PROJECT MANUAL

FAR EAST WATER TANK
PIPE REPLACEMENT PROJECT

COUNTY OF EL PASO
500 EAST SAN ANTONIO
EL PASO, TEXAS
79901

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CDA

SET NO.

FAR EAST WATER TANK PIPE REPLACEMENT PROJECT
EL PASO COUNTY

Note: The numbering and locations of sections is unique to this project. Read all sections of the specifications completely. Failure to do so, or assuming that items are included by others because of the organization of work in these documents, will not relieve the bidders from completing the entire job within the contract price. The General Contractor is responsible for bidding and providing a complete job and for coordinating his subcontractors' bids and work, wherever called for or specified herein or on the plans, period.

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1. **CONTRACTOR'S RESPONSIBILITY:** The Contractor, Sub-Contractors, and materials supplier's are separately and jointly responsible for the proper working, workmanship, installation, operations, appearance, and durability of items incorporated into the project. As a professional, the Contractor shall not use the excuse that work was installed as detailed or specified and does not function or fit properly. If the Contractor or Sub-Contractor are in disagreement with any items, details, methods, specifications, he shall notify the architect prior to ordering or starting the work in question. Such matters will be clarified in writing by the Engineer prior to their incorporation into the project.

2. **MINOR ADJUSTMENTS:** The Contractor is obligated to make minor adjustments in the field as directed by the Architect and Engineer, without additional cost to the Owner.

3. **SITE EXAMINATION:**

   A. Location: The extent and location of the work is as shown on the plans. The Contractor shall confine his use to the site and area, except as required by the Contract Documents to do work off the site, or as determined by direction of the Architect.

   B. Inspection of Premises: The Contractor will be held to have examined the site and the scope of work as described in the Contract Documents and to have satisfied himself as to the conditions that will be obligated to perform his work, or conditions that will in any manner affect the work under this contract. No extra payment will be allowed for additional work that could have been determined by inspection.

   C. The Contractor shall verify all measurements at the area of construction as the work progresses and shall be responsible for their correctness. Failure to do so will not constitute a reason for extra charge or compensation on account of differences between actual dimensions of the work and the measurements indicated on the drawings. Any difference which may be found shall be submitted to the Architect for consideration before proceeding with the work.

   D. The General Contractor shall employ a full-time, competent field superintendent and during the progress of the work, the General Contractor shall lay out on the slabs the exact location of all partitions, doors openings and coordinate all other work and sub-trades as a guide to all trades. Offset lines for all partitions shall be distinctly indicated on the floors and shall be maintained as long as needed.

   E. Before ordering any materials or doing any work the Sub-Contractor shall be responsible for the verification of all measurements of the area of construction he will be working and shall be responsible for their correctness. Any differences found shall be submitted to the Owner for consideration before proceeding with the work or ordering of material.

4. **SAFETY:** The Contractor and his Sub-Contractors are responsible for using good safety procedures and practices at all times. The Owner and the Architect are not responsible for any safety procedures or practice, at any time, on or off the job site, for any reason.

5. INSPECTION AND TESTING:

A. Inspection Agency: An independent testing laboratory will be selected by the Contractor to perform the specific testing of construction materials.

B. Payment for Testing: Testing laboratory charges shall be paid by the Owner and shall not be included as part of this Contract.

C. Payment for Retesting: Should the results of the laboratory tests indicate that the material or workmanship fails to comply with the requirements of the Specifications, the work shall be removed or reworked until it does satisfy the requirements. The final results shall be verified as acceptable by the laboratory tests, which shall be paid for the Contractor, at his own expense.

6. CODES, PERMITS, REGULATIONS AND LICENSES:

A. Compliance: All work pertaining to, all materials supplied for, and executing and completing this Contract, shall comply with the provisions specified in these Specifications and with latest editions of all applicable codes, requirements, laws regulations and ordinances, including any and all amendments and addenda thereto, as adopted by legally constituted authorities having jurisdiction and governing the work, including but not necessarily limited to those of:

1. Local Building Code, Southern Standard (Building code.)
2. Federal Occupational Safety and Health Act.
3. Local Mechanical Code and Plumbing Code.
4. The National Local Electrical Codes.
5. National Fire Protection Association.
6. All other codes, laws, regulations and ordinances called for within applicable Sections of these Specifications.

B. Inclusion: Said codes, laws, regulations and ordinances are hereby made a part of the Contract Documents, as they may apply.

C. Copies at Site: Contractor shall secure and maintain at the project site one copy of all the Codes, Laws, and Ordinances as specified herein and within other sections of these Specifications.

D. Conflicts: In the event of a conflict between these documents and a code requirement, the code requirement shall govern (with the Architect's agreement prior to resolution of the problem), with no increase in price.

7. **PUMPING AND DRAINAGE:** Permit no surface or subsurface water or other fluid to accumulate in excavations or under structures. Should such conditions develop or be encountered, control water or other fluid and suitably dispose of by means of temporary pumps, piping, drainage lines and ditches, dams or other methods as approved by Architect at no cost to Owner.

8. **WATERTIGHT-WEATHERTIGHT CONSTRUCTION:** Anything in the Contract Documents not withstanding, the Contractor accepts the responsibility of constructing a watertight-weathertight structure.

9. **REPAIR:** All streets, curbs, utilities and adjacent structures or property damaged during this construction will be repaired or replaced by the Contractor at no cost to the Architect or Owner.

10. **LABOR:** All labor shall be performed in the best and work workmanlike manner, using current acceptable standards of practice, by mechanics skilled in their respective trades. The standards of work required throughout shall be such as will bring results of first class quality only. Sub Contractors or Mechanics whose work is unsatisfactory to the Owner or the Architect or are considered by the Owner to be unskilled or otherwise objectionable, shall be dismissed from the job.

11. **CONTRACT DOCUMENTS:** Bidder is reminded to carefully read all sections of the specifications, especially the Special Conditions and General and Supplementary General Conditions. The intent of these drawings and specifications shall be interpreted to meet all codes, good workmanship and acceptable standards of practice. Some drawings may be diagrammatic, but in all cases the measurements are to be checked from the work in place. Should a variation be found, it must be referred to the Architect for instructions.

12. **SUPERINTENDENCE:** The required Contractor's Field Superintendent shall be approved by the owner and shall as specified in the General Conditions, shall have authority to make decisions required on the job, and shall keep the project quality and progress of work consistent with the Agreement.

13. **SITE:** Accept the site on an "as-found" basis on date of "Notice to Proceed" and do all work required to render a complete project.

14. **CONSTRUCTION SCHEDULE:** Contractor is to provide a complete construction schedule, using approved scheduling method. First payment will be held until schedule is submitted. Schedule is to be presented in graphic form and in 4 copies, one copy to be at the job site. Schedule to be updated on monthly basis showing all changes in the schedule.

15. **PROTECTION:** It shall be the Contractor's responsibility to protect the safety of the public and employees by securing all work, materials, debris, machinery and equipment during and after working hours.

16. **GUARANTEES:** The Contractor shall deliver to the Owner, with his request for final payment, copies of all manufacturer's guarantees, service contracts, and all other guarantees specified, including his own guarantee for a one year period.

17. **SPECIFICATIONS:** The specifications are intended to supplement the drawings, the two being considered cooperative and therefore, it will not be the province of these specifications to mention any portion of the construction which the drawings are competent to explain, and such omission will not relieve the Contractor from carrying out such portions of the construction which the drawings are competent to explain, and such omission will not relieve the Contractor from carrying out such portions as are only indicated from the drawings, and should items be required by these specifications which are not indicated on the drawings, they are to be supplied and installed.

18. **HINDRANCES AND DELAYS:** No charge shall be made by the Contractor for hindrances or delay from any cause during the progress of any portion of work embraced in this contract.

19. **LOSSES FROM NATURAL CAUSES:** All loss or damage out of the nature of the work to be done, or from the action of the elements or from unforeseen circumstances in the prosecution of the same, or from unusual obstructions or difficulties which may be encountered in the prosecution of the work shall be sustained and borne by the Contractor at his own cost and expense.

