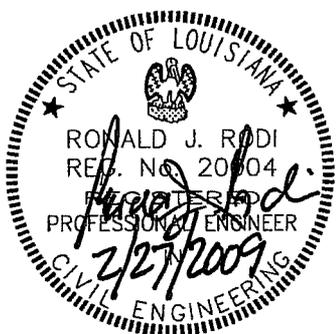


Technical Specifications

Division 2 thru 14

02200	Earthwork
02361	Termite Control
02380	Caissons
02700	Site Improvements
03300	Concrete Work
04810	Unit Masonry Assemblies
05120	Structural Steel
05300	Metal Decking
05410	Pre-Fabricated Light-Gauge Steel Trusses
06100	Rough Carpentry
07115	Bituminous Dampproofing
07210	Building Insulation
07311	Asphalt Shingles
07466	Fiber-Cement Siding & Accessories
07620	Flashing and Sheet Metal
07920	Joint Sealants
08110	Steel Doors and Frames
08331	Overhead Coiling Doors
08710	Door Hardware
09200	Portland Cement Plaster
09651	Resilient Floor Tile
09700	Seamless Flooring
09900	Painting
10420	Letters and Signs
10520	Fire-Protection Specialties
10800	Toilet Accessories
Division 12 – Furnishings (Not Used)	
Division 13 - Special Construction (Not Used)	
Division 14 - Conveying Systems (Not Used)	



SECTION 02200 - EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes the following:
 - 1. Extent of earthwork is indicated on drawings:
 - a. Preparation of subgrade for building slabs, walks, and pavements is included as part of this work.
 - b. Drainage fill course for support of building slabs is included as part of this work.
 - c. Backfilling of trenches within building lines is included as part of this work.
- B. Excavation for Mechanical/Electrical Work: Refer to Divisions 15 and 16 sections for excavation and backfill required in conjunction with underground mechanical and electrical utilities, and buried mechanical and electrical appurtenances; not work of this section.
- C. Definition: "Excavation" consists of removal of material encountered to subgrade elevations indicated and subsequent disposal of materials removed.

1.02 SUBMITTALS

- A. Test Reports-Excavating: Submit following reports directly to Architect/Engineer from the testing services, with copy to Contractor:
 - 1. Test reports on borrow material.
 - 2. Field density test reports.
 - 3. One optimum moisture-maximum density curve for each type of soil encountered.

1.03 QUALITY ASSURANCE

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.
- B. Testing & Inspection Service: Owner shall engage and pay for soil testing and inspection service for quality control testing during earthwork operations. Contractor shall pay for all retesting of failed tests.

1.04 PROJECT/SITE CONDITIONS

- A. Site Information: Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn therefrom by Contractor. Data is made available for convenience of Contractor. Geotechnical Report may be reviewed at Architect's office.

- B. Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.
- C. Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
- D. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
- E. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, during occupied hours, except when permitted in writing by Architect/Engineer and then only after acceptable temporary utility services have been provided.
 - 1. Provide minimum of 48-hour notice to Architect/Engineer, and receive written notice to proceed before interrupting any utility.
- F. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.
- G. Use of Explosives: The use of explosives is not permitted.
- H. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.
- I. Operate warning lights as recommended by authorities having jurisdiction.
- J. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
 - 1. Excavations within drip-line of large trees to be done by hand. Protect the root system from damage or dryout to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 1" diameter and larger with emulsified asphalt tree paint.

PART 2 PRODUCTS

2.01 SOIL MATERIALS

- A. Soil material for fill shall be a low plasticity clay with a maximum Liquid Limit of 40.
- B. Definitions:
 - 1. Sub-base Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand.
 - 2. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, or crushed on site concrete, with 100% passing a 1-1/2" sieve and not more than 5% passing a No. 4 sieve.

3. Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetable and other deleterious matter.

PART 3 EXECUTION

3.01 EXCAVATION

- A. Excavation is Unclassified, and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.
- B. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect/Engineer. Unauthorized excavation, as well as remedial work directed by Architect, shall be at Contractor's expense.
- C. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Architect/Engineer.
- D. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Architect/Engineer.
- E. Additional Excavation: When excavation has reached required subgrade elevations, notify Architect/Engineer who will make an inspection of conditions.
- F. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by Architect/Engineer.
- G. Removal of unsuitable material and its replacement as directed will be paid on basis of contract conditions relative to changes in work.
- H. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
- I. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- J. Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
- K. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- L. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavation to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

- M. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.
- N. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.
- O. Dispose of excess soil material and waste materials as herein specified.
- P. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.
- Q. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.
- R. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown.
- S. Excavation for Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room. Provide 6" to 9" clearance on both sides of pipe or conduit.
- T. Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations. Beyond building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.
- U. For pipes or conduit 5" or less in nominal size and for flat-bottomed multiple-duct conduit units, do not excavate beyond indicated depths. Hand excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.
- V. For pipes or conduit 6" or larger in nominal size, tanks and other mechanical/electrical work indicated to receive subbase, excavate to subbase depth indicated, or, if not otherwise indicated, to 6" below bottom of work to be supported.
- W. Except as otherwise indicated, excavate for exterior water-bearing piping (water, steam, condensate, drainage) so top of piping is no less than 3'-6" below finish grade.
- X. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for entire body of pipe.
- Y. Backfill trenches with concrete where trench excavations pass within 18" of column or wall footings and which are carried below bottom of such footings, or which pass under wall footings. Place concrete to level of bottom of adjacent footing.
- Z. Concrete is specified in Division 3.
- AA. Do not backfill trenches until tests and inspections have been made and backfilling authorized by Architect/Engineer. Use care in backfilling to avoid damage or displacement of pipe systems.

- BB. For piping or conduit less than 2'-6" below surface of roadways, provide 4" thick concrete base slab support. After installation and testing of piping or conduit, provide minimum 4" thick encasement (sides and top) of concrete prior to backfilling or placement of roadway subbase.
- CC. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F. (1 degree C).

3.02 COMPACTION

- A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification indicated below.
- B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D 1557; and not less than the following percentages of relative density, determined in accordance with ASTM D 2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils).
 - 1. Structures, Building Slabs, Steps, Pavements: Compact top 12" of subgrade and each layer of backfill or fill material at 92% maximum density for cohesive material or 75% relative density for cohesionless material.
 - 2. Lawn or Unpaved Areas: Compact top 6" of subgrade and each layer of backfill or fill material at 85% maximum density for cohesive soils and 70% relative density for cohesionless soils.
 - 3. Walkways: Compact top 6" of subgrade and each layer of backfill or fill material at 90% maximum density for cohesive material or 70% relative density for cohesionless material.
- C. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.
- D. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
 - 1. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.03 BACKFILL AND FILL

- A. General: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.
 - 1. In excavations, use satisfactory excavated or borrow material.
 - 2. Under grassed areas, use satisfactory excavated or borrow material.

3. Under walks and pavements, use subbase material, or satisfactory excavated or borrow material, or combination of both.
 4. Under steps, use subbase material.
 5. Under building slabs, use drainage fill material.
 6. Under piping and conduit, use subbase material where subbase is indicated under piping or conduit; shape to fit bottom 90 deg. of cylinder.
- B. Backfill excavations as promptly as work permits, but not until completion of the following:
1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 2. Inspection, testing, approval, and recording locations of underground utilities.
 3. Removal of concrete formwork.
 4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
 5. Removal of trash and debris.
 6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
- C. Ground Surface Preparation: The upper 6" of existing soil beneath all of the building pads and extending 5' beyond on all sides shall be removed and replaced with new compacted earth fill. Prior to proceeding with new fill installation, proof roll exposed subbase to detect soft spots which shall also be removed and replaced with new compacted fill.
- D. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.
- E. Placement and Compaction: Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand-operated tampers.
- F. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- G. Place backfill and fill materials evenly adjacent to structures, piping or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping or conduit to approximately same elevation in each lift.

3.04 GRADING

- A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.
- B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding.
- C. Finish surfaces free from irregular surface changes, and as follows:
 - 1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within no more than 0.10' above or below required subgrade elevations.
 - 2. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10' above or below required subgrade elevation.
 - 3. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 1/2" above or below required subgrade elevation.
- D. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2" when tested with a 10' straightedge.
- E. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.05 PAVEMENT SUBBASE COURSE

- A. General: Subbase course consists of placing subbase material, in layers of specified thickness, over subgrade surface to support a pavement base course.
 - 1. See other Division 2 sections for paving specifications.
- B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.
- C. Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12" width of shoulder simultaneously with compacting and rolling of each layer of subbase course.
- D. Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.
- E. When a compacted subbase course is shown to be 6" thick or less, place material in a single layer. When shown to be more than 6" thick, place material in equal layers, except no single layer more than 6" or less than 3" in thickness when compacted.

3.06 BUILDING SLAB DRAINAGE COURSE

- A. General: Drainage course consists of placement of drainage fill material, in layers of indicated thickness, over subgrade surface to support concrete building slabs.
- B. Placing: Place drainage fill material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting material during placement operations.
- C. When a compacted drainage course is shown to be 6" thick or less, place material in a single layer. When shown to be more than 6" thick, place material in equal layers, except no single layer more than 6" or less than 3" in thickness when compacted.

3.07 FIELD QUALITY CONTROL

- A. Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.
 - 1. Perform field density tests in accordance with ASTM standards.
 - 2. Perform moisture content tests as described above.
- B. Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to Architect/Engineer.
 - 1. Paved Areas and Building Slab Subgrade: Make at least one field density test of subgrade for every 2000 square feet of paved area or building slab, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 2000 square feet of overlaying building slab or paved area, but in no case less than 3 tests.
- C. Foundation Wall Backfill: Take at least 2 field density tests, at locations and elevations as directed.
- D. If in opinion of Architect/Engineer, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense.

3.08 MAINTENANCE

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

- D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.09 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Removal to Designated Areas on Owner's Property: Transport acceptable excess excavated material to designated soil storage areas on Owner's property if so directed by Architect. Stockpile soil or spread as directed by Architect/Engineer.
- B. Transport waste material, including unacceptable excavated material, trash and debris away from Owner's property and legally dispose of as required.

END OF SECTION

SECTION 02700 – SITE IMPROVEMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes the following items:
 - 1. Water & Sewer Improvements

1.02 SCOPE

- A. Work under this section of the Specifications includes all labor, materials, tools, equipment, and incidentals, necessary to perform all operations incidental to furnishing the complete installation of all site improvements and amenities in accordance with the specifications contained in this section, the Standard Specifications, the supplemental Standard Specifications, and in conformity with the Drawings.
- B. Wherever reference is made to Standard Specifications, such reference is to the 2006 Edition or latest revision thereof of "Standard Specifications for Roads and Bridges," by the Office of Highways, Department of Transportation and Development, State of Louisiana.
- C. Unless otherwise specifically noted, materials and execution for Portland cement concrete for these items shall conform to Section 901 of the Standard Specifications.

PART 2 - MATERIALS AND EXECUTION

- 2.01 WATER & SEWER IMPROVEMENTS. The work under this section of these specifications consists of furnishing all labor, equipment, materials, tools and incidentals necessary for the construction of on-site water distribution lines and sanitary sewers, valves, fittings, and appurtenances complete, and in strict conformance with the Contract Drawings and as specified herein.

The approximate locations of proposed water lines and sanitary sewers are shown on the Drawings. Final locations of water lines shall be made by the Engineer at the time of construction. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.

All work shall be constructed in accordance with the lines and grades shown on the Drawings or as directed by the Engineer. The Owner will provide benchmarks which shall be the principal control points for lines and grades. The Contractor shall check such lines and grades by such means as he may deem necessary, and before using them call to the attention of the Engineer any inaccuracies or discrepancies.

The Contractor shall at his own expense perform all surveys and establish all working or construction lines and grades as required for the construction of the project, and shall be solely responsible for the accuracy thereof.

All materials and apparatus required for the work, except as specifically specified otherwise, shall be new, of first class quality, and shall be furnished, delivered, erected, and connected, and finished in every detail, and shall be so selected and arranged as to fit properly. Unless otherwise specifically indicated on the plans or specification, all equipment and materials shall be installed with the approval of the Engineer in accordance with the recommendations of the manufacturer, including the performance of such tests as the manufacturer recommends.

Substitution of materials shall be in accordance with the provisions of these specifications. Should a substitution be accepted and should the substitute material prove defective or otherwise unsatisfactory for the service intended and within the guaranty period, this material or equipment shall be replaced with the new material or equipment specified by name.

Submit for approval detailed shop drawings of all material required to complete the project. No material may be delivered to the job site or installed until receipt of the approved shop drawings. All shop drawings submitted for approval shall bear signed certification stating that these drawings have been carefully checked and found correct with respect to dimensions and available space and that the equipment complies with all requirements of the specifications. Approval rendered on shop drawings shall not be considered as a guarantee of measurements of construction conditions. Where drawings are approved, said approval does not mean that the drawings have been checked in detail; said approval does not in any way provide relief from the responsibility for or necessity of furnishing materials or performing work as required by the contract drawings and specifications.

In addition to the Standard Specifications, the following industry standards also form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ANSI B2.1	Pipe Threads (Except Dry Seal) Specifications, Dimensions, and Gaging for Taper and Straight Pipe Threads, Including Certain Special Applications
ASTM D1785	PolyVinylChloride (PVC) Plastic Pipe Schedule 40, 80, and 120
ASTM D2241	PolyVinylChloride (PVC) Plastic Pipe (SDR-PR)
ASTM D2287	Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
ASTM D2464	Threaded PolyVinylChloride (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2466	PolyVinylChloride (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D2564	Solvent Cement for Poly(Vinyl Chloride) Plastic Pipe and Fittings
ASTM D2774	Underground Installation of Thermoplastic Pressure Piping
ASTM D2855	Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
NSF No. 14	Plastic Piping System Components and Related Materials
PPI TN8/8	Making Threaded Joints with Thermoplastic Pipe and Fittings
UL 651	Schedule 40 and 80 Rigid PVC Conduit

Water piping shall meet the following requirements:

1. All PVC water piping shall be ASTM D1784, Cell Classification 12454-B (PVC 1120). PVC piping 4-inch diameter and smaller shall be integral bell, rubber gasketed pipe joints.
2. Water distribution pipe, 6-inch diameter, shall be AWWA C900 PVC pressure pipe PC 200. Other water pipe: ASTM D2241, PVC 1120 SDR 21, Class 200.
3. PVC Fittings: ASTM D2464.
4. Pipe Joints: ASTM D 3139 (Flexible Elastomeric Seals)

5. Fittings for PVC pipe greater than 4-inch diameter shall be ductile iron conforming to AWWA C153 dimensional standards for a minimum 125 psi service.
6. Gate valves shall conform to AWWA C-500, suitable for 150 psi service.
7. Gate Valves shall have wedge gate, iron body and brass trim, and shall be equipped with a 2-inch square operating nut and valve box.
8. Valve Boxes for water valves shall be two-piece slip adjustment type, cast iron, complete with cover and 24-inch concrete collar. Shaft shall have a minimum inside diameter of 5-1/4 inches, and shall have suitable bells or bases. The word "WATER" shall be cast on the cover.

Sanitary sewer piping requirement shall meet the following requirements:

1. PIPE: All PVC sewer pipe shall be specifically designed to carry domestic sewage by gravity flow and shall meet the requirements of ASTM D-3034 (latest revisions) with a maximum SDR equal 35 and a minimum F/ Y stiffness of 45 psi as tested in conformance with ASTM D-2412 (latest revision). The pipe shall be similar and equal to Certainteed.
2. JOINTS: all joints consist of an integral bell with a factory installed "locked in" gasket. The spigot end of each joint shall be factory beveled. Coupling consisting of a body of extruded stock, internally machined and furnished with the rubber gaskets is permitted for use with all PVC-house service pipe six inches (6") or less.
3. FITTINGS: All fittings shall be standard manufacturer fitting approved by the pipe manufacturer for use of his pipe. All fittings shall meet the requirements of the pipe. A sample of each type of fitting must be submitted for the Engineer's approval before purchase of fittings. All fittings shall be of the same greater strength as the pipe.
4. Precast Concrete Manholes: Precast concrete manhole ring section shall be equal in quality to reinforced concrete sewer pipe ASTM C-76. Joints shall be rubber gasketed. Joints shall be watertight. Reinforcing steel shall meet ASTM A-615 Grade 60. Concrete shall be 4200 PSI in 28 days; reinforcing shall meet AASHTO H-20 loading. Precast concrete units shall meet ASTM C-478 with xypex admix C-1000-T containing red dye. Two coats of xypex concentrate shall be applied to all grouted surfaces at 1.5 pounds per square yard.
5. Pipe-Manhole Connectors: A flexible pipe to manhole connector shall be employed in the connection of all sanitary sewer pipe to precast manholes, equal to Kor-N-Seal, as manufactured by NPC Systems, Inc.
6. Metal castings for manhole frames, covers, and all other iron castings shall be of tough gray iron, free from injurious defects and of such quality that a blow from a hammer on a square edge will produce an indentation of the castings without flaking the metal. When broke, the faces show a fine grained, gray fracture. Castings shall be of the designs and dimensions indicated on the plans. All frames and covers shall be made accurately to the dimensions required and shall be machined to secure perfectly flat and true surfaces; allowance shall fit the frames in any position. Where manhole rings and covers are to be subjected to vehicular traffic, they shall be of traffic grade and weigh not less than 300 pounds.

Excavations, preparations of trenches, installation of piping and backfill shall be in accordance with the applicable portions of these specifications.

