set screw type. (shall

B. FMC: Zinc-coated steel. ,

C. LFMC: Zinc-coated steel with sunlight-resistant and mineral-oil-resistant plastic jacket.

D. RNC: NEMA TC 2, Schedule 40 PVC, with NEMA TC3 fittings.

E. IMC: ANSI C80.6, UL safety standard 1242, coated in hot galvanized coating on exterior.

F. Raceway Fittings: Specifically designed for the raceway type used.

2.3 CONDUCTORS

A. Conductors, 3.5mm^2 (12AWG) and Smaller: Solid copper.

B. Conductors, Larger Than 3.5mm^2 (12AWG): Stranded copper.

C. Insulation: Thermoplastic, rated at 75 deg. C minimum.

D. Wire Connectors and Splices: Units of size, ampacity rating, material, type, and class suitable for service indicated.

2.4 SUPPORTING MATERIALS

A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 14-mm- diameter slotted holes at a maximum of 50 mm o.c., in webs.

D. Slotted-Steel Channel Supports: Comply with "Metal Fabrications" for slotted channel framing.

1. Channel Thickness: Selected to suit structural loading.

2. Fittings and Accessories: Products of the same manufacturer as channel supports.

E. Nonmetallic Channel and Angle Systems: Structural-grade, factory-formed, glass- fiber-resin channels and angles with 14-mm- diameter holes at a maximum of 203 mm o.c., in at least one surface.

1. Fittings and Accessories: Products of the same manufacturer as channels and angles.

2. Entire electrical system shall be fully rated.

F. Raceway and Cable Supports: Manufactured clevis hangers, riser and strut clamps, straps, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.

G. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

H. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body

constructed of malleable-iron casting with hot-dip galvanized finish.

I. Expansion/Anchor: Carbon-steel wedge or sleeve type.

J. Toggle Bolts: All-steel springhead type.

K. Powder-Driven Threaded Studs: Heat-treated steel.

2.5 CONCRETE BASES

A. Concrete Forms and Reinforcement Materials:

B. Concrete: 20.7-MPa, 28-day compressive

2.6 TOUCHUP PAINT

A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.

B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

C. Prevention of Corrosion: For all outdoor applications and all indoor applications in a harsh environment (salt air). Metallic materials shall be protected against corrosion. Equipment enclosures shall have the standard finish and corrosion resistant coating by the manufacturer when used for most indoor installations.

D. Panelboards: Ability to remove access covers is required for maintenance activities. No equipment shall be mounted within 900 mm of the front of the panel.

E. Field Testing: Final test data shall be provided to the COR for forwarding to the Systems Engineer/Condition Monitoring Office/Predictive Testing Group for inclusion in the Maintenance Database.

2.7 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 1.3- or 3.5-mm (0.052- or 0.138-inch) thickness as indicated and of length

to suit application.

D. Coordinate sleeve selection and application with selection and application of fire stopping.

2.8 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.

2. Pressure Plates: Stainless steel. Include two for each sealing element.

3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center/top of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to raceways and piping systems installed at a required slope.

F. Electrical equipment shall be designed and rated to operate in unusual environmental conditions such as wind-blown sand, salt atmosphere, flooding, ultraviolet rays due to altitude, high winds, etc. Where standard ratings are not available to match environmental conditions, equipment

shall be derated as required to compensate for factors such as high altitude and ambient temperature. Equipment installed in conditioned spaces shall be designed and rated for the conditioned ambient.

3.2 RACEWAY APPLICATION

A. Use the following raceways for outdoor installations:

1. Exposed: IMC or EMT
2. Concealed: RNC
3. Underground, Single Run: uPVC.
4. Connection to Vibrating Equipment: LFMC.
5. Boxes and Enclosures: NEMA 250 for boxes and Type 4x for enclosures.

B. Use the following raceways for indoor installations:

1. Exposed: IMC or EMT
2. Concealed: RNC
3. Connection to Vibrating Equipment: FMC; except in wet or damp locations, use LFMC.
4. Damp or Wet Locations: IMC.
5. Boxes and Enclosures: NEMA 250 for boxes, and Type 1 for enclosures, unless otherwise indicated.

3.3 RACEWAY AND CABLE INSTALLATION

A. Conceal raceways and cables, unless otherwise indicated, within finished walls, ceilings, and floors.

B. Install raceways and cables at least 150 mm away from parallel runs of water pipes. Locate horizontal raceway runs above water piping.

C. Use temporary raceway caps to prevent foreign matter from entering.

D. Make conduit bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise

indicated.

E. Use raceway and cable fittings compatible with raceways and cables and suitable for use and location.

F. Install raceways embedded in slabs in middle third of slab thickness where practical, and leave at least 25-mm-concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement/pouring.

2. Space raceways laterally to prevent voids in concrete.

3. Make bends in exposed parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for exposed parallel raceways.

G. Install pull string in empty raceways. Use monofilament/nylon plastic line with not less than (90-kg) tensile strength. Leave atleast (300 mm) of slack at each end of the pull wire.

H. Install telecommunications and signal system raceways, 50 mm and smaller, in maximum lengths of 45 m and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements in addition to requirements above.