20. **PARKING:** The Contractor shall use parking areas designated by the Owner only.

21. **STORAGE OF MATERIALS, ETC.:** The Contractor is responsible for materials stored on the site. Any loss of or damage to such materials will be borne by the Contractor. This is a dangerous site; protect your personnel and materials.

22. **OSHA REGULATIONS:** The Contractor shall abide by OSHA regulation and shall be responsible to see that all safety devices, guardrails, ladders, warning signs, etc., are provided and used by all persons at the construction site. He shall provide whatever temporary facilities are necessary to meet current OSHA regulation; to include all sub-contractors.

23. **INTERPRETATION OF QUESTIONS:**

A. Only written instructions from the Owner, Architect or Contractor are binding throughout bidding and construction.

B. In case of specification and drawing conflict, or drawings conflict, the superior quality shall govern.

C. All questions directed to the Owner by telephone or letter shall come from the General Contractor only. **SUB-CONTRACTORS ARE TO WORK THROUGH THE GENERAL CONTRACTOR.**

24. **COMMON REFERENCE STANDARDS:** Reference in the Specifications to known standards such as codes, specifications, etc., promulgated by professional or technical associations, institutes and societies, are intended to mean the latest edition of each such standard referred to shall be considered a part of the specifications to the same extent as if reproduced therein in full. The following is a representative list such entities:

AASHO	American Association of State Highway Officials
ACI	American Concrete Institute
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
ASA	American Standards Association
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWSC	American Welding Society Code
CSI	Constructions Specifications Institute
FIA	Factory Insurance Association
NEC	National Electrical Code
UL	Underwriter's Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau

25. **CHANGE ORDERS:** The General Contractor may not issue change orders to sub-contractors without the written approval of the Architect.

26. **BRACING & SHORING:** Brace and shore all construction elements and all excavations to protect workers, the public and the project.

27. **Not Used**

28. **COORDINATION:** The General Contractor is responsible for the assignment of work to the trades. Do not infer inclusion of an item to one Sub-Contractor over another due to placement within the drawings or specifications. All work covered in any area of the documents must be done. Who does what is determined by the General Contractor, who must read all specifications sections and all plans, and coordinate all work among the subs and deliver a complete job.

29. **SHOP DRAWING AND MATERIAL BROCHURES & SUBMITTALS:**

A. Shop drawings and materiel brochures & submittals are for the benefit of the contractor and establish his intent toward fabrication and installation of building components. The accuracy of design, dimensions and quantity shown on shop drawings and material submittals are the responsibility of the contractor not the Engineer or Owner. The Contractor shall approve the shop drawings and material submittal to the Architect, Engineer or Owner.

B. All items submitted must meet requirements of the General Conditions & must be approved by the General Contractor & appropriate Sub-contractor prior to submission. The Contractor's stamp indicating each item has been check and **meet plans & specification requirements** must appear on each submitted item or it will not be processed.

C. Submittal data will be accepted for processing ONLY when it is completely marked to indicate **compliance with each and every specification requirement**. Each and every requirement must be highlighted or written cost difference & explanation for non-compliance provided. Incomplete or inadequately marked submittals will not be processed.

D. It is the Contractor's responsibility to insure that submittals are complete, accurate, and reflect the intent of the Project Documents. Submittals processing by the Architect **does not** relieve the Contractor of responsibility for providing all equipment and materials in accordance with requirements of the Project Document.

E. Fabrication prior to complete processing of shop drawings and material submittals is at the Contractor's risk.

F. Shop drawing shall indicate clearly the number of items their location, dimensions, materials, assembly, fastenings, finishes, specifications, and colors. They shall provide installation details at large enough scale to show definitely and accurately the requirements, including proper anchorage.

G. The originals intent of the construction documents must be met, REGARDLESS SUBSTITUTIONS OR REVISIONS.

30. **THE PROJECT LOG:** The Contractor shall keep and maintain a Daily Log. All unforeseen conditions that impact the object shall also be recorded. The log must be accessible to the Owner and the Architect. Inventory of plumbing materials shall be kept in the project log book.

31. **NOT USED**

32. **CONTRACTORS SHALL PROVIDE PERFORMANCE AND PAYMENT BONDS FOR 100% OF THE JOB COST FROM A COMPANY LICENSED IN THE STATE OF TEXAS AND APPROVED BY THE OWNER.**

33. **MATERIAL SAFETY DATA SHEETS**

MSDS SHEETS: The contractor shall obtain and review all Material Safety Data Sheets of Shop Drawings/Product Data Samples and similar submittals, to ascertain that no Asbestos Materials, Asbestos-Containing Materials, or other Hazardous Materials are being utilized or installed. The Contractor shall submit, in compliance with the Texas Department of health; Texas Asbestos Health Protection Rules; December 14, 1998, a statement that no Asbestos Containing Building Materials (ACBM) were used during the construction. Contractor shall compile the information from Material Safety Data Sheets (MSDS) of all products used in the construction of the building (project) and finding no asbestos in any of those products, may make this statement. Submit complete MSDS sheets and the statement to Engineer and Owner with final pay application

34. **NOT USED**

35. **EXISTING CONDITIONS:**

A. Contractors' Examination of Site:

1. By executing Contracts, Contractors, and Subcontractors represent that they have:

   a. Visited the site and made due allowances for difficulties and contingencies;
   b. Compared contract documents with existing conditions and informed themselves of conditions to be encountered, including work by others, if any, being performed; and
   c. Notified Architect of ambiguities and errors they have discovered within Contract documents or between contract documents and existing conditions.
   d. While work under this contract is in progress, protect existing buildings, grounds, contents, and occupants, including those on adjacent property, whether private or public, from damage or harm due to the work under this contract.
   e. Damage caused by Contractor to existing structures, grounds plants, pavements, utilities, work by others, fixtures, or furnishings, shall be repaired by Contractor and left in as good condition as existing before the damaging, unless such existing work is shown to be removed or replaced by new work.

END SECTION 01000

PART 1 – GENERAL

1.01 SCOPE

A. Related Documents: Drawings and general provisions of Contract, including General, Supplementary and Special Conditions, and Division 1 Specifications, apply to work of this Section.

B. If any article or directions contained within this division conflict with PARTS I, II, III, and IV of these specifications, PARTS I, II, III, and IV shall govern.

1.02 SUMMARY

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

1. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.
2. General closeout requirements are included in Section "Project Closeout".
3. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual sections of Divisions 2 through 16.
4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.03 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement.

1. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work, regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights, and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

E. The Owner reserves the right to refuse to accept Work for the project where a special warranty, certification, or similar commitment is required on such Work or part of Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.04 SUBMITTALS

A. Submit written warranties to the owner's construction department. If the certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the work, or a designated portion of the work, submit written warranties upon request of the owner's construction department.

1. When a designated portion of the work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the owner's construction department.

B. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier, or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner for approval before final execution.

1. Refer to individual Sections of Divisions 2 through 16 for specific content requirements, and particular requirements for submittal of special warranties.

C. Form of Submittal: At Final Completion, compile two copies of each required warranty and bond properly executed by the Contractor, or by the subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly, sequenced based on the Table of Contents of the Project Manual.

D. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8 ½" by 11" paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the installer.
2. Identify each binder on the front and the spine with the typed or printed title "Warranties and Bonds", the project title or name, and the name of the Contractor.
3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

END OF SECTION 01700

PART 1 – GENERAL

1.01 SCOPE

A. Related Documents: Drawings and general provisions of Contract, including General, Supplementary and Special Conditions, and Division 1 Specifications, apply to work of this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Operating and Maintenance manual submittal.
2. Submittal of warranties.
3. Final Cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate sections in Divisions 2 through 16.

1.03 RECORD DOCUMENT SUBMITTALS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Owner reference during normal working hours.

B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop drawings. Mark the set to show the actual installation where the installation varies substantially from the work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with a red erasable pencil; use other colors to distinguish between variations in separate categories of the work.
2. Mark new information that is important to the Owner, but was not shown on Contract Drawings and Shop Drawings.
3. Note related Change Order numbers where applicable.
4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other identification on the cover of each set.
5. Transfer all documented changes to a set of mylar reproducible drawings for submission to the Owner as final as-built drawings.