The Contractor shall be responsible for damage to, and maintenance and protection of known existing structures and utilities. Hand trenching may be required in the vicinity of existing utilities and structures.

The size, location and depth of existing utilities shown on the Drawings were taken from maps and records of the Owner and are not warranted by the Engineer. Other utilities may exist on the project site and are not shown on the Drawings. The Contractor shall be responsible for potholing and verifying the type of material, size, location and depth of all existing utilities that are affected by the construction of this project prior to the placement of order(s) for materials.

All sewer pipe installation shall follow these requirements:

1. Pipes and fittings shall be so laid in the trench that after the sewer is completed, the invert of the pipe shall conform accurately to lines and grades shown on the plans. At any stage of construction of a straight stretch between any two consecutive manholes, the starting end of the pipe shall be clearly visible on looking through the pipe from the other end, with full cross section of the interior of the pipe in clear view.
2. All pipe and accessories shall be transported and handled in such a manner as to insure that they are delivered and installed in a sound and undamaged condition. Couplings and rubber gaskets shall be adequately stored to prevent damage and shall be kept clean of oil, grease or other deleterious substances and kept away from excessive heat.
3. Immediately before placing pipe in the trench, it shall be examined for any defects and cleaned and freed from any dirt or foreign material. Any defective pipe shall be promptly removed from the site.
4. All pipe shall be installed in accordance with the manufacturer's instructions. Sewer installation shall begin at the deepest point (at lift station and/or deepest point of the sewer main/wye) and progress to the shallower elevations.
5. When work is suspended either for the night or for any other reasons, all open ends shall be securely and adequately plugged to prevent the entrance of foreign materials or trench water. While pipe laying is in progress the contractor shall keep the trench free of water.
6. Wye and tee branches shall be placed in the sewer lines at points indicated on the drawings.
7. Riser pipe and service lines shall be laid at points and to grades by the Engineer. Riser pipes shall be enclosed in concrete as shown on the plans.
8. Service lines will be laid in accordance with the requirements for sewer pipe. The ends of all service lines and other points for future connections are to be capped with a suitable watertight stopper as manufactured for use with the type of pipe being used.
9. All pipe joints shall be made in accordance with the manufacturer's direction and all joint materials shall be furnished with the pipe by the pipe manufacturer. All joint surfaces shall be thoroughly cleaned before making up.
10. Whenever sewers must cross water mains, the sewers shall be laid at such an elevation that the top of the sewer is at least eighteen inches (18") below the bottom of the water main. When the elevation of the sewer cannot be buried to meet the requirements, the sewer line shall be constructed with mechanical joint cast iron pipe for a distance of ten feet (10') on each side of the water, not centering the joint at the waterline crossing.

11. All SDR 35 PVC pipe shall be installed in strict accordance with ASTM Designation D-2321 (latest revision) with particular concern for the following items:
 - a. Bedding and Backfill shall be Class III materials as per ASTM Designation D-2321 shall be required to a plane one foot (1') above the top of the pipe.
 - b. Bellholes shall be hand excavated at every joint. Each bell hole shall be backfilled with approved bedding material and hand tamped to meet Engineer's approval.
 - c. All services from PVC mains shall be SDR 35 PVC pipe, and adapted based on manufacturer's recommendations for joining pipe of different material. In-line fittings only shall be allowed. Tapping and saddling of PVC pipe is strictly disallowed.
 - d. Chemical Welding: All chemical welding, cementing, gluing or other non-gasketed connections for PVC pipe are strictly disallowed.
 - e. All drop manholes and stack-type services shall be completely concrete encased per plans and specifications. All pipe connected to a wall of a manhole shall employ a manhole water stop with a stainless steel clamp or approved alternate.

After pipelines have been tested and inspected, the trenches shall be backfilled with approved materials, tamped or otherwise thoroughly compacted in place in compliance with the applicable section of these Specifications and the Standard Specifications. Certain areas requiring special backfill shall be as specified on the plans. The special backfill shall be of non-plastic granular backfill conforming to unified soil class SW or SP with maximum aggregate size being 3/8 of an inch. The degree of compaction shall be as specified for the various pipe materials. Granular bedding for the sewer mains shall required as necessary and as approved and directed by the Engineer.

The Contractor shall be responsible for furnishing and installing all piping systems in accordance with sound industry practices and standards, and in accordance with these Specifications. The Contractor shall provide all labor, equipment and materials required, the various piping systems as shown or specified, adhering to the general routing and methods of distribution shown on the drawings, including all required pipe fittings, valves, and other such items and appurtenances as may be required for the satisfactory operation of the systems.

1. Valves shall be installed for the control and/or isolation of all branch mains and laterals.
2. All piping shall be installed in the most neat and workmanlike manner, employing only mechanics skilled in each respective trade.
3. Unless otherwise indicated, piping shall be laid to avoid high points in the system, and shall have a minimum cover over the top of the pipe of 30 inches.
4. All pipe shall be properly reamed after cutting and shall be cleaned before installation.
5. An approved detectable tracer tape shall be laid in the trench on top of the pipe as a tracer to facilitate locating the pipe in the future.
6. Connections between different types of pipes and accessories shall be made with transition fittings recommended by the manufacturer and approved by the Engineer.
7. All pipe, fittings and valves shall be installed in conformance with the recommendations of the manufacturer.

8. Joint thrust restraint as described on the Drawings shall be provided at all tees and bends.
9. Keep all ends of pipes closed with caps or plugs so as to prevent dirt, debris or construction materials from entering the pipes during the construction.

The Contractor shall test all piping systems as follows:

All water piping shall be tested for watertightness. Wherever pipes are placed so they will be ultimately concealed, these tests shall be conducted and the absolute watertightness of each piping system shall be demonstrated before that system is concealed and made inaccessible.

Tests for piping shall consist of subjecting the piping to a hydrostatic pressure of 120 pounds per square inch gauge for a period of not less than two hours with an allowable pressure drop of not more than two (2) psig. During this period, all leaks in pipe, fittings and accessories, in the particular piping system which is being tested, shall be stopped and the hydrostatic test shall be again applied. The procedure shall be repeated until for an entire two hour period, no leaks can be found.

Contractor shall furnish and install all hoses, plugs, valves, tanks, pumps, accurate gauges and necessary incidentals to perform pressure test.

The testing shall be performed under the observation of the Engineer.

Following the pressure and leakage tests, all water lines shall be flushed at a velocity of not less than 2.5 FPS and sterilized in accordance with AWWA Standard C601.

1. All new potable water lines, including pipe, valves, etc. shall be sterilized prior to being placed in use with a solution of HTH Liquid Chlorine, or other approved disinfectant containing no less than fifty (50) parts per million of available chlorine.
2. For this work, the Contractor shall furnish suitable plugs or caps for the pipe, injection pumps, pipe connections, and other equipment together with all labor required.
3. While the disinfectant is being applied to any section of the system, the water shall be allowed to escape at all extremities of this section until an orthotolidin test shows a deep orange color. The disinfectant shall be allowed to remain in the pipe for twenty-four (24) hours, after which the lines shall be thoroughly flushed. After the chlorine treated water has been retained for the required time, the chlorine residual at pipe extremities and at other representative points shall be at least 5 mg/l. If the residual is less than 5 mg/l, the disinfection procedure shall be repeated until a 5 mg/l residual is obtained, as required above. Each section of the system shall be sterilized and re-sterilized until bacteriological approval has been obtained from the appropriate health agency.

All sanitary sewers shall be tested after being installed no less than (4) four months by means of an approved four percent (4%) "go-no go" rigid mandrel test. In the event the mandrel cannot be handpulled through any line with ease, the pipe installation shall be corrected until passing. The contractor shall run the "go-no-go" rigid mandrel deflection test on all PVC sewer mains. The Contractor shall furnish an approved mandrel suitable to accurately measure the maximum deflection of the main. The deflection shall be four percent (4%) maximum immediately after backfill and five percent (5%) maximum at job acceptance. The proposed mandrel for measuring deflection shall be submitted to the Engineer for approval prior to starting construction. At any time prior to acceptance, the Engineer may require the Contractor to re-check any portion of the line that he feels may have had the additional deflection since initial backfill.

Any main which has deflection in excess of five percent (5%) shall be rejected and the Contractor shall remove the existing pipe and replace the main with new pipe with sufficient bedding and backfill to maintain the required deflection. All expenses involved in any testing and/or repairing lines shall be at the CONTRACTOR's sole expense.

At no point in the new portion of the gravity sewer shall the leakage of ground water into the system exceed the infiltration maximum of 100 gallons/inch/mile/day for heads to ten feet (10'). For example, a test for 8" SS main, 1,000 LF, shall be placed under a static head of 10', with maximum allowable exfiltration leakage calculated as follows:

$$8'' \times 100 \text{ gal./inch/mile/day} \times \underline{1000 \text{ LF}} = 151.5 \text{ gallons per day max. allow. leakage} \\ 5280 \text{ LF per mile}$$

After all lines are tied into a manhole and the manhole is complete, it shall be tested for leakage as follows: All lines in the manhole shall be plugged and the manhole filled with water. One hour will be allowed as a stabilization period and the manhole shall be filled back to the top. During the next hour, there shall be no noticeable drop in the water level. If, after testing several manholes, the Contractor has proven that he constructs a water-tight manhole, he will not be required to water test all manholes. However, if the Engineer feels that any manhole is not up to quality previously demonstrated, the Contractor will be required to test that manhole.

All sections of the sewer mains and all manholes shall be tested, and the cost of the testing shall be the responsibility of the Contractor. Repairs on defective work and additional tests shall be made by the Contractor at no additional cost to the Owner.

END OF SECTION

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

2.01 SUMMARY

- A. This section includes the following:
 - 1. Extent of concrete work is shown on drawings. Concrete paving and walks are specified in Division 2.

2.02 SUBMITTALS

- A. Product Data: Submit data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others as requested by Architect.
- B. Shop Drawings; Reinforcement: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures.
- C. Samples: Submit samples of materials as specified and as otherwise requested by Architect, including names, sources, and descriptions.
- D. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design test as specified.

2.03 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 - 1. ACI 301 "Specifications for Structural Concrete for Buildings".
 - 2. ACI 318 "Building Code Requirements for Reinforced Concrete".
 - 3. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice".
- B. Concrete Testing Service: Contractor to engage and pay a testing laboratory acceptable to Architect to perform material evaluation tests and to design concrete mixes.
- C. Materials and installed work may require testing and retesting, as directed by Architect, at anytime during progress of work. Allow free access to material stockpiles and facilities. Retesting of rejected materials for installed work shall be done at Contractor's expense.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with 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. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.
 - 1. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form", Class I.
- B. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Forms for Textured Finish Concrete: Form textured finish concrete surfaces with units of face design, size, arrangement, and configuration as shown on drawings or as required to match Architect's control sample. Provide solid backing and form supports to ensure stability of textured form liners.
- D. Forms for Cylindrical Columns and Supports: Form round-section members with metal, fiberglass reinforced plastic, or paper or fiber tubes. Construct paper or fiber tubes of laminated plies using water-resistant adhesive with wax-impregnated exterior for weather and moisture protection. Provide units with sufficient wall thickness to resist loads imposed by wet concrete without deformation.
- E. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
- F. Corrugated Fibreboard Forms (Void Forms): The void forms shall be double faced corrugated fibreboard constructed of wet strength paper, impregnated with wax and laminated with moisture resistant adhesive. The forms shall be certified to have a minimum strength of 500 pounds per square foot at 100% relative humidity and 40 Degrees Fahrenheit with 20% moisture. Forms wider than 12" shall have reinforced sleeves. Forms shall be covered with a 10 mil cover sheet. The joints shall be taped with three inch duct tape. Forms should be protected from moisture prior to installation. If water soaked after installation, they must be allowed to dry before pouring concrete. Reinforcing steel to be supported from forms should be carried on slab bolsters with runners to prevent puncture of forms and consequent displacement of steel.

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. Welded Deformed Steel Wire Fabric: ASTM A 497.
- E. Supports for Reinforcement: Provide supports for reinforcement including 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, unless otherwise acceptable.
 - 1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which 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, unless otherwise acceptable to Architect.
- B. Use one brand of cement throughout project, unless otherwise acceptable to Architect.
- C. Fly Ash nor Slag: Not permitted.
- D. Normal Weight Aggregates: ASTM C 33, and as herein specified. Provide aggregates from a single source 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 which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to Architect.
- E. Water: Drinkable.
- F. Air-Entraining Admixture: ASTM C 260 - Coordinate use with Ashford Formula.
 - 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. "Sika Aer"; Sika Corp.
 - b. "MB-VR or MB-AE"; Master Builders.
 - c. "Darex AEA"; W. R. Grace.
 - d. "Edoco 2001 or 2002"; Edoco Technical Products.
- G. Water-Reducing Admixture: ASTM C 494, Type A, and containing not more than 0.1 percent chloride ions.
 - 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. "Eucon WR-75"; Euclid Chemical Co.
 - b. "Pozzolith 344"; Master Builders.

- c. "Plastocrete 160"; Sika Chemical Corp.
 - d. "Chemtard"; Chem-Masters Corp.
- H. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G and containing not more than 0.1 percent chloride ions.
 - 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. "WRDA 19"; W. R. Grace.
 - b. "PSP"; Protex Industries Inc.
 - c. "Super P"; Anti-Hydro.
 - d. "Sikament"; Sika Chemical Corp.
 - e. "Mighty 150"; ICI Americas Corp.
 - f. "Eucon 37"; Euclid Chemical Co.
 - g. "PSI Super"; Gifford-Hill.
 - h. "Pozzolith 400"; Master Builders.
- I. Water-Reducing, Non-Chloride Accelerator Admixture: ASTM C 494, Type E, and containing not more than 0.1 percent chloride ions.
 - 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. "Accelquard 80"; Euclid Chemical Co.
 - b. "Pozzolith 500"; Master Builders.
- J. Water-Reducing, Retarding Admixture: ASTM C 494, Type D, and containing not more than 0.1 percent chloride ions.
 - 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. "Edoco 20006"; Edoco Technical Products.
 - b. "Pozzolith 300-R"; Master Builders.
 - c. "Eucon Retarder 75"; Euclid Chemical Co.
 - d. "Daratard"; W.R. Grace.
 - e. "Plastiment"; Sika Chemical Co.
- K. Calcium Chloride or admixtures containing more than 0.1% chloride ions are not permitted.

2.04 RELATED MATERIALS

- A. Waterstops: Provide flat, dumbbell type or centerbulb type waterstops at construction joints and other joints as indicated, unless noted otherwise. Size to suit joints.
- B. Rubber Waterstops: Corps of Engineers CRD-C 513.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - a. The Burke Co.
 - b. Progress Unlimited.
 - c. Williams Products.
 - d. Edoco Technical Products.
 - e. Cetco
- C. Polyvinyl Chloride Waterstops: Corps of Engineers CRD-C 572.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - a. AFCO Products.
 - b. The Burke Co.
 - c. Edoco Technical Products.
 - d. Greenstreet Plastic Products.
 - e. Harbour Town Products.
 - f. W. R. Meadows.
 - g. Progress Unlimited.
 - h. Schleigel Corp.
 - i. Vinylex Corp.
- D. Vapor Retarder (Under Slab): Shall conform to ASTM E 1745, Class C or better and shall have a maximum water vapor permeance of 0.04 perms when tested in accordance with ASTM E96. Vapor retarder component no less than 10 mils thick in accordance with ACI 302, 1R-96. Products: STEGO WRAP VAPOR BARRIER (10 mil) by Stego Industries, Griffolyn T-85 by Reef Industries, or Rufco D16WB by Raven Industries or approved equal.
- E. Non-Shrink Grout: CRD-C 621, factory pre-mixed grout.
 - 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. Metallic:
 - 1) "Vibrofoil"; A.C. Horn, Inc.
 - 2) "Metallic Spec. Grout"; The Burke Co.

- 3) "Embeco 636"; Master Builders.
- 4) "Ferrolith"; Sonneborn-Contech.
- 5) "Firmix"; Euclid Chemical Co.
- 6) "Kemox G"; Sika Chemical Co.
- 7) "Ferrogrout"; L & M Const. Chemical Co.

b. Non-metallic:

- 1) "Masterflow 713"; Master Builders.
- 2) "SonogROUT"; Sonneborn-Contech.
- 3) "Euco-NS"; Euclid Chemical Co.
- 4) "Crystex"; L & M Const. Chemical Co.
- 5) "Sure-Grip Grout"; Dayton Superior Corp.
- 6) "Horngrout"; A.C. Horn, Inc.

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

1. Waterproof paper.
2. Polyethylene film.
3. Polyethylene-coated burlap.

G. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound complying with ASTM C 309, Type I, Class A unless other type acceptable to Architect. 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 which may be incorporated in the work include, but are not limited to, the following.
 - a. "Kurez DR"; Euclid Chemical Co. - or other approved equal.

H. Bonding Compound: Polyvinyl acetate or acrylic base, rewettable type.

1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. "J-40 Bonding Agent"; Dayton Superior Corp.
 - b. "Weldcrete"; Larsen Products.
 - c. "Everbond"; L & M Construction Chemicals.
 - d. "EucoWeld"; Euclid Chemical Co.
 - e. "Hornweld"; A.C. Horn.
 - f. "Sonocrete"; Sonneborn-Contech.
 - g. "Acrylic Bondcrete"; The Burke Co.