I. Connect motors and equipment subject to vibration, noise transmission, or movement with a maximum of 1830-mm flexible conduit. Install LFMC in wet or damp locations. Install separate ground conductor across flexible connections.

J. Set floor boxes level and trim after installation to fit flush to finished floor surface.

3.4 WIRING METHODS FOR POWER, LIGHTING, AND CONTROL CIRCUITS

A. Feeders: Type THHN/THWN insulated conductors in raceway.

B. Underground Feeders and Branch Circuits: Type THWN insulated conductors in raceway.

C. Branch Circuits: Type THHN/THWN insulated conductors in raceway.

D. Remote-Control Signaling and Power-Limited Circuits: Type THHN/THWN insulated conductors in raceway for Classes 1, 2, and 3,

unless otherwise indicated.

E. LVSG: Type THHN/THWN insulated conductors in raceway and Type "SIS" for control circuits.

3.5 WIRING INSTALLATION

A. Install splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

B. Install wiring at outlets with at least 300 mm of slack conductor at each outlet. Pigtailing conductors is not permitted.

C. Connect outlet and component connections to wiring systems and to ground. Tighten electrical connectors and terminals, according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.6 ELECTRICAL SUPPORTING MATERIALS APPLICATION

A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U- channel system components.

B. Dry Locations: Steel materials.

C. Support Clamps for PVC Raceways: Click-type clamp system.

D. Selection of Supports: Comply with manufacturer's written instructions.

E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 90-kg design load.

3.7 SUPPORT INSTALLATION

A. Install support devices to securely and permanently fasten and support electrical components.

B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide Clamps, Attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

C. Support parallel runs of horizontal raceways together on trapeze- or

bracket-type hangers.

D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.

E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.

F. Install 6-mm diameter or larger threaded steel hanger rods, unless otherwise indicated.

G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 38-mm and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.

H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

I. Simultaneously install vertical raceway supports with conductors.

J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 610 mm from the box.

K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.

L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:

    1. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.

2. New Concrete: Concrete inserts with machine screws and bolts.

3. Existing Concrete: Expansion bolts.

4. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.

5. Steel: Welded threaded studs or spring-tension clamps on steel.
   a. Field Welding: Comply with AWS D1.1.

6. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.

7. Light Steel: Sheet-metal screws.

8. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.8 IDENTIFICATION MATERIALS AND DEVICES

A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.

C. Self-Adhesive Identification Products: Clean surfaces before applying.

D. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color- coding may be used for voltage and phase identification.

E. Install continuous underground detectable (WARNING tapes) during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 150 to 200 mm below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 400 mm, overall, use a single line marker.

F. Color-code 400/230 Volts system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

   1. Phase A: Red.

2. Phase B: Yellow.

3. Phase C: Blue.

4. Neutral: White.

5. Ground: Green.

G. Install warning, caution, and instruction signs where required and needed to ensure safe operation and maintenance of electrical systems and associated systems. Install engraved plastic-laminated instruction signs where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

H. Install engraved-laminated emergency-operating signs with white letters on red background with minimum 9-mm-high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

3.9 UTILITY COMPANY ELECTRIC-METERING EQUIPMENT

A. Install equipment according to utility company's requirements. Provide grounding and empty conduits as required by utility company.

3.10 FIRESTOPPING

A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly.

3.11 CONCRETE BASES/PADS

A. Construct concrete bases of dimensions indicated, but not less than 100 mm (4 inches) wider, in lateral directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 20.7-MPa, 28-day compressive-strength concrete and reinforcement as specified in Division Section "Cast-in-Place Concrete."

3.12 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:

1. Raceways.

2. Building wire and connectors.

3. Supporting materials for electrical components.

4. Electrical identification.

5. Electric-metering components.

6. Concrete bases.

7. Electrical demolition/dismanting.

8. Cutting and patching for electrical construction.

9. Touchup painting.

B. Test electric-metering for proper operation, accuracy, and usability of output data.

1. Connect a load of known kW rating, 1.5 kW minimum, to a circuit supplied by the metered feeder.

2. Turn off circuits supplied by the metered feeder and secure them in the "off" condition.

3. Run the test load continuously for eight hours, minimum, or longer to obtain a measurable meter indication. Use a test load placement and setting that ensure continuous, safe operation.

4. Check and record meter reading at end of test period and compare with actual electricity used based on test load rating, duration of test, and sample measurements of supply voltage at the test load connection. Record test results.

5. Repair or replace malfunctioning metering equipment or correct test setup; then retest. Repeat for each meter in installation until proper operation of entire system is verified.

3.13 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified in Division Section "Painting."

1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.

2. Follow paint manufacturer's written instructions for surface

preparation and for timing and application of successive coats.

3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 16100 ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes electrical identification materials and devices required to comply with ANSI C2, NFPA 70, OSHA standards, and authorities having jurisdiction.

1.2 QUALITY ASSURANCE

A. Comply with ANSI C2.

B. Comply with NFPA 70.

C. Comply with ANSI A13.1 and NFPA 70 for color-coding.

1.3 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 RACEWAY AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Color for Printed Legend:

1. Power Circuits: Black letters on an orange field.

2. Legend: Indicate system or service and voltage, if applicable.

C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 50 mm (2 inches) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 50 mm (2 inches) wide; compounded for outdoor use.