C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual work performed in

comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options, and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.

1. Upon completion of the Work, submit record Specifications to the construction department for the Owner's records.

D. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual work performed in comparison with information submitted. Include variations in products delivered to site, and from manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.

1. Upon completion of mark-up, submit complete set of record Product Data to the Owner.

E. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Architect and the Owner's personnel to determine which of the submitted samples that have been maintained during progress of the work are to be transmitted to the Owner for record purposes. Comply with delivery to the Owner's Sample storage area.

F. Miscellaneous Record Submittals: Refer to other Specification Sections for the requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Owner.

G. Maintenance Manuals: Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:

1. Emergency Instructions
2. Spare Parts List
3. Copies of warranties
4. Wiring diagrams
5. Recommended "turn-around" cycles
6. Inspection procedures
7. Shop Drawings and Product Data
8. Fixture lamping schedule

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION

3.01 CLOSEOUT PROCEDURES

A. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

1. Maintenance Manuals
2. Record documents
3. Spare parts and materials
4. Tools
5. Lubricants
6. Fuels
7. Identification systems
8. Control sequences
9. Hazards
10. Cleaning
11. Warranties and Bonds
12. Maintenance Agreements and similar continuing commitments

B. As part of instruction for operating equipment, demonstrate the following procedures:

1. Start-up
2. Shutdown
3. Emergency operations
4. Noise and vibration adjustments
5. Safety procedures
6. Economy and efficiency adjustments
7. Effective energy utilization.

3.02 FINAL CLEANING

A. General: General cleaning during construction is required by the General Conditions and included in Section "Temporary Facilities".

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

1. Complete the following cleaning operations:

   a. Remove labels that are not permanent labels.
   b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are

noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean.

d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication ad other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

e. Clean the site, including landscaping development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth, even-textured surface.

C. Removal of Protection: Remove temporary protection and facilities installed for protection of the work during construction.

D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose as directed and approved by EPCC & City Code.

1. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION 01740

PART 1 – GENERAL

1.01 SCOPE

A. Related Documents: Drawings and general provisions of Contract, including General, Supplementary and Special Contract Conditions and Division 1 Specification sections, apply to the work in this section.

B. Provide the cast-in place concrete system, complete.

1.02 SUMMARY

A. This Section specifies cast-in-place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, curing compounds, and others as requested by Architect.

C. Shop drawings for reinforcement, prepared by registered Professional Engineer for fabrication, bending and placement of concrete reinforcement. Comply with ACI SP-66 (88), "ACI Detailing Manual," showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

D. Laboratory test reports for concrete materials and mix design test.

E. Materials Certificates in lieu of materials laboratory test reports when permitted by Architect. Materials certificates shall be signed by manufacturer and contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.04 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent are shown or specified:

1. ACI 318, "Building Code Requirements for Reinforced Concrete."

2. Concrete reinforcing Steel Institute (CRSI), "Manual of Standard Practice."

B. Materials and installed work may require testing and retesting at any time during progress of work. Tests, including retesting of materials for installed work, shall be done at Contractor's expense.

PART 2 – PRODUCTS

2.01 FORM MATERIALS

A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

B. Forms and Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and side for tight fit.

C. Form Coatings: Provide commercial formulation form-coating compounds with a maximum VOC of 350 mg/l that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will no metal closer than 1-1/2 inches to exposed surface.

1. Provide ties that, when removed, will leave holes not larger than 1-inch diameter in concrete surface.

2.02 REINFORCING MATERIALS

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

B. Steel Wire: ASTM A 82, plain, cold drawn steel.

C. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.

D. Supports for Reinforcements: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire-bar-type supports complying with CRSI specifications.

For slabs-on-grade, use supports with sand plates or horizontal runners where base material will support chair legs.

For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.03 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I.

1. Use one brand of cement throughout project unless otherwise acceptable to Architect.

B. Fly Ash: ASTM C 618, Type C or Type F.

C. Normal Weight Aggregates: ASTM C 33 and as herein specified. Provide aggregates from a single for exposed concrete.

1.For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.

2. Local aggregates not complying with ASTM C 33 but hat special tests or actual service have shown to produce concrete of adequate strength and durability may be used when acceptable to Architect.

D. Water: Drinkable

E. Admixtures, General: Provide admixtures for concrete that contains not more than 0.1 percent chloride ions.

F. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

"Air-Tite," Cormix
"Air-Mix" or "Perma-Air," Euclid Chemical Co.
"Darex AEA" or "Daravair," W.R. Grace & Co.
"MB-VR" or "Micro-Air," Master Builders, Inc.
"Sealtight AEA," W.R. Meadows, Inc.
"Sika AER," Sika Corp.

G. Water-Reducing Admixture: ASTM C 494, Type A

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

"Chemtard," ChemMasters Corp.
"PSI N," Cormix.
"Eucon WR-75," Euclid Chemical Co.
"WRDA," W.R. Grace & Co.
"Pozzolith Normal" or "Polyheed," Master Builders, Inc.
"Prokrete-N," Prokrete Industries
"Plastocrete 161," Sika Corp

H. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

"Q-set," Conspec Marketing & Manufacturing Co.
"Gilco Accelerator," Cormix.
"Accelguard 80," Euclid Chemical Co.
"Daraset," W.R. Grace & Co.
"Pozzutec 20," Master Builders, Inc.

I. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are limited to, the following:

"PSI-R Plus," Cormix
"Eucon Retarder 75," Euclid Chemical Co.
"Daratard-17," W.R. Grace & Co.
"Pozzolith R," Master Builders, Inc.
"Protard," Prokrete Industries
"Plastiment," Sika Corporation

2.04 RELATED MATERIALS

A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

B. Moisture-Retaining Cover: One of the following, complying with ASTM C 171

a. Waterproof paper
b. Polyethylene film
c. Polyethylene-coated burlap

C. Liquid Membrane-Forming Curing Compound: Liquid-type membrane forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.055 gr./sq. cm. When applied at 200 sq. ft./gal.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

"A-H 3 Way Sealer," Anti-Hydro Co., Inc.
"Spartan-Cote," The Burke Co.
"Conspec #1," Conspec Marketing & Mfg. Co.
"Hardtop," Cormix
"Day-Chem Cure and Seal," Dayton Superior Corp.
"Eucocure," Euclid Chemical Co.
"Horn Clear Seal," A.C. Horn, Inc.
"L&M Cure," L & M Construction Chemicals, Inc.
"Masterkure," Master Builders, Inc.
"CS-309," W.R. Meadows, Inc.
"LR-151," Prokrete Industries
"Kure-N-Seal," Sonneborn-Rexnord
"Stontop CS2," Stonhard, Inc.

D. Water-Based Acrylic Membrane Curing Compound: ASTM C 309, Type I, Class B.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

"Highseal," Conspec Marketing and Mfg. Co.
"Safe Cure and Seal," Dayton Superior Corp.
"Aqua-Cure," Euclid Chemical Co.
"Dress & Seal #18WB," L&M Construction chemicals, Inc.
"Masterseal W," Master Builders, Inc.
"Intex," W.R. Meadows, Inc.
"Silka Membrane," Sika Corp.

E. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

"Aquafilm," Ardex, Inc.
"Eucobar," Euclid Chemical Co.
"E-Con," L&M Construction Chemicals, Inc.
"Confilm," Master Builders, Inc.

2.05 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type and strengths of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.

a. Limit use of fly ash to not exceed 25 percent of cement content by weight.

B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until proposed mix designs have been reviewed by Architect.

C. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:

a. 3000-psi, 28-day compressive strength; W/C ratio, 0.46 maximum

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

2.06 ADMIXTURES

A. Use water-reducing admixture or high-range water-reducing admixture (Superplasticizer) in concrete as required for placement and workability.

B. Use nonchloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).

C. Use high-range water-reducing admixture (HRWR) in pumped concrete, concrete for industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water/cement ratios below 0.50.

D. Use air-entraining admixture in all concrete. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1-1/2 percent within following limits:

a. 6.0 percent ¾-inch to ½-inch max. aggregate.