- I. Epoxy Adhesive: ASTM C 881, two component material suitable for use on dry or damp surfaces. Provide material "Type", "Grade", and "Class" to suit project requirements.
 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. "Epoxitite"; A.C. Horn, Inc.
 - b. "Edoco 2118 Epoxy Adhesive"; Edoco Technical Prod.
 - c. "Sikadur Hi-Mod"; Sika Chemical Corp.
 - d. "Euco Epoxy 463 or 615"; Euclid Chemical Co.
 - e. "Patch and Bond Epoxy"; The Burke Co.
 - f. "Sure-Poxy"; Kaufman Products Inc.

2.05 PROPORTIONING AND DESIGN OF MIXES

- A. Prepare design mixes for each type and strength 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 unless otherwise acceptable to Architect.
- 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 mixes have been reviewed by Architect.
- C. Design mixes to provide normal weight concrete with the properties as indicated on the structural drawings.
- 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; at no additional cost to Owner and 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 CONCRETE MIXES

- A. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as herein specified.
- B. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.
 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.

2.07 ADMIXTURES

- A. Use water-reducing admixture or high range water-reducing admixture (super plasticizer) in concrete as required for placement and workability.
- B. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg. F (10 deg. C).
- C. Use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.
- D. 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".
 - 2. Reinforced foundation systems: Not less than 1" and not more than 4".
 - 3. Concrete containing HRWR admixture (super-plasticizer): Not more than 8" after addition of HRWR to site-verified 2"-3" slump concrete.
 - 4. Other concrete: Not more than 4".

PART 3 - EXECUTION

3.01 FORMS

- A. Design, erect, support, brace, and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position.
- B. Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.
- C. 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 selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.
- D. 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 top 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, to prevent swelling and for easy removal.

- E. 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 on forms at inconspicuous locations.
- F. 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.
- G. Form Ties: Factory-fabricated, adjustable-length, removable or snapoff metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.
 - 1. Unless otherwise indicated, provide ties so portion remaining within concrete after removal is 1" inside concrete and will not leave holes larger than 1" diameter in concrete surface.
- H. Provisions 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.
 - I. 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. Retightening forms and bracing after concrete placement is required to eliminate mortar leaks and maintain proper alignment.

3.02 PLACING REINFORCEMENT

- A. 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.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.
- D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.03 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 1-1/2" deep in construction joints in walls, slabs, and between walls and footings; accepted bulkheads designed for this purpose may be used for slabs.
- C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints, except as otherwise indicated.
- D. Waterstops: Provide waterstops in construction joints as indicated. Install waterstops to form continuous diaphragm in each joint. Make provisions to support and protect exposed waterstops during progress of work. Fabricate field joints in waterstops in accordance with manufacturer's printed instructions.
 - 1. Joint filler and sealant materials are specified in Division-7 sections of these specifications.
- E. Contraction (Control) Joints in Slabs-on-Ground: Construct contraction joints in slabs-on-ground as shown on structural drawings.

3.04 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. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

3.05 PREPARATION OF FORM SURFACES

- A. Clean re-used forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition.
- B. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.
- C. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions. 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.
- D. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.06 CONCRETE PLACEMENT

- A. Preplacement 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. Moisten wood forms immediately before placing concrete where form coatings are not used.

- B. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.
- C. General: Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete", and as herein specified.
- D. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which 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 as nearly as practicable to its final location to avoid segregation.
- E. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" 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.
- F. 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.
- G. 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" 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.
- H. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
- I. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
- J. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
- K. Maintain reinforcing in proper position during concrete placement operations.
- L. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.
- M. 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), and not more than 80 deg. F (27 deg. C) at point of placement.
- N. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
- O. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

- P. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
- Q. 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 is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
- R. 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.
- S. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
- T. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

3.07 FINISH OF FORMED SURFACES

- A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. 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 1/4" in height rubbed down or chipped off.
- B. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.
- C. Smooth Rubbed Finish: Provide smooth rubbed finish to scheduled concrete surfaces, which have received smooth form finish treatment, not later than one day after form removal.
- D. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.
- E. Grout Cleaned Finish: Provide grout cleaned finish to scheduled concrete surfaces which have received smooth form finish treatment.
- F. Combine one part portland cement to 1-1/2 parts fine sand by volume, and mix with water to consistency of thick paint. Proprietary additives may be used at Contractor's option. Blend standard portland cement and white portland cement, amounts determined by trial patches, so that final color of dry grout will match adjacent surfaces.
- G. Thoroughly wet concrete surfaces and 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.

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

3.08 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.
- B. After placing slabs, plane surface so that depressions between high spots do not exceed 1/2" under a 10' straightedge. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms, or rakes.
- C. Float Finish: Apply float finish to monolithic slab surface to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.
- D. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or 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 so that depressions between high spots do not exceed 5/16" under a 10' straightedge. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- E. Trowel Finish: Apply trowel 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.
- F. 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 and appearance. The finish slab shall meet F1 25 and Ff 25 requirements as defined by ACI 302. Grind smooth surface defects which would telegraph through applied floor covering system.
- G. 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.
- H. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.
- I. 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.

- J. Non-slip Aggregate Finish: Apply non-slip aggregate finish to concrete stair treads, platforms, ramps, sloped walks, and elsewhere as indicated.
- K. After completion of float finishing, and before starting trowel finish, uniformly spread 25 lbs. of dampened non-slip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as herein specified.
- L. After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose non-slip aggregate.

3.09 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. 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.
- C. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.
- D. 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.
- E. Provide moisture curing by following methods:
 - 1. Keep concrete surface continuously wet by covering with water.
 - 2. Continuous water-fog spray.
 - 3. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.
- F. Provide moisture-cover curing as follows:
 - 1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape of adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- G. Provide curing and sealing compound to interior slabs with resilient flooring, carpet over cushion, or left exposed; and to exterior slabs, walks and curbs, as follows:
 - 1. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). 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.

- H. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to Architect.
- I. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides 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.
- J. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.
- K. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.
- L. Sealer and Dustproofers: Apply a second coat of specified curing and sealing compound only to surfaces given a first coat.

3.10 REMOVAL OF FORMS

- A. 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, provided 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 design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
- C. Form 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.

3.11 RE-USE OF FORMS

- A. Clean and repair surfaces of forms to be re-used 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.
- B. 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.

3.12 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 of 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. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.
- D. Grout base plates and foundations as indicated, using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.

3.13 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.
- B. Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". 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 after bonding compound has dried.
- C. 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 slightly higher than surrounding surface.
- D. 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.
- E. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
- F. 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, in addition to smoothness using a template having required slope.

- G. Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.
- H. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.
- I. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.
- J. Repair defective areas, except random cracks and single holes not exceeding 1" 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 3/4" 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.
- K. Repair isolated random cracks and single holes not over 1" 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 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after 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.
- L. Perform structural repairs with prior approval of Architect or Structural Engineer for method and procedure, using specified epoxy adhesive and mortar.
- M. Repair methods not specified above may be used, subject to acceptance of Architect.

3.14 FIELD QUALITY CONTROL

- A. The Owner shall employ and pay a testing laboratory to perform tests and to submit test reports. Contractor shall pay for retesting of all failed tests.
- B. Sampling and testing for quality control during placement of concrete may include the following, as directed by Architect.
- C. 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, volumetric 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, and when 80 deg. F (27 deg. C) and above; and each time a set of compression test specimens made.
 4. Compression Test Specimen: ASTM C 31; one set of 4 standard cylinders 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. over and above 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.
 6. When frequency of testing will provide less 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.
 7. When total quantity of a given class of concrete is less than 50 cu. yds., strength test may be waived by Architect if, in his judgement, adequate evidence of satisfactory strength is provided.
 8. 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.
 9. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.
- D. Test results will be reported in writing to Architect, Structural Engineer and Contractor within 24 hours that tests are made. 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 tests and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- F. 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 for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

END OF SECTION

SECTION 04810 - UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes unit masonry assemblies consisting of the following:
 - 1. Concrete masonry units
 - 2. Glazed concrete masonry units
 - 3. Face Brick, including solids
 - 4. Decorative integral colored masonry units
 - 5. Mortar and grout.
 - 6. Reinforcing steel.
 - 7. Masonry joint reinforcement.
 - 8. Ties and anchors.
 - 9. Embedded flashing.
 - 10. Miscellaneous masonry accessories.
- B. Related Sections include the following:
 - 1. Division 7 Section "Bituminous Dampproofing" for dampproofing applied to cavity face of cavity walls.
 - 2. Division 7 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
- C. Products furnished, but not installed, under this Section include the following:
 - 1. Anchor sections of adjustable masonry anchors for connecting to structural frame, installed under Division 5 Section "Structural Steel."
 - 2. Manufactured reglets in masonry joints for metal flashing, furnished under Division 7 Section "Sheet Metal Flashing and Trim."
 - 3. Hollow-metal frames in unit masonry openings, furnished under Division 8 Section "Steel Doors and Frames."

1.3 DEFINITIONS

- A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 SUBMITTALS

- A. Product Data: For each different masonry unit, accessory, and other manufactured product specified.
- B. Shop Drawings: Show fabrication and installation details for the following:
 - 1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
 - 2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Initial Selection: For the following:
 - 1. Unit masonry Samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required.
 - 2. Colored mortar Samples showing the full range of colors available.
- D. Samples for Verification: For the following:
 - 1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
 - 2. Colored mortar Samples for each color required, showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used.
 - 3. Weep holes/vents in color to match mortar color.
 - 4. Accessories embedded in the masonry.
- E. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
 - 1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

- G. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
1. Each type of masonry unit required.
 - a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
 - b. Include test results, measurements, and calculations establishing net-area compressive strength of masonry units.
 2. Mortar complying with property requirements of ASTM C 270.
 3. Grout mixes complying with compressive strength requirements of ASTM C 476. Include description of type and proportions of grout ingredients.
- H. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
1. Each type of masonry unit required.
 - a. Include size-variation data for masonry units, verifying that actual range of sizes falls within specified tolerances.
 - b. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.
 2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
 3. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
 4. Each material and grade indicated for reinforcing bars.
 5. Each type and size of joint reinforcement.
 6. Each type and size of anchor, tie, and metal accessory.
- I. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated, as documented according to ASTM E 548.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- D. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.
- E. Mockups: Before installing unit masonry, build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Locate mockups in the locations indicated or, if not indicated, as directed by Architect.
 - 2. Build mockups for the following types of masonry in sizes approximately 48 inches long by 48 inches high by full thickness, including face and backup wythes and accessories. Include a sealant-filled joint at least 16 inches long in each mockup.
 - a. Each type of exposed unit masonry construction.
 - b. Typical exterior wall with through-wall flashing installed for a 24-inch length in corner of mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
 - c. Typical interior unit masonry wall.
 - d. Typical interior unit masonry wall with glazed concrete masonry unit cove base on one side.
 - 3. Clean exposed faces of mockups with masonry cleaner as indicated.
 - 4. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 5. Protect accepted mockups from the elements with weather-resistant membrane.
 - 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 7. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
 - a. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless Architect specifically approves such deviations in writing.
 - 8. Demolish and remove mockups when directed.

- F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
- C. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
 - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

- D. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. General: Provide shapes indicated and as follows:
1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
 2. Provide bullnose units for outside corners, typical throughout.
 3. Show details on Shop Drawings of special conditions and special shapes required.
- B. Concrete Masonry Units:
1. Weight Classification: Lightweight, load-bearing and non-load bearing.
 2. Provide Type II, non-moisture-controlled units.
 3. Size (width): Manufactured to the following dimensions:
 - a. 2 inches nominal; 1-5/8 inches actual
 - b. 4 inches nominal; 3-5/8 inches actual
 - c. 6 inches nominal; 5-5/8 inches actual
 - d. 8 inches nominal; 7-5/8 inches actual
 4. Exposed Faces: Manufacturer's standard colors and texture, unless otherwise indicated.
- C. Glazed Concrete Masonry Units: ASTM C 90
1. Weight Classification: Lightweight, load-bearing and non-load bearing.
 2. Provide Type II, non-moisture-controlled units.
 3. Glazed surface shall be externally heat polymerized cast on facing conforming to ASTM C 744.
 4. Colors selected from manufacturer's standard range or colors.
 5. Glazed units are special order and may require manufacturing lead time.

1. Hot-dip galvanized, carbon-steel wire for exterior walls.
 2. Wire Size for Side Rods: W2.8 or 0.188-inch diameter.
 3. Wire Size for Cross Rods: W2.8 or 0.188-inch diameter.
 4. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units where indicated.
- B. For single-wythe masonry, provide either ladder or truss type with single pair of side rods and cross rods spaced not more than 16 inches o.c.
- C. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to metal studs.

2.6 TIES AND ANCHORS, GENERAL

- A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.
- B. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
- C. Galvanized Steel Sheet: ASTM A 653/A 653M, G60, commercial-quality, steel sheet zinc coated by hot-dip process on continuous lines before fabrication.

2.7 ADJUSTABLE ANCHORS FOR CONNECTING TO STEEL FRAME

- A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Anchor Section: Crimped 1/4-inch- diameter, hot-dip galvanized steel wire anchor section for welding to steel. Mill galvanized wire may be used at interior walls where humidity does not exceed 75 percent.
 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.1875-inch- diameter, hot-dip galvanized steel wire. Mill galvanized wire may be used at interior walls where humidity does not exceed 75 percent.

2.8 MISCELLANEOUS ANCHORS

- A. Anchor Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter and length indicated and in the following configurations:
1. Headed bolts.
 2. Nonheaded bolts, bent in manner indicated.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene or PVC.
- B. Preformed Control-Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
 - 1. Styrene-Butadiene-Rubber Compound: ASTM D 2000, Designation M2AA-805.
 - 2. PVC: ASTM D 2287, Type PVC-65406.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication.
 - 1. Provide units with either two loops or four loops as needed for number of bars indicated.
- E. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Reinforcing Bar Positioners:
 - a. D/A 811; Dur-O-Wal, Inc.
 - b. D/A 816; Dur-O-Wal, Inc.
 - c. No. 376 Rebar Positioner; Heckman Building Products, Inc.

2.10 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of 1/2-cup dry measure tetrasodium polyphosphate and 1/2-cup dry measure laundry detergent dissolved in 1 gal. of water.

2.11 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Add cold-weather admixture (if used) at the same rate for all mortar, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification.
 - 1. Extended-Life Mortar for Unit Masonry: Mortar complying with ASTM C 1142 may be used instead of mortar specified above, at Contractor's option.
 - 2. Limit cementitious materials in mortar for exterior and reinforced masonry to portland cement, mortar cement, and lime.
 - 3. For reinforced masonry and where indicated, use Type S.
 - 4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.

2.12 SOURCE QUALITY CONTROL

- A. Owner will engage a qualified independent testing agency to perform source quality-control testing indicated below:
 - 1. Owner will make payment for these services.
 - 2. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.
- B. Brick Tests: For each type and grade of brick indicated, units will be tested according to ASTM C 67.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.
- D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets or cubes as they are placed.
- F. Wetting of Brick: Wet brick before laying if the initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at the time of laying.

3.3 CONSTRUCTION TOLERANCES

- A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:
- B. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.
- C. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, nor 1/2 inch maximum.
- D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.
- E. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
- F. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
 - 1. Running bond for brick.
 - 2. Or, as indicated on Drawings.
- C. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tool. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
 - 1. At cavity walls, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.
- C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.6 ANCHORING MASONRY TO STRUCTURAL MEMBERS

- A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
 - 1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
 - 2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.7 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated. Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form control joints in concrete masonry as follows:
 - 1. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake joint.
- C. Form expansion joints in brick made from clay or shale as follows:
 - 1. Build in joint fillers where indicated.
 - 2. Form open joint of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 7 Section "Joint Sealants." Keep joint free and clear of mortar.
- D. Build in horizontal, pressure-relieving joints where indicated; construct joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 7 Section "Joint Sealants."

3.8 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.
 - 1. Construct formwork to conform to shape, line, and dimensions shown. Make it sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements of ACI 530.1/ASCE 6/TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
 - 1. Comply with requirements of ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.9 FIELD QUALITY CONTROL

- A. Owner will engage a qualified independent testing agency to perform field quality-control testing indicated below.
 - 1. Owner will make payment for these services.
 - 2. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.

- B. Testing Frequency: Tests and Evaluations listed in this Article will be performed during construction for each 5000 sq. ft. of wall area or portion thereof.
- C. Mortar properties will be tested per ASTM C 780.
- D. Grout will be sampled and tested for compressive strength per ASTM C 1019.
- E. Brick Tests: For each type and grade of brick indicated, units will be tested according to ASTM C 67.
- F. Prism-Test Method: For each type of wall construction indicated, masonry prisms will be tested per ASTM C 1314, and as follows:
 - 1. Prepare 1 set of prisms for testing at 7 days and 1 set for testing at 28 days.

3.10 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
 - 5. Clean brick by the bucket-and-brush hand-cleaning method described in BIA Technical Notes No. 20, using job-mixed detergent solution.
 - 6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.
8. Clean limestone units to comply with recommendations in the Indiana Limestone Institute of America's "Indiana Limestone Handbook."