2.2 CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 0.08 mm (3 inches) thick by 25 to 50 mm (1 to 2 inches) wide.

B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

C. Aluminum Wraparound Marker Labels: Cut from 0.35-mm (0.014-inch) thick aluminum sheet, with stamped, embossed, or scribed legend, and fitted with tabs and matching slots for permanently securing around wire or cable jacket or around groups of conductors.

D. Metal Tags: Brass or aluminum, 50 by 50 by 1.3 mm (2 by 2 by 0.05 inch), with stamped legend, punched for use with self-locking nylon tie fastener.

E. Write-On Tags: Polyester tag, 0.38 mm (0.015 inch) thick, with corrosion-resistant grommet and polyester or nylon tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.3 UNDERGROUND-LINE WARNING TAPE

A. Description: Permanent, bright-colored, continuous-printed, polyethylene tape.

1. Not less than 150 mm (6 inches) wide by 0.102 mm (4 mils) thick.

2. Compounded for permanent direct-burial service.

3. Embedded continuous metallic strip or core.

4. Printed legend shall indicate type of underground line.

2.4 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Metal-Backed, Butyrate Warning Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 1-mm (0.0396-inch) galvanized-steel backing; and with colors, legend, and size required for application. 6.4-mm (1/4-inch) grommets in corners for mounting. Nominal size, 250 by 360 mm (10 by 14 inches).

C. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 915 MM."

2.5 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1.6 mm (1/16 inch) thick for signs up to. 129 sq. cm (20 sq. in) and 3.2 mm (1/8 inch) thick for larger sizes.

1. Engraved legend with black letters on white face.

2. Punched or drilled for mechanical fasteners.

3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.6 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 10 mm (3/8 inch).

B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 10 mm (3/8 inch). Overlay shall provide a weatherproof and ultraviolet-resistant seal for label.

C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 10 mm (3/8 inch).

D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 10 mm (3/8 inch).

E. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 25 mm (1 inch).

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.

1. Minimum Width: 5 mm (3/16 inch).

2. Tensile Strength: 22.6 kg (50 lb), minimum.

3. Temperature Range: Minus 40 to plus 85 deg C (Minus 40 to plus 185 deg F).

4. Color: Black, except where used for color-coding.

B. Paint: Paint materials and application requirements.

1. Exterior Concrete, Stucco, and Masonry (Other Than Concrete Unit

Masonry):

a. Semigloss Acrylic-Enamel Finish: Two finish coats over a primer.

1) Primer: Exterior concrete and masonry primer.

2) Finish Coats: Exterior semigloss acrylic enamel.

2. Exterior Concrete Unit Masonry:

a. Semigloss Acrylic-Enamel Finish: Two finish coats over a block filler.

1) Block Filler: Concrete unit masonry block filler.

2) Finish Coats: Exterior semigloss acrylic enamel.

3. Exterior Ferrous Metal:

a. Semigloss Alkyd-Enamel Finish: Two finish coats over a primer.

1) Primer: Exterior ferrous-metal primer.

2) Finish Coats: Exterior semigloss alkyd enamel.

4. Exterior Zinc-Coated Metal (except Raceways):

a. Semigloss Alkyd-Enamel Finish: Two finish coats over a primer.

1) Primer: Exterior zinc-coated metal primer.

2) Finish Coats: Exterior semigloss alkyd enamel.

5. Interior Concrete and Masonry (Other Than Concrete Unit Masonry):

a. Semigloss Alkyd-Enamel Finish: Two finish coats over a primer.

1) Primer: Interior concrete and masonry primer.

2) Finish Coats: Interior semigloss alkyd enamel.

6. Interior Concrete Unit Masonry:

a. Semigloss Acrylic-Enamel Finish: Two finish coats over a block filler.

1) Block Filler: Concrete unit masonry block filler.

2) Finish Coats: Interior semigloss acrylic enamel.

7. Interior Gypsum Board:

a. Semigloss Acrylic-Enamel Finish: Two finish coats over a primer.

1) Primer: Interior gypsum board primer.

2) Finish Coats: Interior semigloss acrylic enamel.

8. Interior Ferrous Metal:

a. Semigloss Acrylic-Enamel Finish: Two finish coats over a primer.

1) Primer: Interior ferrous-metal primer.

2) Finish Coats: Interior semigloss acrylic enamel.

9. Interior Zinc-Coated Metal (except Raceways):

a. Semigloss Acrylic-Enamel Finish: Two finish coats over a primer.

1) Primer: Interior zinc-coated metal primer.

2) Finish Coats: Interior semigloss acrylic enamel.

C. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless- steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 APPLICATION

A. Raceways and Duct Banks More Than 600 V Concealed within Buildings: 100-mm (4-inch) wide black stripes on 250-mm (10-inch) centers over orange background that extends full length of raceway or duct and is 300 mm (12 inches) wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 75-mm (3- inch) high black letters on 500-mm (20-inch) centers. Stop stripes at legends. Apply to the following finished surfaces:

1. Floor surface directly above conduits running beneath and within 300

mm (12 inches) of a floor that is in contact with earth or is framed above unexcavated space.

2. Wall surfaces directly external to raceways concealed within wall.

3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.