E. Use admixtures for water reduction and set control in strict compliance with manufacturer's directions.

F. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

1. Ramps, slabs, and sloping surfaces: Not more than 3 inches.
2. Reinforced foundation systems: Not less than 1 inch and not more than 3 inches.
3. Concrete containing HRWR admixture (Superplasticizer): Not more than 8 inches after addition of HRWR to site-verified 2-inch to 3-inch slump concrete.
4. Other concrete: Not more than 4 inches.

2.07 CONCRETE MIXING

A. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as specified.

1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 – EXECUTION

3.01 GENERAL

A. Coordinate the installation of joint materials with placement of forms and reinforcing.

3.02 FORMS

A. General: Design, erect, support, brace, and maintain formwork to support vertical and lateral, static and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 347.

B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.

C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.

D. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

F. Provision for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before concrete placement as required to prevent mortar leaks and maintain proper alignment.

3.03 PLACING REINFORCEMENT

A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as herein specified.

Avoiding cutting or puncturing vapor retarder during reinforcement placement and concreting operations.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

E. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.

F. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange space, and securely tie bars and bar support to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

G. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.04 JOINTS

A. Construction Joints: Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Architect.

B. Provide keyways at least 1 ½ inches deep in construction joints in walls and slabs and between walls and footings. Accepted bulkheads designed for this purpose may be used for slabs.

C. Place construction joints perpendicular to maintain reinforcement. Continue reinforcing across construction joints.

3.05 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.

B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to obtain required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.06 PREPARATION OF FORM SURFACES

A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before reinforcement is placed.

Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.07 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work.

B. General: Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting< and Placing Concrete," and as herein specified.

Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete to avoid segregation at its final location.

C. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.

2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

D. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limit of construction joints; until the placing of a panel or section is completed.

1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items in into corners.

2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

3. Maintain reinforcing in proper position during concrete placement.

E. Cold-Weather Placing: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) at point of placement.

1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

2. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

F. Hot-Weather Placing: when hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 an as herein specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.

2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

   Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.

3. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, when acceptable to Architect.

3.08 FINISH OF FORMED SURFACES

A. Rough Form Finish: For formed concrete surfaces not exposed to view in the finish work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding ¼ inch in height rubbed down or chipped off.

B. Smooth Form Finish: For formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

D. Grout-Cleaned Finish: Provide grout-cleaned finish to schedule concrete surfaces that have received smooth form finish treatment.

Combine one part portland cement to 1 ½ parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to consistency of thick paint. Blend standard portland cement and white portland cement, amounts determined by trial patches, so that final color of dry grout will match adjacent surfaces.

Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

E. Related Unformed Surfaces: At top of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.09 MONOLITHIC SLAB FINISHES

A. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and as otherwise.

After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of Ft 18 – F 15. Cut down high spots and fill low

B. Trowel Finish: Apply towel finish to monolithic slab surfaces to be exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.

After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture an appearance, and with surface leveled to tolerances of Ff 20 – F1 17. Grind smooth surface defects that would telegraph through applied floor covering system.

C. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.

D. Nonslip Broom Finish: Apply nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply in accordance with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

B. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.

C. Provide moisture curing by following methods.

Keep concrete surface continuously wet by covering with water.

Use continuous water-fog spray.

Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.

D. Provide moisture-cover curing as follows:

Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during period using cover material and waterproof tape.

E. Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walks and curbs as follows:

Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.

F. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

G. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces, by application of appropriate curing method.

Final cure concrete surfaces to receive liquid floor hardener of finish flooring by use of moisture-retaining cover, unless otherwise directed.

3.11 REMOVAL OF FORMS

A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provide concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days and until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place by testing field-cured specimens representative of concrete location or members.

C. Forming-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

3.12 REUSE OF FORMS

Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable to Architect.

3.13 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

B. Reinforced Masonry: Provide concrete grout for reinforced masonry lintels and bond beams where indicated on drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.

3.14 CONCRETE SURFACE REPAIRS

A. Patching defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.

1. Cut out honeycomb, rock pockets, voids over ¼ inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to depth of less than 1 inch.

   Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar before bonding compound has dried.

2. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off higher than surrounding surface.

B. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry-pack mortar, or precast cement cone plugs secured in place with bonding agent.

1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

C. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope.

1. Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects, as such, include crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.

2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.

3. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may used when acceptable to Architect.

4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least ¾-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

D. Repair isolated random cracks and single holes not over 1 inch in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part portland cement to 2 ½ parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry-pack before bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.

E. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.

F. Repair methods not specified above may be used, subject to acceptance of Architect.

3.15 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. General : The Owner will employ a testing laboratory to perform tests and to submit test reports.

Sampling and testing for quality control during placement of concrete may include the following, as directed by Architect.

B. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

1. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.

2. Air Content: ASTM C 173, volume method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.

3. Concrete Temperature: Test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and each time a set of compression test specimens is made.

4. Compression Test Specimen: ASTM C 31; one set of 4 standard cylinder for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cure test specimens are required.

5. Compressive Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. more than the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

   When frequency of testing will provide fewer than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.

   When total quantity of a given class of concrete is less than 50 cu, yds. Architect may waive strength test if adequate evidence of satisfactory strength is provided.

   When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

   Strength level of concrete will be considered satisfactorily if averages of sets of three consecutive strength tests results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.

C. Test results will be reported in writing to Architect, Structural Engineer, Ready-Mix Producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day test and 28-day tests.

D. Nondestrutive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

E. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay such tests when unacceptable concrete is verified.

END OF SECTION 03300

PART 1 - GENERAL

RELATED DOCUMENTS

Drawing and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

Provide the metal fabrications required for this job, complete.

This section includes the following metal fabrications:

Rough hardware

Ladders and safety cages where required

Nosings

Loose bearing and leveling plates

Miscellaneous framing and supports for overhead doors, suspended partitions, etc.

Miscellaneous steel trim

Shelf and relieving angles

Steel pipe railings

Metal stairs

Related Sections: The following sections contain requirements that relate to this section.

Division 5 Section " Structural Steel" for structural steel framing system components.

Division 5 Section "Handrails and Railings" for ornamental metal handrails and railing systems.

Definitions

Definitions in ASTM E 985 for railing-related terms apply to this section.

SYSTEM PERFORMANCE REQUIREMENTS

Structural Performance: Design, engineer, fabricate, and install the following metal fabrications to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply of each load to produce the maximum stress in each respective component of each metal fabrication.

Top Rail of Guardrail System: Capable of withstanding the following loads applied as indicated:

Concentrated load of 300 lbs applied at any point noncurrently, vertically downward or horizontally.

Uniform load of 100 lbs per linear ft, applied noncurrently, vertically downward or horizontally.

Handrails Not Serving as Top Railing: Capable of withstanding the following loads applied as indicated.

Concentrated loads of 200 lbs applied at any point noncurrently, vertically downward or horizontally.

Uniform load of 50 lbs per linear foot applied noncurrently, vertically downward or horizontally.

Concentrated and uniform loads above need not be assumed to act concurrently.

Infill Area of Guardrail Systems: Capable of withstanding a horizontal concentrated load of 200 lbs applied to one sq. ft. at any point in the system including panels, intermediate rails, or other elements composing the infill area.

Above load need not be assumed to act concurrently with uniform horizontal loads on top rails of railing systems in determining stress on guard.

Heavy Duty Metal Bar Gratings: Capable of withstanding a uniform load of 250 lbs per sq. ft. or a concentrated load of 8000 lbs, whichever produces the greater stress.

SUBMITTALS

General: Submit the following in accordance with Conditions of Contract and Division 1 Specification section.

Product Data for products used in miscellaneous metal fabrications, including paint products and grout.

Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections.

Samples representative of materials and finished products as may be requested by Architect.

Field Measurements: Check actual locations of walls and other construction to which fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.

Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabrication of products without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

Sequence and coordinate installation of wall handrails as follows:

Mount handrails only on completed walls. Do not support handrails temporarily by any means not satisfying structural performance requirements.