3.11 MASONRY WASTE DISPOSAL

- A. Recycling: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION

SECTION 05120 - STRUCTURAL STEEL

PART 1 GENERAL

2.01 SUMMARY

- A. This section includes the following:
1. Extent of structural steel work is shown on drawings, including schedules, notes and details to show size and location of members, typical connections, and type of steel required.
 2. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.
 3. Miscellaneous Metal Fabrications are specified elsewhere in Division 5.
 4. Refer to Division 3 for anchor bolt installation in concrete.
 5. Source Quality Control: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
 - a. Promptly remove and replace materials or fabricated components which do not comply.
 6. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.
 - a. Promptly notify Architect, prior to bid, whenever design of members and connections for any portion of structure are not clearly indicated.

2.02 SUBMITTALS

- A. Product Data: Submit producer's or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
 2. High-strength bolts (each type), including nuts and washers.
 3. Structural steel primer paint.
 4. Shrinkage-resistant grout.
- B. Shop Drawings: Submit shop drawings prepared under the supervision of a registered professional engineer, including complete details and schedules for fabrication and assembly of structural steel members, procedures and diagrams.

- C. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS A2.1 and A2.4 symbols, and show size, length, and type of each weld.
 - 1. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of others sections.
- D. Test Reports: Submit copies of reports of tests conducted on shop and field bolted and welded connections. Include data on type(s) of tests conducted and test results.

2.03 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:
 - 1. AISC "Code of Standard Practice for Steel Buildings and Bridges".
 - 2. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings", including the "Commentary" and Supplements thereto as issued.
 - 3. AISC "Specifications for Architecturally Exposed Structural Steel".
 - 4. AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.
 - 5. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel".
 - 6. "ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".
- B. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".
- C. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.
 - 1. If recertification of welders is required, retesting will be Contractor's responsibility.

2.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to site in such intervals to insure uninterrupted progress of work.
- B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.
- D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Metal Surfaces, General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.
- B. Structural Steel Shapes, Plates and Bars: ASTM A 572 - Grade 50 or ASTM A 992.
- C. Cold-Formed Steel Tubing: ASTM A 500, Grade B.
- D. Hot-Formed Steel Tubing: ASTM A 501.
- E. Steel Pipe: ASTM A 53, Type E or S, Grade B; or ASTM A 501.
 - 1. Finish: Black, except where indicated to be galvanized.
- F. Steel Castings: ASTM A 27, Grade 65-35, medium-strength carbon steel.
- G. Anchor Bolts: ASTM A 307, nonheaded type unless otherwise indicated.
- H. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low-carbon steel bolts and nuts.
 - 1. Provide hexagonal heads and nuts for all connections.
- I. Electrodes for Welding: Comply with AWS Code - use E70XX unless noted otherwise - minimum 1/4" fillet welds.
- J. Structural Steel Primer Paint: Fabricators standard rust inhibiting primer. Primer shall be compatible with any specified sprayed-on fireproofing. (See Architect)
- K. Metallic Shrinkage-Resistant Grout: Pre-mixed factory-packaged ferrous aggregate grouting compound.
 - 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. Firmix; Euclid Chemical Co.
 - b. Embeco 153; Master Builders.
 - c. Ferrolith G; Sonneborn/Contech.
 - d. Irontox; Toch Brothers.
 - e. Kemox C; Sika Chemical.
 - f. Vibra-Foil; W. R. Grace.

- L. Non-metallic Shrinkage-Resistant Grout: Pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CE-CRD-C621.
 - 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. Euco N.S.; Euclid Chemical Co.
 - b. Crystex; L&M Construction Chemicals.
 - c. Masterflow 713; Master Builders.
 - d. Five Star Grout; U.S. Grout Corp.
 - e. Upcon; Upco Chem. Div., USM Corp.
 - f. Propak; Protex Industries, Inc.
 - g. Set Non-Shrink; Set Products, Inc.
- M. Connection Bolts: 3/4" diameter A325-N bolts with twist-off tension indicators.

2.02

FABRICATION

- A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.
- B. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
- C. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- D. Connections: Weld or bolt shop connections, as indicated.
- E. Bolt field connections, except where welded connections or other connections are indicated.
 - 1. Provide high-strength threaded fasteners for principal bolted connections - 3/4" diameter A325-N bolts with twist-off tension indicators.
- F. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
- G. Assemble and weld built-up sections by methods which will produce true alignment of axis without warp.
- H. Holes for Other Work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings.

- I. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.
- J. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.03 SHOP PAINTING

- A. General: Shop paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel which is partially exposed on exposed portions and initial 2" of embedded areas only.
 - 1. Do not paint surfaces which are to be welded or high-strength bolted with friction-type connections.
 - 2. Apply 2 coats of paint to surfaces which are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- B. Surface Preparation: After inspection and before shipping, clean steelwork to be painted. Remove loose rust, loose mill scale, and spatter, slag or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:
 - 1. SP-1 "Solvent Cleaning".
 - 2. SP-2 "Hand Tool Cleaning".
 - 3. SP-3 "Power Tool Cleaning".
 - 4. SP-5 "White Metal Blast Cleaning".
- C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide a uniform dry film thickness of not less than 1.5 mils. Use painting methods which result in full coverage of joints, corners, edges and exposed surfaces.
- D. Painting: Provide a one-coat shop applied paint system complying with Steel Structures Painting Council (SSPC) - Paint System Guide 7.00.

PART 3 - EXECUTION

3.01 ERECTION

- A. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.
- B. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.

- C. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
- D. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
- E. Pack grout solidly between bearing surfaces and bases of plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
 - 1. For proprietary grout materials, comply with manufacturer's instructions.
- F. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
- G. Level and plumb individual members of structure within specified AISC tolerances.
- H. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
- I. Splice members only where indicated and accepted on shop drawings.
- J. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.
- K. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
- L. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
- M. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.
- N. Touch-Up Painting: Immediately after erection erector shall clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
- O. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.

3.02 FIELD QUALITY CONTROL

- A. Engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports. Testing shall be paid for by Owner. Inspector to visually inspect bolted and welded connections and check to see that all connection bolts are installed and tension indicators have been twisted off.
- B. Testing agency shall conduct and interpret tests and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
- C. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.
- D. Testing agency may inspect structural steel at plant before shipment; however, Architect reserves right, at any time before final acceptance, to reject material not complying with specified requirements.
- E. Correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any non-compliance of original work, and as may be necessary to show compliance of corrected work.
- F. Shop Bolted Connections: Inspect in accordance with AISC specifications.
- G. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:
 - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2. Perform visual inspection of all welds.
 - 3. Perform tests of welds as follows. Inspection procedures listed are to be used at Contractor's option.
 - 4. Liquid Penetrant Inspection: ASTM E 165.
 - 5. Magnetic Particle Inspection: ASTM E 109; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
 - 6. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T".
 - 7. Ultrasonic Inspection: ASTM E 164.
- H. Field Bolted Connections: Inspect in accordance with AISC specifications.
- I. Field Welding: Inspect and test during erection of structural steel as follows:
 - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

2. Perform visual inspection of all welds.
3. Perform tests of welds as follows as required:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 109; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
 - c. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T".
 - d. Ultrasonic Inspection: ASTM E 164.

END OF SECTION

SECTION 05300 - METAL DECKING

PART 1 GENERAL

2.01 SUMMARY

- A. This section includes the following:
 - 1. Extent of metal decking is indicated on the drawings, including basic layout and type of deck units required.

2.02 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications and installation instructions for each type of decking and accessories. Include manufacturer's certification as may be required to show compliance with these specifications.
- B. Shop Drawings: Submit detailed drawings showing layout and types of deck panels, anchorage details, and conditions requiring supplementary framing, sump pans, cant strips, cut openings special jointing, and other accessories. Deck supplier shall provide girder fillers, column closures, pour stops and supplementary framing as required to produce a complete deck installation.
- C. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance.

2.03 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated:
 - 1. AISI "Specification for the Design of Cold-Formed Steel Structural Members."
 - 2. SDI "Design Manual for Floor Decks and Roof Decks."

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include but are not limited to the following:
 - 1. Metal Floor Deck Units:
 - 2. Consolidated Systems, Inc.
 - 3. Mac-Fab Products, Inc.
 - 4. Roll Form Products, Inc.
 - 5. United Steel Deck, Inc.

6. Vulcraft Div., Nucor Corp.
7. Wheeling Corrugating Co.

2.02 MATERIALS

- A. Steel for Galvanized Metal Deck Units: ASTM A 446, Grade A.
- B. Miscellaneous Steel Shapes: ASTM A 36.
- C. Sheet Metal Accessories: ASTM A 526, commercial quality, galvanized.
- D. Galvanizing: ASTM A 525, G60.
- E. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Military Specifications MIL-P-21035 (Ships).

2.03 FABRICATION

- A. General: Form deck units in lengths to span three or more supports, with flush, laps at ends and interlocking side laps, unless otherwise indicated.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install deck units and accessories in accordance with manufacturer's recommendations and final shop drawings, and as specified herein.
- B. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.
- C. Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at ends of abutting units.
- D. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.
- E. Do not place deck units on concrete supporting structure until concrete has cured and is dry.
- F. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
- G. Do not use deck units for storage or working platforms until permanently secured.
- H. Fastening Deck Units: Fasten deck units to steel supporting members in accordance with manufacturer's specifications and as specified on Structural Drawings.
- I. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.

- J. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces, etc., as required for strength, continuity of decking and support of other work shown.
- K. Touch-Up Painting: After decking installation, wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.
 - 1. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.
- L. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

END OF SECTION

SECTION 05410 - PRE-FABRICATED LIGHT-GAUGE STEEL TRUSSES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes pre-engineered, prefabricated light gauge cold formed steel framing elements. Work includes:
 - 1. Light Gauge cold formed steel roof trusses.
 - 2. Anchorage, bracing and bridging.
 - 3. Related work.

1.02 REFERENCES

- A. Reference Standards: ADTM A653/A653M-94 "Sheet steel zinc-iron alloy-coated by the hot dip process" American Welding Society (AWS).
 - 1. AWS D1.1 "Structural Welding Code - Steel."
 - 2. AWS D1.3 "Structural Welding Code - Sheet Steel."

1.03 SYSTEM DESCRIPTION

- A. AISI "Specifications": Calculate structural characteristics of cold-formed steel truss members according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members, 1990."
- B. Structural Performance: Design, engineer, fabricate, and erect cold-formed steel trusses to withstand actual loads within limits and under conditions required.
 - 1. Deflections: Live load deflection limited to $L/500$.
 - 2. Total Load Deflection: limited to $L/420$.
 - 3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 120 deg. F.
 - 4. Design components for all live and dead and collateral loads and in addition for wind loads for 90 mph wind in accordance with IBC – 2006. See structural drawings for loads.

1.04 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of cold-formed steel framing and accessory required. Submit shop drawings showing member, type, location, spacing, size and gage of member method of attachment to support members and all necessary erection details, indicate supplemental bracing, strapping, splices, bridging, accessories, and details required for proper installation.
- B. Submit truss drawings, sealed and signed by a qualified registered Louisiana Registered Professional Engineer, verifying truss ability to meet local code and design requirements for Mound, Louisiana.
- C. Description of design criteria:
 - 1. Engineering analysis depicting member stresses and truss deflection.
 - 2. Truss members sizes and gauges and connections at truss joints.
 - 3. Truss support reactions.
 - 4. Top chord, bottom chord and wed bracing requirements.

1.05 ENGINEERING DRAWINGS

- A. All truss designs shall bear the name and seal of a Licensed Professional Engineer registered as a Civil Engineer in the State of Louisiana.
- B. Truss designs shall include the following information: Pitch, span, dimension, and spacing of truss. Truss bearing sizes and locations. Design loading of truss. Screw type and required quantity at each joint. Size and gauge of steel required in all truss members. Permanent lateral bracing as required by design to reduce buckling length of individual truss members and for stability of overall truss roof system. Handling and erection recommendations. A certified bracing plan shall be submitted for approval as part of the shop drawings. Bottom chords may or may not be braced by ceilings. See architectural drawings and provide bracing as required.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Fabrication shall be performed by a cold-formed steel truss fabricator with experience designing and fabricating cold-formed steel systems equal in material, design, and extent to the systems required for this project.
- B. Cold formed steel truss system installation shall be performed by the steel truss system fabricator.
- C. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code-Steel" and AWS D1.3 "Structural welding Code-Sheet Steel."
- D. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."

1.07 DELIVERY STORAGE AND HANDLING

- A. Deliver materials in manufacturer's unopened containers or bundles, fully identified by name brand, type and grade. Exercise care to avoid damage during unloading, storing and erection.
- B. Store trusses on blocking, pallets, platforms or other supports off the ground and in an upright position sufficiently braced to avoid damage from excessive bending.
- C. Protect trusses and accessories from corrosion, deformation, damage and deterioration when stored at job site. Keep trusses free of dirt and other foreign matter.

1.08 PROJECT/SITE CONDITIONS

- A. During construction, adequately distribute all loads applied to trusses so as not to exceed the carrying capacity of any one truss or other component.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. All trusses referred to in this specification shall be; Apline Truss Steel, Grand Prairie, TX, 1-800-755-6005; Steel Source, Inc., Tyler, Texas, 1-903-581-8107, Versa Truss System, Aegis Ultra-Span, or approved equal truss system.

2.02 MATERIALS

- A. Reference Section: The design and fabrication of all steel trusses shall meet with the specifications set by the American Iron and Steel Institute (AISI) as well as any applicable codes set forth by the local governing building authority, and the IBC 2006.
- B. Steel: All steel used for truss members shall be structural sections, meeting ASTM A446 Specifications. Steel is to have a minimum yield strength of 45 KSI, unless otherwise noted, and a minimum G60 galvanization.
- C. Screws: All screws used in the manufacture of steel trusses shall be exterior rated zinc coated Self-Drilling screws. Minimum shear capacity (including a safety factor of 3) shall be as follows:

Screw Size	Steel Gauge	Shear Capacity
#10-16	22 ga	203 Ibs
	20 ga	268 Ibs.
	18 ga	403 Ibs.
	16 ga	423 Ibs.
#12-14	14 ga	713 Ibs.
	12 ga	635 Ibs.

- D. When members of different gauges are joined, the smallest gauge should be used to determine the screw value at that point.
- E. All component gauges: Fabricate components of structural quality steel sheet per ASTM A653 with a minimum yield strength for top cord sections of 55 KSI with web material of 45 KSI steel in 20 gauge minimum thickness.
- F. Bracing, Bridging, and Blocking Members: Fabricate components of commercial quality steel sheet per ASTM A653 with a minimum yield strength of 33,000 psi.

- G. Steel truss components: Provide sizes, shapes, and gauges indicated and as required by design.
- H. Design Uncoated-Steel Thickness: 20 ga. (Minimum)
- I. Finish: Provide components with protective zinc coating complying with ASTM A653, minimum G60.
- J. Fastenings: manufacturer recommended self-drilling, self-tapping screws with exterior rated zinc plated finish. Fasteners shall be of sufficient size and number to ensure the strength of the connection.
- K. Welding: Comply with AWS D1.1 when applicable and AWS D1.3 for welding base metals less than 1/8" thick.
- L. Other fasteners as accepted by truss engineer.

2.03 FABRICATION

- A. Factory fabricate cold-formed steel trusses plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.
- B. Fabricate truss assemblies in jig templates.
- C. Cut truss members by sawing or shearing or plasma cutting. Truss members shall be properly placed in special jigs, holding the members uniformly in place, until the joints have been completely connected with the required number of screw fasteners.
- D. Fasten cold-formed steel truss members by welding or screw fastening, or other methods as standard with fabricator. Wire tying of framing members is not permitted.
- E. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- F. Locate mechanical fasteners and install according to cold-formed steel truss component manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
- G. Care shall be taken during handling, delivery and erection. Brace, block, or reinforce truss as necessary to minimize member and connection stresses.
- H. Fabricate units to maximize variance tolerance from level, true and plumb of 1/8" in ten feet.
- I. Truss construction on job-site is strictly forbidden. They shall be manufactured by experienced workmen, using precision truss fabricating equipment, under the direct supervision of a qualified foreman. All trusses shall be fabricated under strict rules of inspection and quality control as the local codes may require.

PART 3 - EXECUTION

3.01 HANDLING, ERECTION, AND BRACING

- A. Engineering framing anchors and/or truss hangers shall be provided by the contractor in accordance with design requirements.

- B. Field erection of the trusses, including items such as proper handling, safety precautions, temporary erection bracing to prevent toppling or dominoing of the trusses during erection, and any other safeguards or procedures consistent with good workmanship and good building erection practices, shall be the responsibility of the General Contractor and/or the Erection Contractor.
- C. During the entire construction period, all contractors shall provide means for adequate distribution of concentrated loads so that carrying capacity of any one truss and/or other components is not exceeded.
- D. Proper erection bracing shall be installed to hold the truss true and plumb and in safe condition until permanent truss bracing and bridging can be solidly fastened in place to form a structurally sound framing system. All erection and permanent bracing shall be installed and all components permanently fastened before the application of any loads.
- E. The permanent structural cross-bracing to ensure the overall rigidity of the roof system, shall be the responsibility of the Truss Supplier and Contractor. Provide a certified bracing plan for approval as part of the shop drawing submittal.