B. Accessible Raceways and Metal-Clad Cables More Than 600 V: Identify with "DANGER-HIGH VOLTAGE" in black letters at least 50 mm (2 inches) high, with snap-around labels. Repeat legend at 3-m (10-foot) maximum intervals.

C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A: Identify with orange snap-around label.

D. Accessible Raceways and Cables of Auxiliary Systems: Identify the following systems with color-coded, self-adhesive vinyl tape applied in bands:

1. Fire Alarm System: Red.

2. Fire-Suppression Supervisory and Control System: Red and yellow.

3. Combined Fire Alarm and Security System: Red and blue.

4. Security System: Blue and yellow.

5. Mechanical and Electrical Supervisory System: Green and blue.

6. Telecommunication System: Green and yellow.

7. Control Wiring: Green and red.

E. Power-Circuit Conductor Identification: For primary and secondary conductors No. 1/0 AWG and larger in vaults, pull and junction boxes, manholes, and handholes use metal tags. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.

F. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use metal tags. Identify each ungrounded conductor according to source and circuit

number.

G. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source and circuit number.

H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and Operation and Maintenance Manual.

I. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable. Install underground-line warning tape for both direct-buried cables and cables in raceway.

J. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply self-adhesive warning labels. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.

1. Equipment with Multiple Power or Control Sources: Apply to door or cover of equipment including, but not limited to, the following:

a. Power transfer switches.

b. Controls with external control power connections.

2. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.

K. Instruction Signs:

1. Operating Instructions: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which

they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

2. Emergency Operating Instructions: Install instruction signs with white legend on a red background with minimum 10-mm (3/8-inch) high letters for emergency instructions at equipment used for power transfer and load shedding.

L. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

   a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 13-mm (1/2-inch) high letters on 38-mm (1-1/2-inch) high label; where 2 lines of text are required, use labels 50 mm (2 inches) high.

   b. Outdoor Equipment: Engraved, laminated acrylic or melamine label. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

2. Equipment to Be Labeled:

   a. Panelboards, electrical cabinets, and enclosures.

   b. Access doors and panels for concealed electrical items.

   c. Electrical switchgear and switchboards.

   d. Transformers.

   e. Electrical substations.

   f. Emergency system boxes and enclosures.

   g. Motor-control centers.

   h. Disconnect switches.

i. Enclosed circuit breakers.

j. Motor starters.

k. Push-button stations.

l. Power transfer equipment.

m. Contactors.

n. Remote-controlled switches, dimmer modules, and control devices.

o. Battery inverter units.

p. Battery racks.

q. Power-generating units.

r. Voice and data cable terminal equipment.

s. Master clock and program equipment.

t. Intercommunication and call system master and staff stations.

u. Television/audio components, racks, and controls.

v. Fire-alarm control panel and annunciators.

w. Security and intrusion-detection control stations, control panels, terminal cabinets, and racks.

x. Monitoring and control equipment.

y. Uninterruptible power supply equipment.

z. Terminals, racks, and patch panels for voice and data communication and for signal and control functions.

3.2 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach nonadhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

F. System Identification Color Banding for Raceways and Cables: Each color band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

G. Color-Coding for Phase Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.

1. Color shall be factory applied.

2. Colors for 400/230 Volts Circuits:

   a. Phase A: Red.

   b. Phase B: Black.

   c. Ground: Green.

3. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 150 mm (6 inches) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

H. Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 150 to 200 mm (6 to 8
inches) below finished grade. Use multiple tapes where width of multiple

lines installed in a common trench or concrete envelope exceeds 400 mm (16 inches) overall.

J. Painted Identification: Prepare surface and apply paint according to Division painting Sections.

END OF SECTION 26 01 00

SECTION 16101 - CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

B. Related Sections include the following:

1. Division 26-series Sections for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 2001 to 35,000 V.

1.2 QUALITY ASSURANCE

A. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the International Electrical Testing Association and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NEC by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with the Latest Edition of National Electrical Code (NEC).

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Conductor Material: Copper only complying with NEMA WC 5 or 7; solid conductor for 2.0 mm diameter only, stranded for 5.5 mm^2 (10 AWG) and larger. Copper shall be 99 percent conductivity and hard drawn.

B. Conductor Insulation Types: Type THHN-THWN, THW and XLPE.

2.2 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

CONDUCTOR AND INSULATION APPLICATIONS

A. Service Entrance: Type THHN.

B. Exposed Feeders: Type THHN.

C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspaces: Type THHN, single conductors in raceway.

E. Exposed Branch Circuits, including in Crawlspaces: Type THHN, group conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN, group conductors in raceway.

G. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN, group conductors in raceway.

H. Underground Feeders and Branch Circuits: Type THHN, group conductors in raceway.

I. Fire Alarm Circuits: Fire Rated Cable, in raceway.

J. Class 1 Control Circuits: Type THHN, in raceway.

K. Class 2 Control Circuits: Type THHN, in raceway.

L. Neutral Conductor: Where a secondary distribution system requires a neutral conductor, a full-sized neutral conductor shall be used throughout the system, such that that neutral conductor is not shared with any other branch circuit or feeder. If the secondary distribution system supports computers or other equipment that generates harmonics, double size neutrals shall be run from the subpanel boards feeding this equipment back to the MDP or service entrance. Neutral buses shall be sized to accommodate these conductors. Insulated equipment grounding

conductors run with branch circuits shall be installed such that that conductor is not shared with any other branch circuit.