Mount handrails only on gypsum board assemblies reinforced to receive anchors, and where the location of concealed anchor plates has been clearly marked for benefit of Installer.

PART 2 - PRODUCTS

FERROUS METALS

Metal Surfaces, General: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use material whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretch-leveled sheet.

Steel plates, Shapes, and Bars: ASTM A 36.

Rolled Steel Floor Plates: ASTM A 786.

Steel Bars for Gratings: ASTM A 569 or ASTM A 36.

Wire Rod for Grating Cross Bars: ASTM A 510.

Steel Tubing: Product type (manufacturing method)

Hot-Formed Steel Tubing: ASTM A 501.

Steel Pipe: ASTM A 53; finish, type, and weight class as follows:

Black finish, unless otherwise indicated.

Galvanized finish for exterior installations where indicated.

Type F, standard weight (schedule 40), unless otherwise indicated, or another weight, type, and grade required by structural loads.

STAINLESS STEEL

Bar stock: ASTM A 276, Type 302 or 304.

Plate: ASTM A 167, Type 302 or 304.

ALUMINUM

Extruded Bars and Shapes: ASTM B 221, alloys as follows:

6061-T6 or 6063-T6 for bearing bars of gratings and shapes.
6061-T1 for grating cross bars.

GROUT AND ANCHORING CEMENT

Nonshrink Metallic Grout: Premixed, factory-packaged, ferrous aggregate grout complying with CE CRD-C 621, specifically recommended by manufacturer for heavy duty loading applications of type specified in this section.

FASTENERS

General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.

Lag Bolts: Square head type,FS FF-B-561.

Machine Screws: Cadmium plated steel, FS FF-S-92.

Wood Screws: Flat head carbon steel, FS FF-S-111.

Plain Washers: Round, carbon steel, FS FF-W-92.

Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class, and style as required.

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

PAINT

Shop Primer for Ferrous Metal: Manufacturer's or fabricator's standard, fast-cuing, lead-free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure complying with performance requirements of FS TT-P-645.

Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint-20.

Zinc Chromate Primer: FS TT-P-645.

FABRICATION,GENERAL

Form metal fabrications materials of size, thickness, and shape indicated but not less than that needed to comply with performance requirement indicated. Work to dimensions indicated or accepted on shop drawings, using proven detail of fabrication and support. Use type of material indicated or specified or various components of each metal fabrication.

Form exposed work true to line and level with accurate angles and surface and straight sharp edges.

Ease exposed edges to a radius of approximately 1/32", unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

Remove sharp or rough areas on exposed traffic surfaces.

Weld corners and seams continuously to comply with AWS recommendations and the following: Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (counter-sunk) screws or bolts. Locate joints where least conspicuous.

Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

Shop Assembly: Preassemble items in shop to greatest extend possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of jointed pieces. Clearly mark units for reassembly and coordinated installation.

Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.

Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

ROUGH HARDWARE

Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 sections.

STEEL LADDERS

General: Fabricate ladders for the locations shown, with dimensions spacings, details and anchorages as indicated. Comply with requirements of ANSI A14.3.

Siderails: Continuous steel flat bars, 1/2" x 2 1/2", with eased edges, spaced 18 inches apart.

Bar Rungs: Round steel bars, 3/4" diameter, spaced 12 inches o.c.

Fit rugs in center line of side rails, plug weld and grind smooth outer rail faces.

Support each ladder at top and bottom and at intermediate points space not more than 5'-0" o.c. by means of welded or bolted steel brackets.

Size brackets to support design dead and live loads indicated and to hold centerline of ladder rungs clear of the wall surface by no less than 7 inches.

Extended side rails 42 inches above top rung, and return rails to wall or structure unless other secure handholds are provided. If the adjacent structure does not extend above the top rung, goose-neck the extended rails back to the structure to provide secure ladder access.

Provide non-slip surface on top of each rung, either by coating the rung with aluminum oxide granules set in epoxy resin adhesive, or by using a type of manufactured rung which is filled with aluminum oxide grout.

LADDER SAFETY CAGES

General: Fabricate labber safety cages to comply with ANSI A14.3; assemble by welding or riveting.

Primary Hoops: Steel bars, 5/16 inch X 4 inches, for top, bottom, and for cages longer than 20 feet, intermediate primary hoops.

Secondary Intermediate Hoops: Steel bars 5/16 inches X 2 inches hoops spaced not more than 4'-0" o.c. between primary hoops.

Vertical Bars: Steel bars, 5/16 inch X 2 inches, secured to each hoop, spaced approzimately 9 inches o.c.

Fasten assembled safety cage to ladder rails and adjacent construction as indicated.

Galvanize ladder safety cages, including fasteners, in the following locations:

Exterior locations
Interior locations where indicated

LOOSE BEARING AND LEVELING PLATES

Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free wraps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

LOOSE STEEL LINTELS

Fabricate loose structural steel lintels from steel angles and shapes of indicated for openings and recesses in masonry walls and partitions at locations indicated.

Welding adjoining members together to form a single unit where indicated.

Size loose lintels for equal bearing of one inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.

Galvanize loose steel lintels locate in exterior walls.

MISCELLANEOUS FRAMING AND SUPPORTS

General: Provide steel framing and supports for applications indicated or which are not a part of structural steel framework, as required to complete work.

Fabricate units to sixes, shape, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welding construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

MISCELLANEOUS STEEL TRIM

Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices whenever possible. Provide cutouts, fitting, and anchorages as required for coordination of assembly and installation with other work.

SHELF AND RELIEVING ANGLES

Fabricate shelf and relieving angles from steel angles of sizes indicated and for attachment to concrete framing. Provide slotted holes to receive 3/4" bolts, spaces not more than 6 inches from ends and not more than 24" o.c., unless otherwise indicated.

For cavity walls, provide vertical channel brackets to support shelf/relieving angles from back-up masonry and concrete. Align expansion joints in angles with indicated expansion joints in cavity wall exterior wythe.

Galvanize shelf angles to be installed on exterior concrete framing.

Furnish wedge-type concrete inserts, complete with fasteners, for attachment of shelf angles to cast-in place concrete.

STEEL PIPE RAILINGS AND HANDRAILS

General: Fabricate pipe railings and handrails to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of pipe, post spacings, and anchorage, but not less than that required to support structural loads.

Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.

Form changes in direction of railing members as follows:

By insertion of prefabricated elbow fittings and radius bends of radius indicated, at fabricator's option.

By any method indicated above, applicable to change of direction involved.

Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deform exposed surface of pipe.

Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.

Close exposed ends of pipe by welding 3/16" thick steel plate in place or by use of prefabricated fittings, except where clearance of end of pipe and adjoining wall surface is 1/4 inch or less.

Toe Boards: Where indicated, provide toe boards at railings around openings and at the edge of open-sided floor and platforms. Fabricate to dimensions and details indicated, or if not indicated, use 4" high x 1/8" steel plate welded to, and centered between, each railing post.

Brackets,Flanges,Fitting,and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fitting, and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.

For railing posts set in concrete, fabricate sleeves from steel pipe not less that 6 inches long and with an inside diameter not less than 1/2 inch greater than the outside diameter of post, with steel plate closure welded to bottom of sleeve.

Provide friction fit, removable cover designed to keep sleeves clean and hold top edge of sleeve 1/2" below finished surface of concrete.

For removable railing posts, slip-fit sockets from steel pipe whose inside diameter is sized for a close fit with posts and to limit deflection of post without lateral load, measured at top, to not more than 1/12 of post height. Provide socket covers designed and fabricated to resist accidental dislodgment.

Fillers: provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses. Size fillers to produce adequate bearing to prevent bracket rotation and overstressing of substrate.

For exterior steel railings and handrails formed from steel pipe with galvanized finish, galvanize fittings, brackets, fasteners, sleeves, and other ferrous components.

For interior steel railings and handrails formed from steel pipe with galvanized finish, galvanize fittings, brackets, fasteners, sleeves, and other ferrous components.

For interior steel railings formed from steel pipe with black finish provide nongalvanized ferrous metal fitting, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.

FINISH, GENERAL

Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

Finish metal fabrications after assembly.