3.02 INSTALLATION

- A. Install metal framing systems in accordance with manufacturer's printed or written instruction and recommendations.
- B. Installation of truss: Secure to structures, weld symmetrically on both sides of truss, or provide symmetrical connection hardware as required.
- C. Set trusses plumb where truss system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure.
- D. Install supplementary framing, blocking, and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with manufacturer's recommendations and industry standards in each case, considering weight or loading resulting from item supported.
- E. It is the responsibility of the General Contractor and Sub-Contractor to insure that fabricated trusses shall be handled, stored, and installed in such a manner that they are not subjected to damage. If it is necessary to store trusses prior to installation, the trusses must be stored in a vertical position with adequate bearing points and bracing to prevent tripping or racking. Proper handling, safety precautions, and other procedures consistent with good installation practices must be observed by all sub-contractors and their employees. Installation bracing shall hold trusses straight and plumb and in safe condition until decking and permanent truss bracing has been fastened forming a structurally sound framing system. All sub-contractors shall employ proper construction procedures to insure adequate distribution of temporary construction loads so that the carrying capacity of any single truss, or group of trusses, is not exceeded. All temporary and permanent bracing shall be installed and all trusses permanently fastened before application of any loads. Permanent structural bracing shall be installed prior to subjecting the structure to additional loads.
- F. Chord and web members SHALL NOT be removed, cut, punched, or altered without the prior approval of the truss design engineer. Damaged chords, webs, or complete trusses shall be repaired or replaced as directed and approved by a registered Professional Engineer. The repair or replacement detail(s) shall be approved by a registered Professional Engineer prior to installation or application of the repair or replacement.

- G. Weld 12 gauge minimum connectors to attach trusses to structure. Provide structural brackets on both sides of each bearing point. Prime all field welds with zinc chromate liquid galvanizing coating.
- H. Trusses shall be designed for all mechanical pipe loads and other suspended equipment loads as required.

At completion of truss erection, a representative from the truss company shall inspect the trusses and issue a certified report to the Engineer that the truss system has been properly installed.

END OF SECTION

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions, Division 1 Specification Sections, Addenda, Supplemental Instructions, and Change Orders, apply to work of this section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Wood blocking, cants, nailers at roofs.
 - 2. Other wood blocking, furring and nailers.
 - 3. Roof sheathing.

1.03 DEFINITIONS

- A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise indicated.

1.04 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee Board of Review.
- C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
 - 1. Preservative-treated wood.
 - 2. Fire-retardant-treated wood.

1.05 QUALITY ASSURANCE

- A. Source Limitations for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product through one source from a single producer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

- A. Lumber: Southern Yellow Pine, Kiln Dried, and pressure treated SYP.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 3. Provide dressed lumber, S4S, unless otherwise indicated.
 - 4. Sub Fascia board – grade C and better – KD.
 - 5. Miscellaneous blocking – Grade No. 2 or better.
- B. Miscellaneous blocking against masonry – SYP #1 pressure treated – only type C (CCA-C) is approved for use. Do not use (ACQ, CA, or SBX)
 - 1. Fasteners must be hot dipped galvanized or stainless steel
 - 2. Provide dressed lumber, S4S, unless otherwise indicated.
 - 3. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2 inch nominal thickness or less, unless otherwise indicated.

2.02 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWWA C2 (lumber) and] \AWPA C9 (plywood).
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction.
- B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing members less than 18 inches above grade.
4. Wood floor plates that are installed over concrete slabs directly in contact with earth.

2.03 WOOD FRAMING MEMBERS

A. No. 2 Kiln dried, Southern Yellow Pine.

2.04 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Cants.
3. Nailers.
4. Furring.
5. Grounds.

B. For items of dimension lumber size, provide No.2 grade lumber with 19 percent maximum moisture content.

2.05 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch thick.

2.06 ROOF SHEATHING

A. Plywood Roof Sheathing: Exposure 1 sheathing, 1/2" CDX.

1. Thickness: Not less than 1/2" nominal.

2.07 FASTENERS

B. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153 or of Type 304 stainless steel.

2. Where rough carpentry is exposed to or, in contact with pressure-preservative treated wood, provide fasteners of Type 304 stainless steel only.
- C. Nails, Brads, and Staples: ASTM F 1667.
 - D. Power driven fasteners: CABO NER-272
 - E. Screws for attaching Roof Sheathing
 1. Wafer head streater no. 8 x 2 zinc or galvanized plated (www.grabberman.com)
 - F. Screws for fastening to cold formed metal framing: ASTM C954, except with wafer heads and reamer wings, lengths as recommended by screw manufacturer for material being fastened.

2.08 MISCELLANEOUS MATERIALS

- G. Building Paper: Asphalt-saturated organic felt complying with ASTM D 226, Type I (No. 30 asphalt felt), unperforated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- C. Apply field treatment complying with AWWA M4 to cut surfaces of preservative-treated lumber and plywood.
- D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 1. International Building Code, current version
- E. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.
- F. Use finishing nails for exposed work, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
- G. Use Clips at unsupported plywood edges.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build anchor bolts into masonry during installation of masonry work. Where possible, secure anchor bolts to formwork before concrete placement.

3.3 WOOD STRUCTURAL PANEL INSTALLATION

- A. Plywood Roof Decking: Fasten panels as indicated below.
 - 1. Eight feet up from roof eave & rake – fasten panels with screws 6” o.c. at panel perimeter and 8” o.c. in panel field.
 - 2. Beyond 8 feet up from eave & rake – 6” o.c. at panel edge and 12” o.c. at panel field.
 - 3. Screw to cold formed metal framing, trusses, and decking.
 - 4. Apply panels from roof edge down and immediately cover with felt.

3.4 BUILDING PAPER APPLICATION

- A. Apply building paper horizontally with 2-inch (overlap and 6-inch end lap; fasten to sheathing with galvanized staples or roofing nails. Cover upstanding flashing with 4-inch overlap.

END OF SECTION

SECTION 07115 – BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This section includes cold applied, emulsified-asphalt dampproofing applied to the following surfaces:
 - 1. Exterior face of masonry (cmu) indicated to receive fiber cement siding.

1.03 QUALITY ASSURANCE

- A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications, installation instructions, and general recommendations. Include data substantiating that materials are recommended by manufacturer for applications indicated and comply with requirements.
- B. Material Certificates: For each product, signed by manufacturer.

1.05 JOB CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt dampproofing to be performed according to manufacturer's written instructions.
- B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has thoroughly cured.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include the following:
 - 1. Cold Applied, emulsified asphalt dampproofing:
 - a. Euclid Chemical Company, Emulsified asphalt mastic
 - b. Sonneborn, Div. of ChemRex, Inc., Hydrocide 700 & 700B

2.02 MISCELLANEOUS MATERIALS

- A. Cut-back asphalt primer: ASTM D 41
- B. Emulsified asphalt primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, with applicator present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.
 - 1. Begin dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Protection of other work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.
- B. Clean substrates of projects and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

3.03 APPLICATION, GENERAL

- A. Comply with manufacturers written recommendations unless more stringent requirements are indicated or required by project conditions to ensure satisfactory performance of dampproofing.
 - 1. Apply additional coats if recommended by manufacturer or required to achieve coverages indicated.
 - 2. Allow each coat of dampproofing to cure 24 hours before applying subsequent coats.
- B. Apply dampproofing to provide continuous plane of protection on exterior face of inner wythe of exterior masonry cavity walls and above brick veneer on same wall.
 - 1. Lap dampproofing at least 1/4 inch onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.
 - 2. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe, and lap dampproofing at least 1/4 inch onto shelf angles supporting veneer.

3.04 COLD APPLIED, EMULSIFIED ASPHALT DAMPPROOFING

- A. On masonry backup for brick veneer assemblies: Apply primer and one brush or spray coat at not less than 1 gal/100sf.
- B. On exterior face on inner wythe of cavity walls: apply primers and one brush or spray coat at not less than:
 - 1. Hydorcide 700 – 1/8 inch wet film, trowel application
 - 2. Hydrocide 700B – 30-35sf/gal-spray application, two coats
 - 3. Euclid emulsified asphalt mastic – 2.5 gal/100sf, trowel application, two coats.
- C. Where indicated, install protection course over completed and cured dampproofing. Comply with dampproofing material manufacturer's written recommendations for attaching protection course. Support protection course with spot application of trowel-grade mastic where npt otherwise indicated.

3.05 CLEANING

- A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

END OF SECTION

SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions, Division 1 Specification Sections, Addenda, Supplemental Instructions, and Change Orders, apply to work of this section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Fiberglass batt insulation.
 - 2. Foamed-in-place insulation.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulation products.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Glass-Fiber Insulation:
CertainTeed Corporation.
Owens Corning.
Knauf Fiber Glass
 2. Foam-in place insulation:
 - a. Polymaster, Inc.
 - a. Thermco Foam
 - a. Icynene

2.02 INSULATING MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
1. 8 inch nominal, unfaced R-30 24"x96", installed between metal trusses and intermediate supports, above plaster ceiling on channels. Tightly fit insulation.
 2. Flame Spread of 75 for concealed and 25 for exposed, with a smoke developed of 450 maximum.
- B. Foamed-in place insulation injected into the void cell of the masonry units.
1. Polymaster R501 Foam Insulation
 2. Thermco Foam
 3. Icynene Insulation System

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.
- B. Foamed-in-place insulation: Ensure cores or spaces are free of mortar or other restrictions to the free flow of foam insulation. Verify that all work within the wall voids is complete prior to installation. Verify that masonry cells do not contain water.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.
- B. Close off openings in cavities receiving poured-in-place insulation to prevent escape of insulation. Provide bronze or stainless-steel screens (inside) where openings must be maintained for drainage or ventilation.
- C. Foamed-in-place insulation: Allow masonry mortar to set prior to installing insulation. Select the most aesthetically pleasing locations for foam injection, including masonry joints, wythe side of walls, covered side of walls. For pressure fill installation, drill fill holes into CMU cores (Drill hole size: Minimum diameter 5/8", maximum diameter 2 inches. For 8" CMU, drill every other core.

3.03 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.04 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Do not obstruct ventilation spaces, except for firestopping.
 - 1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
- C. Install board insulation on concrete masonry substrates in accordance with manufacturer's recommendation.

3.05 INSTALLATION OF FOAMED-IN-PLACE INSULATION

- A. Do not install foam insulation when product temperature is below 50 degrees F (10degrees C)
- B. Install foam insulation in CMU cores using pressure fill method to a uniform density. Completely fill all spaces, crevices and voids.
- C. Fill and point drill holes in exposed or concealed masonry units with mortar after installation, shaping and texturing to match existing materials.

3.06 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- B. Do not permit subsequent construction to damage or disturb installed foam insulation.
- C. Do not paint masonry walls until at least 72 hours after installation of foam insulation.

END OF SECTION

SECTION 07311 - ASPHALT SHINGLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this Section.

PART 2 - PRODUCTS

2.01 SUMMARY

- A. This section includes:
 - 1. Asphalt shingles
 - 2. Felt underlayment
 - 3. Ridge vents
 - 4. Metal flashing and trim

2.02 QUALITY ASSURANCE

- A. **Installer Qualifications:** A firm or individual that is approved, authorized, or licensed by asphalt shingle roofing system manufacturer to install roofing system indicated.
- B. **Source Limitations:** Obtain ridge and hip cap shingles and felt underlayment through one source from a single asphalt shingle manufacturer.
- C. **Fire Test Response Characteristics:** Provide asphalt shingle and related roofing materials with the fir-test response characteristics indicated, as determined by testing identical products per test method by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. **Exterior Fire Test Exposure:** Class A; ASTM E 108 or UL 790, for application and roof slopes indicated.
- D. **Mockups:** Build mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
 - 2. Approved mockups may become part of the completed work if undisturbed at time of substantial completion.

2.03 DEFINITIONS

- A. **Roofing Terminology:** Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this section.

2.04 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period. Materials failures include manufacturing defects and failure of asphalt shingles to self seal after reasonable time.
 - 1. Material warranty period: 30 years from date of substantial completion, prorated, with first 5 years non-prorated.
 - 2. Wind-speed warranty period: Asphalt shingles will resist blow-off or damage caused by wind speeds up to 70mph for 5 years from the date of substantial completion.
- B. Roofing Installer's Warranty: Two years from the date of substantial completion.

2.05 PRODUCTS

- A. Glass-Fiber Reinforced Asphalt Shingles
 - 1. Architectural grade fiberglass shingles ASTM D 3462, laminated, multiply overlay construction, glass-fiber reinforced, mineral granule surfaced, and self sealing. Match color, style and texture with existing welcome center building, owner shall approve final selection of shingles.
 - a. Manufacturers: See existing manufacturer from existing Welcome Center or one of the following:
 - 1) Owens Corning: Oakridge 30AR
 - 2) TAMKO Roofing Products, Inc. Heritage 30AR
 - 3) Elk Roofing – High Definition with stainguard 30 year
 - 2. Strip size: Manufacturer's standard.
 - 3. Algae Resistance: Granules treated to resist algae discoloration and mildew or stainguard.
 - 4. Color and Blends: Match color, style and texture with existing Welcome Center building, owner shall approve final selection of shingles.
- B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt full range.
- C. Underlayment Materials:
 - 1. Felts: ASTM D 226, Type II, 30# asphalt saturated organic felts, non-perforated.
- D. Accessories:
 - 1. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

2. Roofing Nails: Hot dip galvanized steel wire shingle nails, minimum 0.120 inch diameter, barbed shank, sharp pointed, with a minimum 3/8 inch diameter flat head. Nail shall be manufactured by Maize with a ring shank shank x 1" long and of sufficient length to extend at least 1/8 inch through OSB or plywood sheathing. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
3. Felt underlayment nails: Aluminum, stainless steel or hot dipped galvanized steel wire with low profile capped heads or disc caps, 1-inch minimum diameter.
4. Ridge Vents:
 - a. Cor Vent – Extreme X-5
 - b. Northwest building Products – Premier
 - c. Shingle manufacturer's ridge vent (Type to receive ridge shingles), if required to satisfy warranty requirements.

2.06 METAL FLASHING AND TRIM

- A. Sheet metal flashing and trim: Comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim".
 1. Sheet Metal: Provide zinc coated (galvanized) steel 24 gauge at concealed locations and prepainted, metallic coated steel at visible locations (i.e. drip edges, open valleys ,etc.)
 2. Prepainted, metallic coated steel shall be a high performance organic finish, Fluoropolymer 2 coat system. Color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, complying with ASTM 2604.
 3. Color: As selected by Architect from manufacturer's full range.
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's Architectural Sheet Metal manual that apply to design, dimensions, metal and other characteristics of item.
 1. Step Flashings: Fabricate with a headlap of 2 inches and a minimum extension of 4 inches over the underlying asphalt shingle and up the vertical surface.
 2. Open Valley Flashing: Fabricate in lengths not exceeding 10 feet with 1 inch high inverted Vprofile at center and equal flange widths of 12 inches.
 3. Drip Edges: Fabricate in lengths not exceeding 10 feet with 2 inch roof deck flange and 1-1/2 inch fascia flange with 3/8 inch drip at lower edge.
- C. Vent Pipe Flashing: ASTM B 749, Type L5121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof and extending at least 4 inches from pipe onto roof.

PART 3 - EXECUTION

3.01 EXAMINATION - INSTALLATION

- A. Examine substrates, areas, and conditions with installer present for compliance with requirements for installation tolerances and other conditions affecting work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Installation Standard: ARMA's "Residential Asphalt Roofing Manual" and NRCA's "The NRCA Roofing and Waterproofing Manual."
- D. Metal flashed open valley underlayment: Install two layers of 36 inch wide felt underlayment centered in valley. Stagger end laps between layers at least 72 inches. Lap ends of each layer at least 12 inches in direction to shed water, and seal with asphalt roofing cement. Fasten each layer to roof deck with felt underlayment roofing nails. Lap roof deck felt underlayment over first layer of valley felt underlayment at least 6 inches.
- E. Step Flashings: Install with a headlap of 2 inches and extend over the underlying asphalt shingle and up the vertical surface. Fasten to roof deck only.
- F. Open Valley Flashings: Install centrally in valleys, lapping ends at least 8 inches in direction to shed water. Fasten upper end of each length to roof deck beneath overlap. Secure hemmed flange edges into metal cleats spaced 12 inches apart and fastened to roof deck.
- G. Rake Drip Edges: Install rake drip edge flashings over underlayment and fasten to roof deck.
- H. Eave Drip Edges: Install eave drip edge flashings below underlayment and fasten to roof sheathing.
- I. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.
- J. Asphalt shingle installation:
 - 1. Install asphalt shingles according to manufacturers written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual", and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing manual".
 - 2. Install starter strip along lowest roof edge, consisting of an asphalt strip with tabs removed at least 7 inches with self sealing strip face up at roof edge. Extend asphalt shingles ½ inch over fascia at eaves and rakes. Install starter strip along rake edge.
 - 3. Install first and remaining courses of asphalt shingles stair stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

4. Fasten asphalt shingle strips with a minimum of four roofing nails (or number required by manufacturer to meet required loading conditions) located according to manufacturers written instructions.
5. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots. Add a layer of Ice and Water Shield or equivalent underlayment.
6. When ambient temperature during installation is below 50 degrees F, seal asphalt shingles with asphalt roofing cement spots.
7. Cut and fit shingles at open valleys, trimming upper concealed corners of shingle strips. Maintain uniform width and exposed open valley from highest to lowest point.
8. Set valley edge of asphalt shingles in as 3 inch wide bed of asphalt roofing cement.
9. Do not install asphalt shingles to metal open valley flashings.
10. Ridge vents: Install as per manufacturers recommendations. Anchor ridge vents to wood and metal decking with wafer head sreaker screws at 8 inches o.c. Screws shall be 3 inches long. Cover ridge vents with ridge and hip shingles. Attach with hot dipped galvanized nails long enough to penetrate roof sheathing.
11. Ridge and Hip Cap Shingles: maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing. Use longer ring shanked nails to anchor ridge caps and hip caps thru shingles and ridge vents.