3.2 INSTALLATION

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means; including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Section 26 00 00 "Basic Electrical Materials and Methods".

F. Seal around cables penetrating fire-rated elements according to Section 26 00 00 Part 3.10 "Fire Stopping".

G. Identify and color-code conductors and cables according to Section 26 00 00 Part
3.8 "Identification Materials and Devices".

H. Install outdoor underground feeders in concrete encased ductbank.

I. Each electronic equipment rack shall be fed by an individual circuit breaker protected branch circuit.

3.3 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 300 mm of slack.

3.4 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.

2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

B. Test Reports: Prepare a written report to record the following:

1. Test procedures used.

2. Test results that comply with requirements.

3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION

SECTION 16 2726 – WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Single and duplex receptacles, ground-fault circuit interrupters, and integral surge suppression units.

2. Single- and double-pole snap switches and dimmer switches.

3. Device wall plates.

4. Floor service outlets and multioutlet assemblies.

1.2 ACRONYMS & ABBREVIATIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. PVC: Polyvinyl chloride.

D. TVSS: Transient voltage surge suppressor.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

C. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device through one source from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NEC and marked for intended use.

C. Comply with the Latest Edition of National Electrical Code (NEC).

PART 2 - PRODUCTS

2.1 WIRING DEVICES, GENERAL

A. Wiring Devices: Provide U.S. NEMA type wiring devices and associated devices, boxes, and covers. Receptacles other than 230-volt general-purpose convenience

outlets shall be marked on the cover plates with voltage, amperage, phase, and frequency. Matching plugs shall be provided.

B. Wire and Cable: Select types of insulation according to the application. See the NEC for insulation types, operating temperatures, ambient temperature, and voltage classes. Cable and wire sizes, types, and insulation shall be properly specified by the A/E using American standards in order to obtain the highest quality transmission for security, data, and other signal cables. Provide solid conductors for conductors sized 5.5 mm^2 and smaller. Provide stranded conductors for conductors sized 8.0 mm^2 and larger. Provide copper branch circuits and feeder conductors sized at 125 percent of full load capacity. Use full- sized neutral conductor and a separate ground conductor for each circuit. Circuits and feeders that supply power for electronic equipment may require an oversized neutral to compensate for high harmonic neutral currents. Such feeders must be identified in the design and the neutral increased to a minimum of two times full rated size. Non-metallic sheathed cable ("Romex") is prohibited, and armored or metal clad cable, Types AC or MC is prohibited except as permitted in limited applications by DE/EEB.

C. Overload Protection: Copper conductors shall be provided overload protection in accordance with NEC Table 310-6. Overload protection shall not exceed 15A for

2.5 mm^2 conductors, 20A for 3.5 mm^2 conductors or 30A for 5.5 mm^2 conductors.

2.2 RECEPTACLES

A. Receptacles, General: General-purpose receptacles shall be installed on 15 and 20-amp branch circuits, and shall be of the grounding type with effective grounding contacts. NEMA type 5-20R receptacles, 20A, 300 Volts rated shall be used in all spaces. Flexible arrangements, such as for floor outlets or cable trays in office areas shall be provided to allow for partition rearrangement. An underfloor duct system shall not be used. G.F.C.I. protection shall be provided for receptacles in bathrooms, kitchen, and other wet areas and outdoors per NEC requirements.
G.F.C.I. circuit breakers may be required in lieu of protection at the receptacle. Provide receptacle outlet as indicated in the plan.

B. Straight-Blade and Twist Locking Receptacles: Heavy-Duty grade. NEMA 6-20R, 20A, 400 Volts rated.

C. GFCI Receptacles shall not be used. Outlets designated for GFCI protection shall be fed from a GFCI circuit breaker. One GFCI breaker, rated for 10mA ground fault trip, 60Hz, 230V (line to neutral) shall be installed in an enclosure adjacent to the first receptacle in the branch circuit. This breaker will provide ground fault protection for all receptacles in the circuit.

D. Provide one 20 A and one 15 A cord plug cap for each duplex receptacle, and two of each for each quadruplex receptacle. Plug caps shall be of the grounding type, utilizing only screw terminals for terminating conductors.

2.3 SWITCHES

A. Single- and Double-Pole Switches: Comply with DSCC W-C-896F.

B. Snap Switches: Heavy-Duty grade, quiet type.

2.4 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.

2. Material for Finished Spaces: 1-mm- thick, brushed stainless steel.

3. Material for Unfinished Spaces: Galvanized steel

2.5 FLOOR SERVICE FITTINGS

A. Type: Modular, flush-type, dual-service units suitable for wiring method used.

B. Power Receptacle: NEMA Configuration 5-20R, unless otherwise indicated. Colors to match interior color scheme approved by the Architect.

C. Signal Outlet: Blank cover with bushed cable opening, unless otherwise indicated.

2.6 FINISHES

A. Color:

1. All device faceplate shall be approved by the Architect.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies level, plumb, and square with building lines.

B. Install wall dimmers to achieve indicated rating after derating for ganging according to manufacturer's written instructions.

C. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' written instructions.

D. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates where possible.