STEEL AND IRON FINISHES

Galvanizing: For those items indicated for galvanizing, apply zinc-coating by hot-dip process compliance with the following requirements:

ASTM A 153 for galvanizing iron and steel hardware.

Preparation for Shop Priming: Prepare uncoated ferrous metal surface to comply with minimum requirements indicated below for conditions of installed metal fabrications:

Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1 for shop painting.

Stripe paint all edges, corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

Center nosing on tread widths with noses flush with riser faces and tread surfaces.

Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

INSTALLATION, GENERAL

Fastening to In-Place Construction; Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

Cutting, Fitting, and Placement: Perform cutting, drilling , and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces, level, plumb, true, and free of rack; and measured from established lines and levels.

Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction .

Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joint, but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding appearance and quality of welds made, methods used in correcting welding work.

Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint or zinc chromate primer.

SETTING LOOSE PLATES

Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

Set loose level and bearing plates on wedges, or other adjustable devices. After bearing members have been positioned and plumbed tighten the anchor bolts. Do not remove wedges or shims, but if producing, cut off flush with the edge of the bearing plate before packing with Gout.

INSTALLATION OF SUPPORT FOR TOILET PARTITIONS

Anchor support securely to, and rigid brace from, overhead building structure & walls.

INSTALLATION OF STEEL PIPE RAILING AND HANDRAILS

Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loading. Plum posts in each direction. Secure posts and railing ends to building construction as follows:

Anchor posts in concrete by means of pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's directions.

Anchoring posts in concrete by core drilling holes not less than 5" deep and 3/4" greater than outside diameter of post. Clean holes of all loose material, insert posts and fill annular space between post and concrete with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's directions.

Anchor posts to steel with steel oval flanges, angle type or floor type as required by conditions, weld to posts and bolted to steel supporting members.

Anchor rail ends into concrete and masonry with steel round flanges welded to rail ends and anchored into wall construction with lead expansion shields and bolts.

Anchor rail ends to steel with steel oval or round flanges welded to rail ends and bolted to structural steel members, unless otherwise indicated.

Install removable railing section where indicated in slip-fit metal socket cast into concrete. Accurately locate sockets to match post spacing.

Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 1 1/2" clearance from inside face of handrail and finish wall surface. Locate brackets as indicated, or if not indicated, at spacing required to support structural loads. Secure wall brackets and wall return fittings to building construction as follows:

Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.

For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.

For hollow masonry anchorage, use toggle bolts having square heads.

For steel framed gypsum board assemblies, fasten brackets directly to steel framing or concealed
anchors using self-tapping screws of size and type required to support structural loads.

Expansion Joints: Provide expansion joints at locations indicated, or if not indicated, at intervals not to exceed 40 feet. Provide slip joint with internal sleeve extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; locate
joint within 6 inches of post.

ADJUST AND CLEANING

Touch-up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same materials as used for shop painting to comply with SSPC-PA 1 requirements for touch-up of field painted surfaces.

Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of the shop paint on miscellaneous metal is specified in Division 9 Section "Painting" of these specifications.

For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair to comply with ASTM A 780.

END OF SECTION 05500

PART 1 GENERAL

1.01 DESCRIPTION:

A. The surfaces to be painted in this Work are indicated on the Drawings (in the Room Finish Schedule, List of Finishes, and as specifically noted) and in the Painting Schedule in this Section of these Specifications.

B. Surfaces to be painted: Except for surfaces specified or scheduled not to be painted and except for factory-finished items, job-paint all surfaces, interior and exterior, exposed to view or weather. Examine other sections of these specifications to determine other items which are factory-finished or prime-coated. Prime-coated items shall be job-finished under this section. Special attention must be given to the painting of all doors. All required finishes must be applied to all surfaces - See Section 3.04 N.

B2. **Note: In all areas having an "open interior structure" (no ceiling), all exposed elements and construction shall be painted. Such elements include, but are not limited to, ductwork, metal roof deck, steel joists, bridging, etc. steel beams, and other structural components. Different elements shall be painted in different colors. Refer to the Drawings for specific information.**

C. Surfaces not to be painted: Surfaces not to be finished under this Section: non-ferrous metals, acoustical ceilings, floor coverings, wallcoverings, and roofing. In mechanical and electrical equipment rooms and similar spaces used by maintenance personnel only, do not paint conduit, piping, structural steel or steel joists except for touch-up, unless scheduled otherwise.

D. Related work in other sections: Hollow Metal Work and Gypsum Drywall.

1.02 SUBMITTALS:

A. Painting materials scheduled are products of **SHERWIN-WILLIAMS Co.**, unless indicated otherwise. Substitutions may be requested in accordance with Shop Drawings and Submittals. Approved manufacturer's specifications must be adhered to. The following are acceptable, subject to specification compliance; first line products as selected by Architect:
Possible substitute colors must be exact computer match to the specified colors.

1. Sherwin-Williams
2. Pittsburgh
3. Comex/Kwal Paint
4. Benjamin Moore
5. Dunn Edwards

B. Submittals: Before starting work, submit a schedule in triplicate showing the name of paint manufacturer, type of paint to be used on each different surface in building.

C. Color selections: Color schedules will be issued prior to beginning of painting work. In general, color schemes will be repeated so excessive number of colors are generally not required. However, for pricing purposes, the contractor, shall not base his bid on a color limit. No additional funds will be granted for multiple color and/or texture selections. Colors; factory mixed, but Contractor shall tint samples at job as required until the colors, textures are satisfactory.

D. Color samples: Prepare samples of each kind of painted work and each color for approval sufficiently in advance of beginning of work to permit adequate time for consideration of materials, colors. Prepared samples minimum 12" squares.

E. Provide certificates stating fire hazard classification of each material furnished for this project under any
specification provision related to fire resistance or surface burning characteristics.

1.03 PRODUCT HANDLING:

A. Deliver sealed containers with labels legible, intact.

B. Store and mix materials only in such rooms as may be assigned for this purpose and take all necessary precautions to prevent fire. Comply with health, fire regulations.

C. Cover or otherwise protect finished work of other trades and surfaces not being painted concurrently or not to be painted.

D. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

1.04 QUALITY ASSURANCE:

All paint products used for interior spaces, must comply with "EPA Method 24", meaning it must contain less than 450 grams of VOC/VOS per liter of coating (3.8 pounds per gallon).

PART 2 PRODUCTS

2.01 PAINT MATERIALS:

A. Where necessary to thin any oil vehicle paint materials, use either pure linseed oil or turpentine unless manufacturer of material calls for other types of thinners.

B. Use one brand of materials insofar as possible. In any case, primers and sealers shall be same brand as finish coats.

C. Paint, varnish, fillers: Of type, brand hereinafter specified under "Schedule of Painting Materials" such as linseed oil, shellac, turpentine, etc. shall be of highest quality, with identifying labels on containers.

PART 3 EXECUTION

3.01 ENVIRONMENTAL REQUIREMENTS:

A. Comply with manufacturer's recommendations as to environmental conditions under which coating, coating systems, can be applied.

B. Do not apply finish in area where dust is being generated.

3.02 EXAMINATION OF SURFACES:

Carefully inspect surfaces to be painted, covered or otherwise finished, and notify in writing of any defects, improper materials, workmanship or other defects which will affect satisfactory execution and permanency of work. Absence of such notification shall be construed as acceptance by this subcontractor of surfaces, and later claims of defects in surfaces will not relieve this subcontractor from responsibility under his guarantee.

3.03 PREPARATION OF SURFACES:

NOTE: The complete and proper preparation, including but not limited to, cleaning, sanding, stripping, patching, and leveling of all surfaces which have existing and old finishes, shall be part of this contract. It shall be the contractor's responsibility to examine all existing surfaces, prior to Bid. Requests for additional funding at a later time will not be granted.

A. Wood: Sandpaper to smooth, even surface, then dust off. Prime knots, pitch streaks, with two coats shellac before priming. After priming has been applied, thoroughly fill nail, other holes, cracks, with plastic wood or putty. Sandpaper, dust off between coats.

B. Steel and iron: Remove grease, rust scale, dust; touch up any chipped or abraded places on shop-coat. Remove heavy coating of scale from ferrous metal by wire-brushing or sandblasting as necessary to produce a satisfactory surface for painting.