END OF SECTION

SECTION 07466 – FIBER CEMENT SIDING & ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Siding.
- B. Fascia.
- C. Soffit
- D. Accessories and trim.

1.02 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry: Framing and Sheathing.
- B. Section 07920 - Joint Sealers.
- C. Section 09900 - Paints and Coatings: Field painting.

1.03 REFERENCES

- A. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 1998.
- B. ASTM C 1185 - Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards; 1999.
- C. ASTM C 1186 - Standard Specification for Flat Non-Asbestos Fiber Cement Sheets; 1999.
- D. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction; 1998.
- E. ASTM E 84 -- Standard Test Method for Surface Burning Characteristics of Building Materials; 1999.
- F. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials; 1995.
- G. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 1999.
- H. ASTM E 228 - Standard Test Method for Linear Thermal Expansion of Solid Materials with a Vitreous Silica Dilatometer; 1995.
- I. ASTM G 26 - Standard Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials; 1996.

1.04 SUBMITTALS

- A. Make submittals under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods, including nailing patterns.
 - 4. Applicable model code authority evaluation report (ICBO, BOCA, CCMC, etc.)
- C. Siding manufacturer's requirements for vapor retarders, primer, paint, etc., to be installed by others.
- D. Shop drawing showing installation methods, layout, and trim details.
- E. Maintenance and periodic inspection recommendations.

1.05 QUALITY ASSURANCE

- A. Installer: Provide installer with not less than three years of experience with products similar to those specified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products off the ground, on a flat surface, and under a roof or separate water-proof covering.

1.07 WARRANTY

- A. Register manufacturer's 30 year warranty, made out in Owner's name, with copy to Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. CertainTeed Corporation, Siding Products Group, P.O. Box 860, Valley Forge, Pennsylvania 19482. ASD. Tel: (800) 233-8990 (professional) or (800) 782-8777 (consumer). www.certainteed.com.
- B. James Hardie.
- C. Approved equals.

2.02 PANELS

- A. Fiber Cement Board Panels - General: Cement and cellulose fiber formed under high pressure into boards with integral surface texture; complying with ASTM C 1186 Type A Grade II; machined edges; for nail attachment.
1. Surface Burning Characteristics: Flame spread index of 0, smoke developed index of 6, maximum; when tested in accordance with ASTM E 84 (Class I/A).
 2. Flammability: Noncombustible, when tested in accordance with ASTM E 136.
 3. Flexural Strength: At least 1450 psi when in equilibrium condition, and at least 1015 psi when in wet condition, tested in accordance with ASTM C 1185.
 4. Coefficient of Thermal Expansion: Less than 1×10^{-5} /inch/inch/degree F (0.5×10^{-5} /degree C), when tested in accordance with ASTM E 228.
 5. Water Vapor Transmission: Less than 7.0 perm-inch (10 ng/(Pa s m)), when tested in accordance with ASTM E 96.
 6. Freeze Thaw Resistance: At least 80 percent flexural strength retained, when tested in accordance with ASTM C 1185.
 7. UV Resistance: No cracking, checking, or erosion, when tested for 2000 hours in accordance with ASTM G 26.
 8. Water Tightness: No water droplets on underside, when tested in accordance with ASTM C 1185.
- B. Horizontal Siding: CertainTeed WeatherBoards, FiberCement Siding.
1. Thickness: 5/16 inch (8 mm), nominal.
 2. Length: 12 feet (3657 mm), nominal or as required.
 3. Style: Cedar lap siding.
 4. Width: 7-1/4 inches (185 mm) wide.
 5. Finish: Factory sealed with FiberTect.
- C. Soffit: CertainTeed WeatherBoards, FiberCement Soffit
1. Thickness: 1/4" (6mm)
 2. Style: Owner to select from standard textures
 3. Finish: Factory sealed with Fibertect.

2.03 ACCESSORIES

- A. Trim: Fiber cement board 1" thick, actual.
- B. Trim: Western red cedar lumber, without knotholes, checks, or cracks; 1 inch (25 mm) nominal thickness.

- C. Trim: Pressure preservative treated southern pine, without knotholes, checks, or cracks, No.1 grade or better; 1 inch (25 mm) nominal thickness.
- D. Provide the following trim:
 - 1. Starter strip for lap siding.
 - 2. Outside corners, butted to siding.
 - 3. Trim at doors and shutters, butted to siding.
 - 4. Fascia board.
 - 5. Soffit Panels
- E. Sealant: Paintable, 100 percent acrylic latex caulk complying with ASTM C 920.
- F. Sheet Metal Flashing: Minimum 26 gauge hot-dipped galvanized steel sheet, or aluminum.
- G. Nails: Length as required to penetrate minimum 1-1/4 inch (32mm) into solid backing; hot-dipped galvanized or stainless steel.
- H. Building Paper: Kraft or bituminous paper; not polyethylene or foil.
- I. Finish Paint: As specified in Section 09900.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to commencing installation, verify governing dimensions of building and condition of substrate.

3.02 PREPARATION

- A. Examine, clean, and repair as necessary any substrate conditions that would be detrimental to proper installation.
- B. Do not begin installation until unacceptable conditions have been corrected.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and drawing details.
 - 1 Read warranty and comply with all terms necessary to maintain warranty coverage.
 - 2 Install in accordance with conditions stated in model code evaluation report applicable to location of project.
 - 3 Use trim details indicated on drawings.
 - 4 Touch up all field cut edges before installing.

- 5 Pre-drill nail holes if necessary to prevent breakage.
- B. Over Wood and Wood-Composite Sheathing: Fasten siding through sheathing into studs.
- C. Allow space between both ends of siding panels that butt against trim for thermal movement; seal joint between panel and trim with exterior grade sealant.
- D. Joints in Horizontal Siding: Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.
- E. Joints in Vertical Siding: Install Z-flashing in horizontal joints between successive courses of vertical siding.
- F. Furred Installation: Leave space at top and bottom open; top may be behind soffit; at bottom install insect screen over opening by wrapping a strip of screen over bottom ends of vertical furring strips.
- G. Install sheet metal flashing above door and window casings and horizontal trim in field of siding.
- H. Do not install siding less than 6 inches (150 mm) from surface of ground nor closer than 2 inches (25 mm) to roofs, patios, porches, and other surfaces where water may collect.
- I. After installation, seal all joints except lap joints of lap siding. Seal around all penetrations. Paint all exposed cut edges.
- J. Finish Painting: Specified in Section 09900.

3.04 CLEANING

- A. At completion of work, remove debris caused by siding installation from project site.
- B. Touch-up, repair or replace damaged products before painting.

END OF SECTION

SECTION 07620 – FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions, Division 1 Specification Sections, Addenda, Supplemental Instructions, and Change Orders, apply to work of this section.

1.02 SUMMARY

- A. This Section includes sheet metal flashing and trim in the following categories:
 - 1. Exposed trim, fascia.
 - 2. Metal flashing.
 - 3. Louvers and vents
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 4 Sections for through-wall flashing and other integral masonry flashings specified as part of masonry work.
 - 2. Division 7 Roofing Sections for flashing and roofing accessories installed integral with roofing as part of roofing-system work.

1.03 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing.

1.04 SUBMITTALS

- A. Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.
- B. Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.
- C. Samples of sheet metal flashing, trim, and accessory items, in the specified finish. Where finish involves normal color and texture variations, include Sample sets composed of 2 or more units showing the full range of variations expected.
 - 1. 8-inch square Samples of specified sheet materials to be exposed as finished surfaces.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experience Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

- B. Prefinished Metal Guarantee: 20 year non-prorated warranty covering peeling, fading, chalking and film integrity. Warranty shall include labor and materials through the 20th year

1.06 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.01 FLASHING AND SHEET METALS

- A. Galvanized Steel Sheet: G 90, commercial quality, with full strength 70% Kynar finish (Coating 1.0 +/- 0.1 mil total dry film thickness). 24 Gauge except as indicated. Finish side protected with strippable film prior to shipping. Finish color to be selected by the Architect from the manufacturer's full range of colors.
- B. Prefinished Aluminum Ventilation Louvers: .081" - 6063 - T6 extruded aluminum frame with mitered corners. .081" - 6063 - T6 extruded aluminum non drainable "K" stationary blades x 6" deep with 30o blade angle. Provide ½" .060" expanded aluminum screen in aluminum U-frame mounted to inside of stationary louvers. Kynar finish same as required prefinished metal above.
- C. Membrane Flashing: Nervastral Synthetic, heavy duty, flexible homogeneous, impermeable sheeting. Refer to drawings for mil thickness. Manufacturer by Rubber and Plastics Compound Company, Inc., Long Island City, New York..
- D. Lead Sheet: ASTM B 749, Type L51121, copper-bearing lead sheet, with a minimum thickness of 0.0625 inch, except not less than 0.0937 inch thick for applications where burning (welding) is involved.

2.02 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Burning Rod for Lead: Same composition as lead sheet.
- B. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.
- C. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coat.
- D. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- E. Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealants."

- F. Epoxy Seam Sealer: 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.
- G. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.
- H. Paper Slip Sheet: 5-lb/square red rosin, sized building paper conforming to FS UU-B-790, Type I, Style 1b.
- I. Polyethylene Underlayment: ASTM D 4397, minimum 6-mil thick black polyethylene film, resistant to decay when tested according to ASTM E 154.
- J. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.
- K. Roofing Cement: ASTM D 4586, Type I, asbestos free, asphalt based.

2.03 FABRICATION, GENERAL

- A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
- B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.
- D. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- E. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- F. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
- G. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
- H. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

- I. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
 1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.
- B. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Roof-Edge Flashings: Secure metal flashings at roof edges according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.
- D. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches, except where pretinned surface would show in finished Work.
 1. Do not solder the following metals:
 - a. Aluminum.
 - b. Coil-coated galvanized steel sheet.
 2. Pretinching is not required for the following metals:
 - a. Lead.
 - b. Lead-coated copper.
 - c. Terne-coated stainless steel.

3. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
- E. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.
1. Use joint adhesive for nonmoving joints specified not to be soldered.
- F. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.
1. Underlayment: Where installing stainless steel or aluminum directly on cementitious or wood substrates, install a slip sheet of red-rosin paper and a course of polyethylene underlayment.
 2. Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.
- G. Install reglets to receive counterflashing according to the following requirements:
- H. Where reglets are shown in masonry, furnish reglets for installation under Division 4 Section "Unit Masonry."
- I. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Install counterflashings in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant, lead wedges and sealant, interlocking folded seam, or blind rivets and sealant. Lap counterflashing joints a minimum of 2 inches and bed with sealant.
- J. Roof-Drainage System: Install drainage items fabricated from sheet metal, with straps, adhesives, and anchors recommended by SMACNA's Manual or the item manufacturer, to drain roof in the most efficient manner. Coordinate roof-drain flashing installation with roof-drainage system installation. Coordinate flashing and sheet metal items for steep-sloped roofs with roofing installation.
- K. Roof-Penetration Flashing: Coordinate roof-penetration flashing installation with roofing and installation of items penetrating roof. Install flashing as follows:
1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
 2. Seal and clamp flashing to pipes penetrating roof, other than lead flashing on vent piping.

3.03 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

- B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION

SECTION 07920 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions, Division 1 Specification Sections, Addenda, Supplemental Instructions, and Change Orders, apply to work of this section.

1.2 SUMMARY

- A. This Section includes sealants for the following applications, including those specified by reference to this Section:

- 1. Joints in the following surfaces:

- a. Control and expansion joints in unit masonry.
- b. All Joints between dissimilar materials
- c. Perimeter joints between materials listed above and frames of doors and windows.
- d. Control and expansion joints in ceiling and overhead surfaces.
- e. Control, expansion, and isolation joints in cast-in-place concrete slabs.
- f. Joints in exterior stucco.
- g. Joints between different materials listed above.
- h. Perimeter joints of exterior openings where indicated.
- i. Tile control and expansion joints.
- j. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
- k. Perimeter joints between interior wall surfaces and frames of interior doors, windows.
- l. Joints between plumbing fixtures and adjoining walls, floors, and counters.
- m. Control and expansion joints in cast-in-place concrete slabs.
- n. Control and expansion joints in tile flooring.
- o. Other joints as indicated.

- 2. Fire-resistant assemblies:

- a. Penetrations through fire rated materials and assemblies.

- B. Joints between Related Sections include the following:
 - 1. Division 4 Section "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
 - 2. Division 9 Section "Portland Cement Stucco"

1.3 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each type and color of joint sealant required. Install joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.
- E. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.
- F. Compatibility and Adhesion Test Reports: From sealant manufacturer indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- G. Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.
- H. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Preconstruction Compatibility and Adhesion Testing: Submit to joint sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Use manufacturers standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - a. Perform tests under environmental conditions replicating those that will exist during installation.
 - 2. Submit not fewer than nine pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain joint sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
 - 5. Testing will not be required if joint sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
 - 2. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F.
 - 3. When joint substrates are wet.

- B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- C. Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.
- D. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified in the sealant schedules at the end of Part 3.
- B. Products: Subject to compliance with requirements, provide one of the products indicated for each type in the sealant schedules at the end of Part 3.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.

2.3 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 - 1. Type C: Closed-cell material with a surface skin.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. **Surface Cleaning of Joints:** Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 3. Remove laitance and form-release agents from concrete.
 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. **Joint Priming:** Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. **Masking Tape:** Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. **General:** Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.
- F. Install sealants by proven techniques to comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses provided for each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealants from surfaces adjacent to joint.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint configuration, per Figure 5B in ASTM C 1193, where indicated.
 - 5. Provide recessed joint configuration, per Figure 5C in ASTM C 1193, of recess depth and at locations indicated.
 - a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field-test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet of joint length for each type of elastomeric sealant and joint substrate.
 - b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.
2. Test Method: Test joint sealants by hand-pull method described below:
 - a. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches long at sides of joint and meeting cross cut at one end. Place a mark 1 inch from cross-cut end of 2-inch piece.
 - b. Use fingers to grasp 2-inch) piece of sealant between cross-cut end and 1-inch mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
 - c. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.
3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.
4. Inspect tested joints and report on the following:
 - a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - b. Whether sealants filled joint cavities and are free from voids.
 - c. Whether sealant dimensions and configurations comply with specified requirements.
5. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
6. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.

- B. Evaluation of Field-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements, will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

3.7 JOINT SEALANT SCHEDULE

- A. Multicomponent Nonsag Urethane Sealant: Where joint sealants of this type are indicated/required, provide products complying with the following:
 - 1. Products: Available products include the following:
 - a. Chem-Calk 500; Bostik Inc.
 - b. Dynatrol II; Pecora Corporation.
 - c. Sikaflex - 2c NS; Sika Corporation.
 - d. DYmeric 511; Tremco.
 - 2. Type and Grade: M (multicomponent) and NS (nonsag).
 - 3. Class: 25.
 - 4. Use: NT (nontraffic), M, G, A, and O.
 - 5. Applications: Including, but not limited to, perimeter of interior and exterior door, window and storefront frames; around interior and exterior electrical and mechanical fixtures; glazing; HVAC duct penetrations in finished walls; coping joints; interior and exterior control and expansion joints.
- B. Fire Resistant Joints: Where joint sealants of this type are indicated/required, provide products with fire resistance rating indicated which are identical to the adjacent materials, substrates and/or assemblies, and are acceptable to the authorities having jurisdiction.

Applications: Including, but not limited to, pipe and duct penetrations, perimeter sealants at rated assemblies.

- C. Acoustical Sealant for Concealed Joints: Where joint sealants of this type are indicated/required, provide products complying with ASTM C 834, and the following:
1. Products: Available products include the following:
 - a. BA-98; Pecora Corporation.
 - b. Tremco Acoustical Sealant; Tremco.
- D. Multi-part Pourable Polyurethane Sealant for Exterior Joints: Where joint sealants of this type are indicated/required, provide products complying with ASTM C 920-86, and the following:
1. Products: Available products include the following:
 - a. Vulkem 245; Mameco International, Inc.
 - b. Sikaflex 2c SL; Sika Corp.
 2. Applications: Concrete and asphalt pavements.

END OF SECTION

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Addenda, Supplemental Instructions, and Change Orders, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Steel doors.
 - 2. Steel door frames.
- B. Related Sections include the following:
 - 1. Division 4 Section "Unit Masonry Assemblies" for installing anchors and grouting frames in masonry construction.
 - 2. Division 5 Section "Formed-Metal Fabrications" for customized hollow-metal work other than doors, panels, and frames.
 - 3. Division 8 Section "Door Hardware" for door hardware and weather stripping.

1.03 DEFINITIONS

- A. Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets.

1.04 SUBMITTALS

- A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.
- B. Shop Drawings: Show the following:
 - 1. Elevations of each door design.
 - 2. Details of doors including vertical and horizontal edge details.
 - 3. Frame details for each frame type including dimensioned profiles.
 - 4. Details and locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, accessories, joints, and connections.
 - 7. Coordination of glazing frames and stops with glass and glazing requirements.

- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for factory-finished doors and frames.
- D. Samples for Verification: For each type of exposed finish required, prepare a sample not less than 3 by 5 inches and of same thickness and material indicated for final unit of Work.
- E. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.
- F. Oversize Construction Certificates: For door assemblies required to be fire-protection rated and exceeding size limitations of labeled assemblies.