E. Remove wall plates and protect devices and assemblies during painting.

F. Adjust locations of floor service outlets to suit arrangement of partitions and furnishings.

3.2 CONNECTIONS

A. Ground equipment according to Section 26 02 01 "Grounding and Bonding."

B. Connect wiring according to Section 26 01 01 "Conductors and Cables."

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.3 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.

2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION

SECTION 162803 – PANEL BOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes load centers and panelboards, overcurrent protective devices, and associated auxiliary equipment rated 600 V and less for the following types:

1. Lighting and appliance branch-circuit panelboards.

2. Distribution panelboards.

1.2 ACRONYMS & ABBREVIATIONS

A. Retain abbreviations that remain after this Section has been edited.

B. EMI: Electromagnetic interference.

C. GFCI: Ground-fault circuit interrupter.

D. RFI: Radio-frequency interference.

E. RMS: Root mean square.

F. SPDT: Single pole, double throw.

1.3 SUBMITTALS

A. Product Data: For each type of panelboard, overcurrent protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a. Enclosure types and details.

b. Bus configuration, current, and voltage ratings.

c. Short-circuit current rating of panelboards and overcurrent protective devices.

d. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

2. Wiring Diagrams: Power, signal, and control wiring.

C. Qualification Data: For testing agency.

D. Field quality-control test reports including the following:

1. Test procedures used.

2. Test results that comply with requirements.

3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

E. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

F. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. Include:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Testing agency that is a member company of the Inter National Electrical Testing Association and that is acceptable to authorities having jurisdiction.

B. Electrical Components, Devices, and Accessories: labeled as defined in NEC, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NEMA PB 1.

D. Comply with Latest Edition of NEC.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not exceeding 40 deg C (104 deg F).

2. Altitude: Not exceeding 2000 m (6600 feet).

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.

2. Altitude not exceeding 2000 m (6600 feet).

C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Post or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify COR no fewer than two days in advance of proposed interruption of electrical service.

2. Do not proceed with interruption of electrical service without COR's written permission.

D. Unusual Service Condition: Engine generator equipment and installation shall operate under the following conditions.

1. High salt-dust content in the air due to sea-spray evaporation.

1.3 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping and encumbrances to workspace clearance requirements.

1.4 EXTRA MATERIALS

A. Keys: Six spares of each type of panelboard cabinet lock.

PART 2 - PRODUCTS

2.1 FABRICATION AND FEATURES

A. Enclosures: Flush or surface-mounted cabinets. NEMA PB 1, Type 1, to meet environmental conditions at installed location.

1. Outdoor Locations: NEMA 250, Type 4x.

2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.

3. Other Wet or Damp Indoor Locations: NEMA 250, Type 3R.

4. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.

5. Separate neutral and grounding buses for all panelboards.

B. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.

C. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.

D. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.

E. Directory Card: With transparent protective cover, mounted inside metal frame, inside panelboard door.

F. Bus: Hard-drawn copper, 98 percent conductivity.

G. Bus Bars of Power Distribution and Branch Circuit Panelboards: Provide hard drawn copper. The neutral bus shall be isolated from both the ground bus and the cabinet, except at the service entrance or at the output of separately derived systems and shall be grounded in accordance with the Latest Edition of NEC.

H. Main and Neutral Lugs: Compression type suitable for use with conductor material.

I. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to steel enclosure.

J. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect switches.

K. Future Devices: Mounting brackets, bus connections,and necessary appurtenances required for future installation of devices.

L. Isolated Equipment Ground Bus: Adequate for branch-circuit equipment ground conductors; insulated from steel enclosure.

M. Neutral Bus:Neutral bus rated 100 percent of phase bus and suitable for nonlinear loads.

N. Split Bus: Vertical buses divided into individual vertical sections.

O. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.

P. Gutter Barrier: Arrange to isolate individual panel sections.

Q. Column-Type/Free Standing Panelboards: Narrow gutter extension, with cover, to overhead pull box equipped with ground and neutral terminal buses. Feed- through Lugs: Compression type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

R. Provide 10 percent spare circuit breakers, 20 percent spaces for future breakers, and 20 percent overall spare current carrying capacity for future expansion.

2.2 PANELBOARD SHORT-CIRCUIT RATING

A. Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.3 LOAD CENTERS

A. Overcurrent Protective Devices: Bolt-on, full-module circuit breaker.

B. Conductor Connectors: Mechanical type for main, neutral, and ground lugs and buses.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Branch Circuit Panelboards: Branch protective devices in panelboards shall be of the bolt-on type circuit breakers. Locate panelboards at the utility area nearest the center of the load. Panelboards shall have main circuit breakers. Where multiple section panelboards are required, each section shall have a main breaker. Size panels as noted above.

B. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

C. Doors: Front mounted with concealed hinges; secured with flush latch with twist lock; keyed alike.

2.5 DISTRIBUTION PANELBOARDS

A. Power Distribution Panelboards serving three-phase motors and other power equipment shall be of circuit breaker type. Size the panel bus, lugs,

and circuit breakers to match the ratings indicated in the Overcurrent Protective device coordination system fault level.

B. Doors: Front mounted, except omit in fused-switch panelboards; secured with vault-type latch with twist lock; keyed alike.