C. Galvanized metal: Wash untreated surfaces with solution of chemical phosphoric metal etc., allow to dry at least 12 hours, dust off. All exposed galvanized surfaces shall be painted except at structural steel.

D. Gypsum board and plaster: Before painting, test with moisture testing device, apply no paint or sealer when moisture content exceeds 8%. Test sufficient areas in each space as often as necessary, to determine proper moisture content for painting. Gypsum board and plaster used as backing for wall fabric shall receive one coat of size.

E. New and Previously Painted Concrete Tilt-up Surfaces:

- Surface to be painted should be free of all dirt, chalk, grease/oil, loose and

flaking paint, etc., in accordance with SSPC-SP-2 (Hand-Tool Cleaning), SSPC-SP-3 (Power-Tool Cleaning), or NACE RP-01-72 ("Water-Blast Cleaning").

- ☐ In severe cases, all old paint shall be removed.
- ☐ New concrete surfaces must be allowed to cure no less than 30 days.
- ☐ All surface imperfections need to be filled with appropriate patching material.

F. General: Before painting, remove hardware, accessories, plates, similar items or provide ample protection of such items. Upon completion of each space, replace. Remove doors to paint top and bottom edges.

G. Provide scaffolding, drop cloths and other equipment necessary to execute work, and which is not specifically mentioned to be provided by others.

3.04 APPLICATION:

A. Apply to highest standards by skilled mechanics.

B. Surfaces to be painted shall be clean, dry smooth, protected from dampness. Each coat of paint shall be well brushed on, worked out evenly. Comply with recommendations of product manufacturer for drying time between succeeding coats. Except as specifically approved otherwise by the Architect, confine spray application to metal frame work and similar surfaces where brush work would be obvious and undesirable.

NOTE: **Where spray application is used, back rolling of prime coat on gypsum board is required. Do not double back with spray equipment to build up film thickness of two coats in one pass.**

C. Vary slightly the color of successive coats. Secure approval of each coat before proceeding with next coat.

D. Finish coats shall be smooth, free of brush marks, streaks, laps or pile-up of paints, skipped or missed areas.

E. Make edges of paint adjoining other materials or colors clean, sharp with no overlapping.

F. Paint prime-coated hardware, grilles and registers same color surrounding material.

G. Back-priming shall be of same material as specified for front side; required for all wood cabinets, millwork, trim, except where finish is plastic laminate. Back primed concealed parts before erection. Take care that back painting does not contact exposed finish surface.

H. Do not paint sealant unless directed.

I. Fire and smoke rated partitions as identified on plans shall be permanently

identified on both sides above ceilings and in concealed spaces by red-painted stenciled notices spaced not over 10 feet apart. Lettering shall be not less than one (1) inch high. Wording at corridors shall be "CORRIDOR PARTITION - PROTECT OPENINGS". At smoke compartment boundaries, wording shall be "SMOKE PARTITION-PROTECT OPENINGS". At horizontal exit walls, exit enclosures, hazard enclosures and other fire walls wording shall be "ONE-HOUR FIRE BARRIER - PROTECT OPENINGS" (or TWO-HOUR, as indicated on plan).

J. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.

K. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.

L. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.

M. Prime faces of wood doors, except where plastic faced, with one coat of clear alkyd sealer as soon as doors are delivered to job site.

N. Scheduled door finish (paint or stain with sealer - not only sealer!) must be applied to **all door surfaces, including tops, bottoms, and all sides.** Non-Compliance with this requirement will be subject to rejection of the installed doors. DO NOT REMOVE OR PAINT OVER DOOR LABELS INDICATING FIRE RATING!!!
NOTE: Prior to commencing the painting work, the painting contractor must provide a written statement to the Architect via the Construction Manager wherein they acknowledge that the content of the above requirements are completely understood, and will be fully implemented.

O. Re-coat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

P. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage.

Q. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.

R. Provide satin finish for final coats, unless otherwise indicated.

S. Complete Work: Match approved samples for color, texture, and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

T. Paint all cover plates for electrical, plumbing, mechanical, telephone, computer, etc. regardless when these items get installed. At project completion all these items must be painted to match adjacent surface.

U. Wherever paint is used on metal deck to receive fireproofing, it shall be the responsibility of the contractor to determine compatibility with spray-applied fire resistive material.

3.05 CLEANING:

A. At the completion of work of other trades touch-up and restore all damaged or defaced painted surfaces.

B. Remove spilled, splashed or splattered paint from all surfaces.

C. Leave unfinished space clean, in condition required for equivalent spaces in project.

3.06 PAINTING SCHEDULE:

(NOTE: Schedule is based on " Sherwin-Williams" Products, equal products from different manufacturer's may be approved by the Architect.) Substitutions would require exact computer match to the specified colors.

3.06.1 EXTERIOR PAINT SCHEDULE:

A. Concrete, Stucco, Brick and Masonry (other than Concrete Unit Masonry): Provide the following finish systems over exterior concrete, stucco, and brick masonry substrates:

1. 100% Acrylic Flat Finish **Two finish coats** over a primer.

   a) Primer: S-W Loxon Masonry Primer, A24W8300 masonry acrylic primer undercoat. Applied at a dft of not less than 3.2 mils.

   b) Finish Coats: S-W A-100 Exterior Latex Flat, A6 Series 100% acrylic flat finish. Applied at a dft of not less than 1.2 mils.

2. Texture Coating: **One finish coat** over a properly prepared substrate. (used for concrete tilt-ups when textured finish is desired, higher costs)
   a) Primer: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300 100% acrylic primer. Applied at a dft of not less than 3.2 mils, **or** self-priming after power washing.

   b) Finish Coat: S-W UltraCrete Textured Masonry Topcoat, A44-800 Series Texture Coating. Applied at 50-80 sq ft/gal.

B. Concrete Unit Masonry: Provide the following finish systems over exterior concrete unit masonry:

1. 100% Acrylic Flat Finish: **Two finish coats** over block filler.

   a) Block filler: S-W PrepRite Block Filler, B25W25 latex block filler.

Applied at 75-125 sq ft/gal.

b) Finish Coats: S-W A-100 Exterior Latex Flat, A6 Series 100% acrylic flat finish. Applied at a dft not less than 1.2 mils.

B-1. Concrete Unit Masonry Clear Sealer: Provide the following finish systems over exterior concrete unit masonry:

1. 40% Silane Clear Finish: **1 finish coat.**

a) Finish Coat: S-W Loxon 40% Silane Water Repellant, A31T40. Applied per manufacturers recommendations.

C. Exterior Gypsum Soffit Board: Provide the following finish systems over exterior gypsum soffit board: (Flat Finish is the standard)

1. 100% Acrylic Flat Finish: **Two finish coats** over an exterior alkali-resistant primer:

a) Primer: S-W Exterior Latex Wood Primer, B42W8041 100% acrylic primer undercoat. Applied to a dft no less than 1.4. mils.

b) Finish Coats: S-W A-100 Exterior Latex Flat, A6 Series 100% acrylic flat finish. Applied to a dft not less than 1.2 mils.

2. 100% Acrylic Satin enamel Finish: **Two finish coats** over a primer.

a) Primer: S-W Exterior Latex Wood Primer, B42W8041 acrylic primer undercoat. Applied to a dft not less than 1.4 mils.

b) Finish Coats: S-W A-100 Exterior Latex Satin, A82 Series 100% acrylic satin enamel. Applied to a dft of not less than 1.5 mils.

D. Ferrous Metal and Non-Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items (spot prime as needed).

1. 100% Acrylic Semi-Gloss Enamel Finish: **Two finish coats** over a rust-inhibitive primer.

a) Primer: S-W Pro Industrial™ Pro-Cryl® Universal Primer, B66-310 Series latex metal primer. Applied at a dft of not less than 2.0 mils.

b) Finish Coats: S-W Pro Industrial Semi-Gloss Acrylic, B66-650 Series semi-gloss enamel. Applied at a dft of not less than 2.5 mils.