1.05 QUALITY ASSURANCE

- A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.
- B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4-inch high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Steel Doors and Frames:
 - a. Allied Steel Products, Inc.
 - b. Benchmark Commercial Doors; a division of General Products Co., Inc.
 - c. Ceco Door Products; a United Dominion Company.
 - d. Kewanee Corporation (The).
 - e. Mesker Door, Inc.
 - f. Steelcraft; a division of Ingersoll-Rand.

2.02 MATERIALS

- A. Hot-Rolled Steel Sheets: ASTM A 569/A 568, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- B. Cold-Rolled Steel Sheets: ASTM A 366/A 568, commercial quality, matte finish exposed, oiled.
- C. Galvanized Steel Sheets: ASTM A 526/A 525, commercial quality.

2.03 DOORS

- A. General: Provide doors of sizes, thicknesses, and designs indicated.
- B. Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level:
 - 1. Level 2 and Physical Performance Level B, (Heavy Duty), Model 2 (Seamless).
- C. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
 - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).

2.04 FRAMES

- A. General: Provide steel frames for doors, transoms, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.

- B. Frames of 0.042-inch thick steel sheet for:
 - 1. Level 1 steel doors.
- C. Frames of 0.053-inch thick steel sheet for:
 - 1. Door openings wider than 48 inches.
 - 2. Level 2 steel doors.
- D. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.
- E. Plaster Guards: Provide 0.016-inch thick, steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.
- F. Supports and Anchors: Fabricated from not less than 0.042-inch thick, electrolytic zinc-coated or metallic-coated steel sheet.
 - 1. Wall Anchors in Masonry Construction: 0.177-inch diameter, steel wire complying with ASTM A 510 may be used in place of steel sheet.
- G. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153/A 153M, Class C or D as applicable.

2.05 FABRICATION

- A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.
- B. Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch- thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.
- C. Interior Door Faces: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch- thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.
- D. Core Construction: Manufacturer's standard core construction that produces a door complying with SDI standards.
- E. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between pairs of doors. Not more than 3/4 inch at bottom.

- F. Clearances for Fire-Rated Doors: As required by NFPA 80.
- G. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- H. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.
- I. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- J. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.
- K. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.
 - 1. For concealed overhead door closers, provide space, cutouts, reinforcement, and provisions for fastening in top rail of doors or head of frames, as applicable.
- L. Frame Construction: Fabricate frames to shape shown.
 - 1. Fabricate frames with mitered or coped and continuously welded corners **and seamless face joints**.
 - 2. For exterior applications, fabricate frames with mitered or coped and continuously welded corners **and seamless face joints**.
 - 3. Provide welded frames with temporary spreader bars.
- M. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
- N. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.
- O. Astragals: As required by NFPA 80 to provide fire ratings indicated.

2.06 FINISHES

- A. Factory-Applied Paint Finish: Manufacturer's standard, factory-applied paint finish complying with ANSI A250.3 for performance and acceptance criteria.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.
- B. Placing Frames: Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
 - 1. Place frames before construction of enclosing walls and ceilings.
 - 2. In masonry construction, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.
 - 3. In metal-stud partitions, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Attach wall anchors to studs with screws.
 - 4. Install fire-rated frames according to NFPA 80.
 - 5. For openings 90 inches or more in height, install an additional anchor at hinge and strike jambs.
- C. Door Installation: Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.
 - 1. Fire-Rated Doors: Install within clearances specified in NFPA 80.

3.02 ADJUSTING AND CLEANING

- A. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION

SECTION 08710 – DOOR HARDWARE

PART 1 - GENERAL

- A. **SECTION INCLUDES:** Furnish all finish hardware as required and specified herein. Materials of quality less than outlined by these specifications or manufacturers and products not prior approved will not be accepted. Any discrepancies or omissions noted should be brought to the attention of the Architect prior to the bid opening for instructions. Any additional items required will be of the same type and quality to be consistent with other hardware specified.
- B. **RELATED DOCUMENTS:** Drawings and General Provisions of the contract, including General and Supplementary Conditions and Division 1 of the specifications, including all addendums, apply to this section.
- C. **RELATED SECTIONS:** Coordinate with Division 8, sections for doors and frames for the installation of finish hardware.
- D. **CODE DOCUMENTS:** The following documents where used to establish these specifications.
- E. NFPA standards for life safety codes, fire and smoke doors.
- F. ANSI Standards for accessibility by the physically handicapped.
- G. ANSI Standards for finish hardware.
- H. **HARDWARE SCHEDULE:** Submit six (6) copies for approval, following the sequence and format as recommended by the Door and Hardware Institute.
- I. **PRODUCT DATA:** Submit three (6) copies with the finish hardware schedule, showing all items of hardware to be furnished.
- J. **SAMPLES:** Furnish samples if requested by the Architect. All samples will be returned to the hardware supplier, and if approved may be used on the project.
- K. **TEMPLATES:** Templates are to be furnished by the finish hardware supplier as required.
- L. **KEYING SCHEDULE:** Furnish a keying schedule indexed by door number, showing key sets and hardware headings. Include all special keying notes and stamping. Submit three (3) copies for approval.

- M. **KEYING REQUIREMENTS:** Key to owners system for this project. All cylinders to be a High Security System as designated in schedule. Supplier must be a factory authorized distributor. Furnish all locks and cylinders factory keyed. The finish hardware supplier will meet with the Architect and Owner to establish the final keying requirements. Furnish temporary construction master keying for use by the contractor during construction. The temporary construction master keys only will be issued to the General Contractor during construction. Permanent keys and a copy of the final keying schedule must be delivered direct to the owner by the finish hardware supplier. At completion of the project, the contractor must activate the cylinders to operate by the owners permanent keys. Furnish the following keys:
- 10 ea. Construction keys
 - 6 ea. Grand and or master keys
 - 3 ea. Change keys per lock and cylinder
- N. **SUPPLIER QUALIFICATIONS:** The supplier must be a factory authorized distributor of all materials to be furnished on this project. Be available to make job site visits as required by the quality control requirements of these specifications, or as requested by the Contractor or Architect.
- O. **MARKING:** The hardware supplier must mark all items of hardware with the door number or item number as listed in the approved hardware schedule.
- P. **DELIVERY:** The hardware supplier must deliver all hardware to the project in manufacturers original packages.
- Q. **STORAGE:** All hardware will be stored by the General Contractor in a secure and dry area.
- R. **WARRANTIES:** Furnish manufacturers standard warranties to cover defects in materials and workmanship.

PART 2 - PRODUCTS

- A. **APPROVED MANUFACTURERS AND MATERIALS:** Manufacturers listed in these specifications are to establish a standard of quality required for this project. Furnish material only from manufacturers listed below for each item. Furnish all like items from the same manufacturer (All exit devices from one manufacturer)
- B. **BUTT HINGES:** Provide products manufactured by THE HAGER COMPANIES. Requirements.
- 4.5" high hinges for openings 36" or less
 - 5" X 4.5" high hinges for opening greater than 36"
 - All hinges to have torx screws.
- Interior types.
- BB1279 & IHTAB750
- Exterior types
- BB1191 & IHTAB850

Finishes.

Satin chrome plated for interior butt hinges.

Stainless for exterior butt hinges

Equal: Mckinney, PBB

- C. CYLINDERS: Provide products manufactured by Medico Requirements. All cylinders to be high security in type. All to be factory keyed by an authorized direct distributor. All to be 7 pin in type.

- D. LOCKS & LATCH SETS: Provide products manufactured by Sargent.

Requirements.

All locks shall be manufactured by Sargent to match existing. Locks to be manufactured from 12 gauge zinc dichromate steel and fully adjustable beveled armor front. Deadbolt to be a full 1" throw manufactured of cast stainless. Locks handing to be field reversible without requiring part replacement. Heavy duty grade 1 types where called for. All locksets to have torx screws. Functions as listed in hardware sets.

UL listed for fire rated doors.

Curved lip strikes w/ wrought boxes for all lock and latch sets.

Equal: Yale, Schlage

- E. EXIT DEVICES: Provide products manufactured by Sargent

Requirements.

Exit devices shall be rim or vertical rod where called for in Hardware Schedule.

All devices shall be UL listed and furnished with the proper trim where called for in the Hardware Schedule. All trim to be heavy duty type. All to have torx screws equal: Yale, Von Duprin

- F. DOOR CLOSERS: Provide products manufactured by Norton

Requirements.

Surface Closer:

Closers to be rack and pinion type with cast aluminum alloy shell.

Closers shall be surface mounted and shall project no more

than 2 1/8" from the surface of the door. Barrier free for interior non rated doors

Have adjustable back-check and back-check positioning.

Have adjustable sweep and latching cycles.

UL listed for fire rated doors.

Hex nuts and bolts mounting for all doors closers

All closers must have stops built in where called for.

All closers to have torx drive screws

Finish.

Satin aluminum painted

Equal: Yale, Sargent

G. DOOR TRIM: Provide products manufactured by THE HAGER COMPANIES.

Requirements.

All plates to be .050 thick

Note, Protection plate heights listed are for flush doors, adjust height accordingly for louvers, bottom rail heights, raised panel doors or doors with applied moldings.

All to have security torx screws

Types.

30S – Push plate – 4" x 16".

33G – Pull plate – 8" pull mounted to 4" x 16" plate, thru bolted.

190S – Armor plates – 34" high x 2" less door width.

190S – Kick plates – 8" high x 2" less door width.

190S – Mop plates – 4" high x 1" less door width.

Finish.

Satin stainless steel

Equal: Rockwood, Trimco

H. AUXILIARY BOLTS: Provide products manufactured by THE HAGER COMPANIES.

Requirements.

Provide all necessary strikes, shims, and guides to insure proper installation and operation.

Fully automatic coordinators for sequential closing of paired doors with all accessories, including carry bars and brackets as required to facilitate the installation of vertical rod exit devices and door closers. Filler pieces to close the header area for an architecturally clean line.

All to have security torx screws

Types.

282D – Manual flush bolts for non rated doors

294D – Auto flush bolts for wood smoke & fire rated doors

293D – Auto flush bolts for metal smoke & fire rated doors

297D – Coordinator

280X – Dust proof strike

Finish.

Satin chrome plated.

Equal: Rockwood, Trimco

I. DOOR STOPS: Provide products manufactured by THE HAGER COMPANIES.
Requirements.

Provide stops as required by opening conditions.

Provide overhead types where wall or floor stops can not be used.

Interior types.

241F – Floor mounted

236W – Wall mounted type

Finishes.

Satin chrome plated for floor stops.

Satin stainless steel for wall stops

Equal: Rockwood, McKinney

J. WEATHER & FIRE PROTECTION: Provide products manufacturer by THE HAGER COMPANIES.

Requirements.

Vinyl or brush types where called.

Thresholds and saddles to meet handicap requirements

Weather types.

891SV – Perimeter weather seal.

756SV – Door bottom sweep

520SV – Lip type threshold for swing out doors

413S – Flat saddle type for swing in doors.

Smoke types.

726 – Perimeter smoke seal.

Fire types.

723 – Perimeter fire seal, intumescent type.

Finishes.

Satin anodized aluminum for all others.

Brown for fire and smoke seals.

Equal – Pemko, Mckinney

K. DOOR SILENCERS: Provide products manufactured by THE HAGER COMPANIES.

Requirements.

Provide for all metal frames.

Types.

307D – Rubber

Finish.

PART 3 - EXECUTION

- A. **FIELD CONDITIONS:** The finish hardware installer and the General Contractor will examine all doors, frames and related items for conditions that would prevent the proper installation of the finish hardware. Do not proceed until all corrections are made.
- B. **PREPARATION:** The hardware installer must read all notes included, and become familiar with the finish hardware schedule. The hardware installer must read and understand the installation instructions packed with each item of hardware.
- C. **INSTALLATION:** Installation must be done by skilled workman who work with proper tools and be in accord with the manufacturer's instruction. Hardware must be installed accurately, applied securely, and adjusted properly. Install the hardware only with fasteners furnished by the manufacturer, warranties and/or labels will be void on material installed with unauthorized fastener
- D. **FIELD QUALITY CONTROL:** The finish hardware supplier shall provide the following field quality control & furnish a complete report to the Architect and General Contractor after each field visit.

Prior to installation:

Visit the project, and with the General Contractor and installer check the hardware for any shortages or shipment damage. Instruct the installer on any special conditions, and the adjustments required for the proper installation of the finish hardware.

After installation:

Check the project for the proper application of the finish hardware according to the approved hardware schedule. Check that all items, including door control devices have been properly adjusted and are operating properly. Notify the Architect of any hardware not installed in accordance with the approved hardware schedule or properly adjusted. Where hardware is found not to be installed correctly or properly adjusted, the General Contractor must adjust, repair, or replace as directed by the Architect. Instruct the owner personnel in the proper operation, adjustments, and maintenance of the finish hardware.
- E. **ADJUSTING:** The installer will make final adjustments of each item of hardware to insure proper operation and function. Adjust door control devices for final operation after air handling equipment is operational.
- F. **CLEANING:** Clean all hardware with non-abrasive cleaners, and leave clean and free of disfigurements.
- G. **PROTECTION:** Protect all items of hardware from damage until the Owner has accepted the project as complete.
- H. **HARDWARE SETS & GENERAL REQUIREMENTS:** The following hardware sets are a guide and description of the materials required. It is the responsibility of the finish hardware supplier to properly detail and furnish the hardware for proper function and operation based on approved manufacturers and products. Adequate knowledge of finish hardware and attention to opening details are required.

I.
3,13,26,
45

HARDWARE SET # 1

3	EA	HINGES	IHTAB850 X RSS	630	HAGER
1	EA	PULL PLATE	4"x16" W/8"PULL	33G	HAGER
1	EA	DEADBOLT (3200S)	SINGLE FUNCTION (15)	630	HAGER
1	EA	SECURITY CLOSER	SCP4400DL X 4070-5 X TORX	689	YALE
1	EA	KICK PLATE	190S 8" X 2" LDW	630	HAGER
1	EA.	THRESHOLD	520SAV X 36"	MILL	HAGER
1	EA	WEATHERSTRIP	891SAV 36 X 84	MILL	HAGER
3	EA	MUTES	307D	GR	HAGER
1	EA	PUSH PLATE	4"x16"	30S	HAGER

HARDWARE SET # 2

19

6	EA	HINGES	IHTAB850 X RSS	630	HAGER
1	EA	MORTISE LOCK SECURITY	AUSL8847FL	630	YALE
1	EA	CYLINDER	U5153 7 PIN	630	YALE
1	EA	SECURITY CLOSER	SCP4400DL X 4070-5 X TORX	689	YALE
2	EA	FLUSHBOLTS	282D X 12" X TORX	626	HAGER
2	EA	KICK PLATE	190S 8" X 2" LDW	630	HAGER
1	EA.	THRESHOLD	520SAV X 72"	MILL	HAGER
1	EA	WEATHERSTRIP	891SAV 72 X 84	MILL	HAGER
2	EA	MUTES	307D	GR	HAGER

HARDWARE SET # 3

2,14,16,
17,18,25,
44

3	EA	HINGES	IHTAB850 X RSS	630	HAGER
1	EA	MORTISE LOCK SECURITY	AUSL8847FL	630	YALE
1	EA	CYLINDER	U5153 7 PIN	630	YALE
1	EA	SECURITY CLOSER	SCP4400DL X 4070-5 X TORX	689	YALE
1	EA	KICK PLATE	190S 8" X 2" LDW	630	HAGER
1	EA.	THRESHOLD	520SAV X 36"	MILL	HAGER
1	EA	WEATHERSTRIP	891SAV 36 X 84	MILL	HAGER
3	EA	MUTES	307D	GR	HAGER

HARDWARE SET # 4

11,20,35,
54

3	EA	HINGES	BB1191 4 1/2 X 4 1/2	630	HAGER
1	EA	MORTISE LOCK SECURITY	AUE8805FL	630	YALE
1	EA	CYLINDER	U5153	630	YALE
1	EA	CLOSER	4420 X SNB	689	YALE
1	EA	KICK PLATE	190S 8" X 2" LDW	630	HAGER
1	EA	STOP	241F	626	HAGER
3	EA	MUTES	307D	GR	HAGER

HARDWARE SET # 5

4,5,6,7,8,9,10,12,20,21,22,23,27,28,29,30,31,32,33,36,37,38,39,40,41,42,43,45,46,47,
48,49,50,51,52,53,55,56,57,58,59,60,61,62

3	EA	HINGES	BB1191 4 1/2 X 4 1/2	630	HAGER
1	EA	PULL PLATE	4"x16" W/8" PULL	33G	HAGER
1	EA	COAT HOOK PUSH	BL6610	626	HAGER
1	EA	PLATE	4"x16"	30S	HAGER
2	EA	MUTES SURFACE	307D	GR	HAGER
1	EA	BOLT	275D		HAGER

HARDWARE SET # 6

1,15

3	EA	HINGES	BB1191 4 1/2 X 4 1/2	630	HAGER
1	EA	MORTISE LOCK	AUE8802FL	630	YALE
1	EA	CLOSER	R4400 X SNB	689	YALE
1	EA	KICK PLATE	190S 8" X 2" LDW	630	HAGER
1	EA	STOP	241F	626	HAGER
3	EA	MUTES	307D	GR	HAGER

HARDWARE SET # 8

VOID

END OF SECTION

SECTION 09200 – PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

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

1.02 SUMMARY:

- A. Non-structural steel framing and support
- B. Interior Portland Cement Plasterwork (stucco)

1.03 RELATED SECTIONS:

- A. Division 5 Section “Cold Formed Metal Framing”
- B. Division 7 Section “Building Insulation”
- C. Division 7 Section “Joint Sealants”

1.04 JOB CONDITIONS:

- A. Installer must examine surfaces which are to receive plaster, grounds and other accessories which act as grounds or screens, and shall notify the Contractor, in writing, of conditions detrimental to the proper and timely completion of the work. Do not proceed with the plaster work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. Comply with ASTM C 926 requirements.
- C. Plasterwork:
 - a. Apply and cure plaster to prevent plaster from drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
 - b. Apply plaster when ambient temperature is greater than 40 deg F.
 - c. Protect plaster coats from freezing or not less than 48 hours after set of plaster coat has occurred.
 - d. Factory-prepared finishes: Comply with manufacturer’s written recommendation for environmental conditions for applying finishes.