C. Main Overcurrent Protective Devices: Circuit breaker.

D. Branch overcurrent protective devices shall be one of the following:

1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.

2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

3. Fused switches.

2.6 OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low- level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 800 A and larger.

2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

3. Electronic Trip Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:

a. Instantaneous trip.

b. Long- and short-time pickup levels.

c. Long- and short-time time adjustments.

d. Ground-fault pickup level, time delay, and I^2t response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let- through ratings less than NEMA FU 1, RK-5.

5. Integrally Fused Circuit Breakers: Thermal-magnetic trip element

with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.

6. GFCI Circuit Breakers: Single- and two-pole configurations with 30-mA trip sensitivity.

B. Molded-Case Circuit-Breaker Features and Accessories. Standard frame sizes, trip ratings, and number of poles.

1. Lugs: Compression style, suitable for number, size, trip ratings, and material of conductors.

2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

3. Ground-Fault Protection: Remote-mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground- fault indicator.

4. Communication Capability: Circuit-breaker-mounted, Universal-mounted, Integral or Din-rail-mounted communication module with functions and features compatible with power monitoring and control system.

5. Shunt Trip: 220 or 240 V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.

C. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.

2.7 CONTROLLERS

A. Motor Controllers: NEMA ICS 2, Class A combination controller equipped for panelboard mounting and including the following accessories:

1. Individual control-power transformers.

2. Fuses for control-power transformers.

3. Bimetallic-element overload relay.

4. Melting-alloy overload relay.
5. Indicating lights.

6. Seal-in contact.

7. Four convertible auxiliary contacts.

8. Push buttons.

9. Selector switches.

B. Contactors: NEMA ICS 2, Class A combination controller equipped for panelboard mounting and including the following accessories:

1. Individual control-power transformers.

2. Fuses for control-power transformers.

3. Indicating lights.

4. Seal-in contact.

5. One convertible auxiliary contacts.

6. Push buttons.

7. Selector switches.

C. Controller Disconnect Switches: Adjustable instantaneous-trip circuit breaker, integrally mounted and interlocked with controller.

1. Auxiliary Contacts: Integral with disconnect switches to de-energize external control-power source.

D. Contactors in Main Bus: NEMA ICS 2, Class A, mechanically held general-purpose controller.

1. Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.

2. Control-Power Source: 220 V branch circuit.

2.8 ACCESSORY COMPONENTS AND FEATURES

A. Furnish accessory set including tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

B. Furnish portable test set to test functions of solid-state trip devices

without removal from panelboard.

C. Fungus Proofing: Permanent fungicidal treatment for panelboard interior, including overcurrent protective devices and other components.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Mounting Heights: Top of trim 1880 mm above finished floor, unless otherwise indicated.

C. Mounting: Plumb and rigid without distortion of enclosure. Mount recessed panelboards with fronts uniformly flush with wall finish.

D. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

E. Install filler plates in unused spaces.

F. Provision for Future Circuits at Flush Panelboards: Stub four 25mm Ø empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 25mm Ø empty conduits into raised floor space or below slab not on grade.

G. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Section 26 00 00 Part 3.8 "Identification Materials and Devices".

B. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.3 CONNECTIONS

A. Install equipment grounding connections for panelboards with ground continuity to main electrical ground bus.

B. Tighten electrical connectors and terminals according to manufacturer's

published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.

2. Test continuity of each circuit.

B. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

C. Balancing Loads: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes as follows:

1. Measure as directed during period of normal system loading.

2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24- hour services such as fax machines and online data-processing, computing, transmitting, and receiving equipment.

3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.

4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

D. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard.

Remove panel fronts so joints and connections are accessible to portable scanner.

1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.

2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

3. Record of Infrared Scanning: Prepare a certified report that identifies panelboards checked and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.6 CLEANING

A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION

SECTION 16500 - ELECTRICAL LIGHTING

PART 1 - GENERAL

1.01 SCOPE: The contractor or electrical contractor shall supply and install all labor, materials, tools, transportation, equipment, services and facilities required for the complete, proper and substantial installation of all electrical lighting with electronic ballasts shown on the plans or outlined in this specifications. The installation shall include all the material and devices not specifically mentioned herein or noted on the drawings, but which are necessary to make complete working installation of all electrical system.

1.02 RELATED WORK

A. Section 16400 - Service and distribution
B. Section 16050 - Basic Electrical Material and Method

1.03 SUBMITTALS: Utilize the technology, classifications and methods prescribed by the IES lighting handbooks, as applicable for the data, shop drawings and reports of the lighting system specified.

A. Data

1. Lighting fixtures

B. Shop drawing

1. Lighting fixture assemblies

PART 2 - PRODUCTS

2.01 MATERIALS

A. Compact Flourescent Lighting shall be pin light type model FWK480-AMG 1x18W,PL Pin light Lamp, with aluminum reflector and glass, electronic Tridonic Atco Ballast 110V rated, 60Hz. Lamp holder and starter holder shall be BJB brand or approved equal.

B. 2'x4' lighting troffer 2x28watts T5 flourescent tube or approved equal.

C. 25watts wall bracket light

D. 28watts T5 flourescent tube for cove lighting
E. 30watts pinlights

PART 3 - EXECUTION

3.01 INSTALLATION

A. Meet with all requirements of NFPA 70. Install all lighting fixtures plumb, level, square with ceiling and walls, in alignment with adjacent lighting fixtures and secure in accordance with the manufacturers direction and approved shop drawings. Mounting of lighting fixtures shall be approved by the Architect or his representative before installation is started.