1a. Full-Gloss Alkyd-enamel: **Two finish coats** over a glavanized metal primer. (For High Performance areas, such as hand rails and canopies)

a) Primer: S-W Pro Industrial™ Pro-Cryl® Universal Primer, B66-310 Series latex metal primer. Applied at a dft of not less than 2.0 mils.

b) Finish Coats: S-W Pro Industrial Alkyd Enamel, B54-150 Series. Applied to a dft not less than 2.0 mils.

3.06.2 INTERIOR PAINT SCHEDULE:

A. Concrete and Masonry (other than Concrete Unit Masonry): Provide the following paint systems over interior and brick masonry substrates: (Egg-shell standard)

1. Flat Acrylic Finish: **Two finish coats** over a primer.

   a) Primer: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300. Applied at a dft of not less than 3.2 mils.

   b) Finish Coats: S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series. Applied to a dft of not less than 1.6 mils.

2. Low-Luster Acrylic-enamel Finish: **Two finish coats** over a primer.

   a) Primer: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300. Applied at a dft of not less than 3.2 mils.

   b) Finish Coats: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series. Applied to a dft of not less than 1.7 mils.

3. Semi-Gloss Acrylic-enamel Finish: **Two finish coats** over a primer.

   a) Primer: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300. Applied at a dft of not less than 3.2 mils.

   b) Finish Coats: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series. Applied to a dft of not less than 1.7 mils.

4. Waterborne Polyamide Semi-Gloss Epoxy: **Two finish coats** over a primer. (Use for High Performance such as Bathrooms)

   a) Primer: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300. Applied at a dft of not less than 3.2 mils.

   b) Finish Coats: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy Semi-Gloss K46 Series. Applied to a dft of not less than 2.0 mils.

B. Concrete Unit Masonry: Provide the following finish systems over interior concrete unit masonry: (Egg-shell standard)

1. Flat Acrylic Finish: **Two finish coats** over block filler.

   a) Block Filler: S-W PrepRite® Block Filler, B25W25. At 75-125 sq ft/gal.

   b) Finish Coats: S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series. Applied to a dft of not less than 1.6 mils.

2. Low-Luster Acrylic enamel Finish: **Two finish coats** over block filler.

a) Block Filler: S-W PrepRite® Block Filler, B25W25. At 75-125 sq ft/gal.

b) Finish Coats: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series. Applied to a dft of not less than 1.7 mils.

3. Semi-Gloss Acrylic Enamel Finish: **Two finish coats** over block filler.

a) Block Filler: S-W PrepRite® Block Filler, B25W25. At 75-125 sq ft/gal.

b) Finish Coats: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 enamel. Applied to a dft of not less than 1.6 mils.

4. Waterborne Polyamide Semi-Gloss Epoxy: **Two finish coats** over a primer. (Use for High Performance such as Bathrooms)

a) Block Filler: S-W PrepRite® Block Filler, B25W25. At 75-125 sq ft/gal.

b) Finish Coats: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy Semi-Gloss K46 Series. Applied to a dft of not less than 2.0 mils.

C. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces: (Egg-shell standard)

1. Flat Acrylic Finish: **Two finish coats** over primer.

a) Primer: S-W ProMar 200 Zero VOC Latex Primer, B28W2600. Applied at a dft of not less than 1.5 mils.

b) Finish Coats: S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series. Applied to a dft of not less than 1.6 mils.

2. Low-Luster Acrylic Enamel Finish: **Two finish coats** over primer.

a) Primer: S-W ProMar 200 Zero VOC Latex Primer, B28W2600. Applied at a dft of not less than 1.5 mils.

b) Finish Coats: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series. Applied to a dft of not less than 1.7 mils.

3. Semi-Gloss Acrylic Enamel Finish: **Two finish coats** over primer.

a) Primer: S-W ProMar 200 Zero VOC Latex Primer, B28W2600. Applied at a dft of not less than 1.5 mils.

b) Finish Coats: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 enamel. Applied to a dft of not less than 1.6 mils.

4. Waterborne Polyamide Semi-Gloss Epoxy: **Two finish coats** over a primer. (Use for High Performance such as Bathrooms)

a) Primer: S-W ProMar 200 Zero VOC Latex Primer, B28W2600. Applied at a dft of not less than 1.5 mils.

b) Finish Coats: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy Semi-Gloss K46 Series. Applied to a dft of not less than 2.0 mils.

D. Interior Concrete Floors: Provide the following paint finish system over interior concrete floors:

1. Water-Based Gloss Epoxy; Abrasive blast followed by **two finish coats** over a Sealer coat. (Not LEED, use Acrylic 2. Or Clear 3. If LEED)

a) Seal Coat: ArmorSeal Floor-Plex® 7100 Primer, B70W410.

b) Finish Coats: ArmorSeal Floor-Plex 7100 Water Based Epoxy, B70-400 Series. Applied not less than 1.5 to 2.0 dry per coat.

2. Acrylic Primer/ Acrylic System: **Two finish coats.**

a) Finish Coats: ArmorSeal Tread-Plex B90. Apply per manufacturer's recommendations.

3. Clear Gloss Sealer and Finish: **Two finish coats.**

a) Finish Coats: S-W H&C Wet Look Clear. Apply per manufacturer's recommendations.

E. Wood and Hardboard: Provide the following paint finish systems over new interior wood surfaces:

1. Semi-Gloss Alkyd-Enamel finish: **Two finish coats** over a primer.

a) Primer: S-W Premium Wall & Wood Primer, B28W8111. Applied to a dft of not less than 1.8 mils.

b) Finish Coats: S-W ProMar 200 Waterbased Acrylic-Alkyd Semi-Gloss, B34-8200 Series. Applied to a dft of not less than 1.7 mils.

F. Ferrous Metal and Non-Ferrous Metal: Provide the following finish systems over metal. Primer is not required on shop-primed items (spot prime as needed).

1. 100% Acrylic Semi-Gloss Enamel Finish: **Two finish coats** over a rust-inhibitive primer.

a) Primer: S-W Pro Industrial™ Pro-Cryl® Universal Primer, B66-310 Series latex metal primer. Applied at a dft of not less than 2.0 mils.

b) Finish Coats: S-W Pro Industrial Semi-Gloss Acrylic, B66-650 Series semi-gloss enamel. Applied at a dft of not less than 2.5 mils.

G. Exposed Metal Ceilings: Provide the following finish systems over metal.

Primer is not required on shop-primed items (spot prime as needed).

1. Dryfall Flat Finish: One finish coat over a rust-inhibitive primer.

   a) Primer: S-W Pro Industrial™ Pro-Cryl® Universal Primer, B66-310 Series latex metal primer. Applied at a dft of not less than 2.0 mils.

   b) Finish Coat: S-W Pro Industrial Waterborne Acrylic Dryfall Flat, B42-80 Series. Applied at a dft of not less than 1.7 mils.

3.06.3 INTERIOR STAIN AND NATURAL-FINISH WOODWORK SCHEDULE:

A. Stained Woodwork and Wood Doors: Provide the following stained finishes over new interior woodwork and wood doors:

1. Alkyd/Water-Based Stain Satin-Varnish Finish: Two finish coats of water-based clear satin polyurethane over a sealer coat and interior wood stain.

   a) Stain coat: S-W Wood Classics 250 VOC g/L Interior Oil Stain, A49 Series.

   b) Sealer Coat: S-W Wood Classics WB Polyurethane, Satin, A68 Series.

   c) Finish Coats: S-W Wood Classics WB Polyurethane, Satin, A68 Series.

   NOTE 1. All exposed wood surfaces of any kind within the project shall be covered under this provision, unless they are specifically and clearly excluded. If in doubt, the sub-contractor must obtain clarification, prior to submitting a proposal.

   NOTE: 2: Approximately six, 8" x 12" different color samples (on maple veneer) are required for the Architect's final selection.

3.07 MATERIAL COMPLIANCE:

Work in this section of the specifications shall be governed by General Requirements, Section 01000 - Codes and Standards. If conflict exits between products and methods herein specified and the Section noted above, notify Architect via the Construction Manager 10 days prior to submitting a proposal.

END OF SECTION