3.02 FIELD TESTS AND INSPECTION

A. Perform all field-tests and provide all labor, equipment and incidentals required for testing.

B. After installation of fixtures and at such time as the Architect may require, conduct an operating tests for approval. Tests to be performed shall be in the presence of the Architect or the Construction Manager.

C. Replace and correct all defective materials and workmanship disclosed as the result of the tests given herein. Tests shall be such that each time of control equipment will function not less than five times.

3.03 WARRANTY:

A. A warranty for a period of one (1) year shall be provided against failure of components resulting from normal used and/or factory defects.

END OF SECTION

SECTION 171116 – COMMUNICATION CABINETS, RACKS, FRAMES, & ENCLOSURES

PART 1 – GENERAL

1.1 SUMMARY

A. The work covered in this section consists of the furnishing and installation of all necessary labor, supervision, materials, equipment, tests, and services to install communications cabinets, racks, frames and enclosures.

B. Standards and Codes References:

1. ANSI/EIA RS– 310D
2. ANSI/TIA/EIA – 569B and all addenda for Commercial Building Standard for Telecommunication Pathways and Spaces.
3. ANSI/J-STD 607-A – Commercial Building Grounding (Earthing) and Bonding Requirement for Telecommunication.
4. ANSI/TIA/EIA – 606-A and all addenda for Administration Standard for Commercial Telecommunications Infrastructure.
5. ANSI/TIA/EIA – 568-B.1 and all addenda for commercial Building Telecommunication Cabling Standard Part I: General Requirements.
6. ANSI/NECA/BICSI 568-2001 – Standard for Installing Commercial Building Telecommunications Cabling
7. NEC – National Electrical Code, Latest Edition.

1.2 SUBMITTALS

A. Provide detail elevation drawings of each equipment cabinet in the TRs, ERs. Drawing shall be in scale not less than 1:20.

B. Provide manufacturer's literature and sample of telecommunications installation materials.

C. Provide resumes and certifications of field personnel meeting qualification

requirements in the Quality Assurance section of this specification section. Submit a minimum of 6 months prior to installation of cabinets, racks, frames, and enclosures for communications.

1.3 QUALITY ASSURANCE

A. Contractor Qualifications: Contractor shall have on staff a Registered Communications Distribution Designer (RCDD) certified by BICSI. The RCDD shall inspect the work in progress and certify the work at the completion of the project. Installation field supervisor must be certified by BICSI at the technician level. 50 percent of the installation technicians assigned to this project shall be either certified by BICSI at the installer level or trained and certified by the manufacturer
to install or test cabling. Untrained technicians assigned to this project shall be trained and certified at no cost to the Owner Representative.

B. Comply with NEC, ANSI/TIA/EIA, and BICSI installation manual.

1.4 COORDINATION

A. Coordinate layout and installation of cabinets, racks, frames, and enclosures with communications cabling installation, data switches, termination fields and patch panels, and all other equipment to mount inside cabinets, enclosure, racks, etc.

B. Adjust arrangements and locations of equipment in ERs and TRs to accommodate and optimize arrangement and space requirements as approved by the Owner Representative.

C. Coordinate with other sections as required ensuring that the entire work will be carried out in orderly, complete, and organized fashion.

PART 2 – PRODUCTS

2.1 GENERAL

A. Open equipment rack shall not be permitted.

2.2 EQUIPMENT

A. Equipment cabinet shall be either freestanding or wall mounting equipment cabinet/enclosures and size as required in the drawings. Equipment cabinet shall be modular steel unit and equipped with the

following:

1. Fans for ventilation.
2. Hinged doors with reversible swing and lock for protection.
3. Contain rail conforming to EIA RS-310-D standard for mounting standard 482-mm equipment.
4. Grounding busbar kit inside equipment rack.
5. Transparent front door and vented rear door.
6. Power strip with surge protection and have a minimum of 6-receptacle outlets on the power strip.
7. Vertical wire management extending the full height of the rack including both sides: front and back.
8. Contain knockouts for cable accessed along the top, bottom, or rear panels.
9. Wall mount Equipment cabinet shall have dual locking hinges for front and back access.
10. Freestanding cabinets shall be accessible from both front and back.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Verify installation methods specified by the manufacturer prior to installation.

B. Ensure the cabinets will fit the footprint allocated prior to attempting installation.

C. Connect ground busbar in cabinet/rack to TBB or TMGB.

D. Securely fasten floor mounted cabinets/racks to the floor with anchors, expansion bolts, etc. Coordinate with structural engineer for proper type and use of bolts.

E. Plan for the space needed for installation of both equipment and cable.

F. Support the top of the floor mounted cabinet/rack by bracing it to the wall,

support barrier, or ladder rack. Consult a seismic engineer when seismic bracing is required.

G. Plan for the equipment to be installed in the cabinet/rack. Ensure that the open space recommendations are adhered to for airflow between electronic equipment. Also ensure that is adequate space for cable so that bend radius and separation requirements are met.

END OF SECTION