1.05 SUBMITTALS:

- A. Sample of plaster finish and colors (3' x 3'), to be selected by Architect.
- B. Product Data for cementitious materials, lath, metal support components, and accessories.

- C. Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, sections, details of components and attachments to other work.

PART 2 - PRODUCTS

2.01 PORTLAND CEMENT PLASTER MATERIALS:

- A. Base-Coat Cement:
 - 1. Portland Cement, ASTM C 150, Type 1
- B. Base-Coat Lime:
 - 1. Special finishing hydrated lime, Type S
- C. Base-Coat Aggregate:
 - 1. Sand
- D. Base-Coat Fiber:
 - 1. Hair or fiber, mix with plaster for scratch coat on metal lath
- E. Admixture:
 - 1. Acryl 60
- F. Finish Coat:
 - 1. Finish to be mill prepared, water resistant, USG Oriental Exterior Finish Stucco, BASF, Merlex, or approved equal. Color selected by architect.

2.02 REINFORCEMENT AND ACCESSORIES:

- A. Metal Lath: Galvanized steel 3.5 lb. per sq. yd. self furring diamond mesh lath.
- B. Plastering Accessories: Standard gage aluminum accessories as indicated or, if not otherwise indicated, as recommended by plaster manufacturer, including cornerite, stripite, corner beads, casing beads, resilient edged casing beads, one piece control joints, two piece expansion joints and similar units.
- C. Wire Ties: No. 9 W & M gage, ASTM A 641, Class 1 galvanized wire spaced at 3'-0" o.c.
- D. Runner Channels: 1-1/2" galvanized channels spaced as indicated on the drawings.
- E. Furring Channels: 1" galvanized steel. 316 lb/1000 linear feet. Spaced as indicated on the drawings.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Installation of Metal Support Systems:

1. Isolation: Where lathing and metal support system abutts building structure horizontally, and where partition/wall work abutts overhead structure, isolate the work from structural movement sufficiently to prevent transfer of loading into the work from the building structure. Install slip or cushion type joints to absorb deflections but maintain lateral support.
 - a. Frame both sides of control and expansion joints independently, and do not bridge joints with furring and lathing or accessories.
2. Fixture Support Framing: Install supplementary framing, blocking and bracing where work is indicated to support fixtures, equipment, services, casework, heavy trim and furnishings and similar work requiring attachment and support.
3. Size to comply with ASTM C 1063 for portland cement.

B. Metal Lathing & Accessories:

1. Installation to comply with ASTM C 1063 and C 1047 unless otherwise indicated.

D. Plastering Accessories:

1. Anchor each flange of accessories 8" o.c. to plaster base.
2. Miter or cope accessory corners, and install with tight joints accurately aligned.
3. Set accessories plumb, level and true to line, with a tolerance of 1/8" in 10'-0".
- 4) Install metal corner beads at external corners.
5. Install casing beads at terminations of plaster work, except where plaster is indicated to pass through other work and be concealed by lapping work, and except where special screens, bases or frames act as casing beads including interior metal door frames.

3.02 INSTALLATION OF PLASTER:

A. Provide 3-coat plaster installation. Comply with ASTM C 926.

B. Texture of Plaster Finishes

- 1 Exterior and interior: Sand-float finish

3.03 INSTALLATION OF PLASTER MOLDINGS:

A. Install plaster moldings in accordance with manufacturers recommendations. Take proper precautions to protect molding finish during application of stucco coatings.

3.04 CUTTING PATCHING:

- A. Cut, patch, point-up and repair plaster as necessary to accommodate other work and to restore cracks, dents and imperfections. Repair or replace work to eliminate blisters, buckles, excessive crazing and check cracking, dry-outs, efflorescence, sweat-outs and similar defects, including areas of the work which do not comply with specified tolerances, and where bond to the substrate has failed.
- B. Sand smooth-troweled finishes lightly to remove trowel marks and arises.
- C. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces which are not to be plastered. Repair floors, walls and other surfaces which have been stained, marred or otherwise damaged during the plastering work. When plastering work is completed, remove unused materials, containers and equipment and clean floors of plaster debris.

END OF SECTION

SECTION 09651 - RESILIENT FLOOR TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Vinyl composition tile (VCT).
 - 2. Resilient Wall Base

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Samples for Verification: Full-size units of each color and pattern of resilient floor tile required.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide products identical to those tested for fire-exposure behavior per test method indicated by a testing and inspecting agency acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store tiles on flat surfaces.

1.6 PROJECT CONDITIONS

- A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After post-installation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

- C. Close spaces to traffic during floor covering installation.
- D. Close spaces to traffic for 48 hours after floor covering installation.
- E. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Vinyl Composition Tile: Furnish not less than 5% of total installed, in unopened containers.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 COLORS AND PATTERNS

- A. Colors and Patterns: As selected by Architect from manufacturer's full range.

2.3 VINYL COMPOSITION TILE:

- A. VCT-1 Standard vinyl composition tile:
 - 1. Size: 12" x 12" tile
 - 2. Gauge: 1/8"
 - 3. Static Load Limit: 75 psi
 - 4. Manufacturer and Product:
 - a. Armstrong – Standard Excelon imperial texture, color 1 tbd
 - b. Mannington – Essentials, color 1 tbd
- B. Fire-Test-Response Characteristics:
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648.

2.4 RESILIENT WALL BASE:

- A. ASTM F 1861, AFCO-USA, Armstrong World Industries, Azrock Commercial Flooring, Roppe Corp.
- B. Type: Rubber. Style: Cove.

- C. Minimum Thickness: 0.125 inch
- D. Height: 4 inches
- E. Lengths: Coils in manufacturer's standard length
- F. Outside corners: Job formed or pre-molded.
- G. Inside corners: Jog formed or pre-molded.
- H. Surface: Smooth

2.5 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic cement based formulation provided or approved by resilient product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

3. Moisture Testing:
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.
- E. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
 1. Do not install resilient products until they are same temperature as space where they are to be installed.
- F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 TILE INSTALLATION

- A. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 1. Lay tiles square with room axis in pattern indicated.
- B. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).
- C. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.
- D. Extend tiles into toe spaces, door reveals, closets, and similar openings.
- E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

- F. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor coverings that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing resilient product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
 - a. Do not wash surfaces until after time period recommended by manufacturer.
- B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
 - 1. Apply protective floor polish to horizontal surfaces that are free from soil, visible adhesive, and surface blemishes if recommended in writing by manufacturer.
 - a. Use commercially available product acceptable to manufacturer.
 - 2. Cover products installed on horizontal surfaces with undyed, untreated building paper until Substantial Completion.
 - 3. Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION

SECTION 09700 – SEAMLESS FLOORING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. **WORK INCLUDED:** All labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing all operations of the work in this Section, complete as shown on the Drawings and as specified herein. Work includes, but is not limited to, the following:
 - 1. Examine all other Sections for work related to those other Sections and required to be included as work under this Section.
 - 2. Submittals.
 - 3. Resinous flooring.
- B. **RELATED DOCUMENTS:** Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to Work of this Section as if printed herein.
- C. **RELATED WORK SPECIFIED IN OTHER SECTIONS:** The following items are covered by the indicated other Sections of this Project Manual. Coordinate as required with all other trades to ensure proper and adequate provision for the installation of items described in this Section.
 - 1. Cast-In-Place Concrete: Section 03300
 - 2. Finish Carpentry: Section 06200
 - 3. Sealants and Caulking: Section 07920

1.02 QUALITY ASSURANCE

- A. **ACCEPTABLE MANUFACTURER:** As specified herein under "Products."
- B. **INSTALLER'S QUALIFICATIONS:** Installation shall be by qualified Tufco personnel.
- C. Furnish and install the resinous flooring using materials and methods to ensure that the completed work will remain bonded to the substrate in this building and will have the chemical resistance and physical properties as published by the Manufacturer for the specified products.
- D. **REFERENCES AND STANDARDS (Latest Edition):**
 - 1. American Society of Testing and Materials (ASTM)
 - 2. American Concrete Institute (ACI)

1.03 SUBMITTALS

- A. Comply with pertinent provisions of Section 01300.
- B. **PRODUCT DATA;** Submit:

1. Complete list of all materials, with descriptive data and installation instructions.
2. Selection of color and finish will be made by the Architect from samples of Manufacturer's palette.
3. Manufacturer's recommended care and maintenance instructions.

1.04 DELIVERY, STORAGE AND HANDLING

- A. COMPLY WITH PERTINENT PROVISIONS OF SECTION 01600: Material shall be stored in a dry, protected area in such a manner as to prevent damage. Damaged or deteriorated materials shall be removed from the premises.
- B. Ensure timely delivery so products will be available at project site when required for installation so as not to delay job progress.

1.05 PROJECT CONDITIONS

- A. New concrete substrates should be properly cured to develop specified compressive strength, and other properties. A safe period of cure is usually determined to be 21 to 28 days under normal temperature and humidity conditions. Shorter cure time may be acceptable in the event that high early strength and/or other accelerated cure concretes are being used.
- B. The concrete shall have a light steel trowel finish.
- C. Floor flatness tolerance as determined by ASTM E 1155, "Standard Method for Determining Floor Flatness and Levelness Using the F-Number System," should have a minimum FF of 30, 3/16 inch as determined by the 10-foot straightedge method (ACI 118 gives information on both systems). Values outside these tolerances may necessitate the use of fill material in addition to the amount of material specified herein.
- D. Expansion joints shall be of non-asphalt type.
- E. Concrete shall be finished to grade of desired finished floor.
- F. Utilities, including electric, water and temporary or finished lighting shall be supplied by the General Contractor.
- G. Job area shall be free of other trades during, and for a period of time specified in Part 3.03.F, after floor installation.
- H. Protection of finished floor from damage by subsequent trades shall be the responsibility of the General Contractor.

1.06 WARRANTY

- A. Warranty for this work is extended beyond the normal one year period to five years.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. This product for this application designed around MRXL or TFXL Series as manufactured by: Tufco International, Inc.
- B. Approved equals meeting this spec will be accepted.

2.02 PERFORMANCE CRITERIA

- A. RESIN: The resin primer, binder and glaze shall be thermosetting resins formulated for the specific flooring application taken from the following list of resins:

Tufco Resin 2080 Tufco Resin 1099

Tufco Resin 1098 Tufco Resin 7010

Tufco Resin 1093 Tufco Resin 7040

Tufco Resin 1095 Tufco Resin 7090

Refer to specific floor to be installed, and Product Bulletins of specified resins for performance criteria.

- B. AGGREGATE: The aggregate fillers shall be clean, kiln dried silica sand and aluminum oxide as follows:

Tufco No. 8 Silica Sand U.S. Standard Sieve passing 8 to 16

Tufco No. 24 Silica Sand U.S. Standard Sieve passing 20 to 40

Tufco Colored Aggregate U.S. Standard Sieve passing 20 to 40

Tufco Aluminum Oxide U.S. Standard Sieve passing; varies with varying surface requirements

- C. FINISHED FLOOR PHYSICAL PROPERTIES

Compressive Strength, ASTM C-579 14,000 PSI Minimum IZOD Impact, Ft-Lb/In 1.8 Minimum

2.03 JOINT SEALANT MATERIALS

- A. Joint sealant shall be the type produced by the resinous flooring manufacturer for type of service and joint condition indicated.

2.04 OTHER MATERIALS

- A. All other materials not specifically described, but required for a complete installation, shall be only those recommended by the Manufacturer of the seamless flooring system.

PART 3: EXECUTION

3.01 SURFACE CONDITIONS

- A. Prior to all work of this Section, carefully inspect previously installed work of other trades and verify that all such work is complete to the point where this installation may commence. Particular attention should be given to items in Part 1.04 of this Specification.
- B. The concrete shall be allowed to cure for an acceptable period prior to application of resinous flooring. Refer to Part 1.05.A of this Specification.
- C. Verify that the final installation shall be complete in accordance with the original design and the Manufacturer's recommended method of installation. In the event of discrepancy, immediately notify the Architect.

3.02 SURFACE PREPARATION

- A. Concrete floor preparation shall be by mechanical means and shall include the use of scabblers, scarifiers, shot-blast or other acceptable devices for removal of bond-inhibiting materials such as curing compounds or laitance.
- B. After all operations in 3.02.A, thoroughly clean surface to remove dust and loose material.

3.03 APPLICATION

- A. GENERAL: Apply each component of resinous system in compliance with Manufacturer's directions to produce a uniform monolithic wearing surface of thickness indicated, uninterrupted except at divider strips, sawn joints or other types of joints, if any, indicated or required.
- B. KEYING: Keying shall be done to assure soundness at all floor terminations.
 - 1. Keying shall be performed at all flooring terminations to a nominal width of 1-1/2 inches and a nominal depth of one inch.
 - 2. Keying shall be performed at walls, pads and other vertical surfaces to a nominal width of one inch and a nominal depth of one inch.
- C. DETAILING: Detailing shall be done at all moving cracks and joints to prevent cracking to the flooring. Working cracks, expansion joints and control joints shall be detailed in one of the following ways:
 - 1. Keying and installation of non-reinforced flexible joint compound.
 - 2. Keying and installation of metal reinforcing mesh and the specified flooring resins and aggregates.
- D. The flooring shall be applied in laminated layers per the manufacturer's required coverage rates to yield a nominal 1/4 to 7/16 inch finished floor, excluding any additional fill and leveling Material.

- E. The laminated layers of the flooring shall be applied in the following manner:
1. LAYER 1, BASE COAT : A resin layer shall be spread and worked into the concrete surface, cracks, keys and detailed areas for a complete seal. Aggregate shall be distributed evenly over the uncured resin to a dry appearance.
 2. LAYER 2, SAND COAT : A resin layer shall be applied over the entire area, aggregate shall be distributed evenly over the uncured resin to a dry appearance.
 3. LAYER 3, COLORED AGGREGATE COAT : A resin layer shall be applied over the entire area, aggregate shall be distributed evenly over the uncured resin to a dry appearance.
 4. LAYER 4, GLAZE COAT : A resin layer optionally sprinkled with aggregate to achieve the desired texture. Resin layer shall be applied over the entire area in sufficient volume to anchor the aggregate and seal the floor. For highest non-skid (XNS) and high non-skid (NS) floors, aggregate is lightly sprinkled for the desired texture. For medium (M) and smooth (S) floors, sanding or grinding shall be done prior to applying resin. Smooth (S) floors require one additional Glaze Coat.
- F. CURING: Floors shall cure in accordance with Manufacturer's written recommendations before being subjected to traffic of any nature.
1. Approximate curing schedule (at 75oF or above).

END OF SECTION

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions, Division 1 Specification Sections, Addenda, Supplemental Instructions, and Change Orders, apply to this section.

1.2 SUMMARY

- A. The work includes painting and finishing of interior and exterior exposed items not noted as pre-finished and surfaces throughout the project, except as otherwise indicated.
 - 1. Surface preparation, priming and coats of paint specified are in additions to shop-priming and surface treatment specified under other sections of the work.
 - 2. Interior and exterior unit masonry, fiber cement siding-trim-soffit-fascia, miscellaneous metals, wrought-iron gate, mechanical piping & ducts
 - 3. Miscellaneous Metals
- B. Shop Priming:
 - 1. Unless otherwise specified, shop priming of ferrous metal items is included under the various sections for structural steel, miscellaneous metal, hollow metal work, and similar items.

1.3 SUBMITTALS

- A. Samples, Painting:
 - 1. Submit samples for Architect's review of color and texture only. Compliance with all other requirements is the exclusive responsibility of the Contractor. Provide a listing of the material and application for each coat of each finish samples.
 - 2. Concrete Unit Masonry: 4 by 8 inch samples of masonry, with mortar joint in the center for each color.

1.4 DELIVERY AND STORAGE

- A. Deliver all materials to the job site in original, new and unopened packages and containers bearing manufacturer's names and label.

1.5 JOB CONDITIONS

- A. Apply water-base paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50°F and 90°F unless otherwise permitted by the paint manufacturer's printed instructions.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Devoe
- B. PPG
- C. Benjamin Moore
- D. Sherwin Williams
- E. Glidden

2.2 PAINTING MATERIALS

- A. Primers, Sealers, Fillers, and special coatings shall be of the highest quality manufactured by approved coating manufacturers:
- B. Exterior Finish Coats: Exterior Alkyd Enamel. Applied at a dry film thickness of not less than 2 mils.
- C. Interior Finish Coats: Interior Semi-gloss Acrylic Enamel and Interior Semi-gloss Alkyd Enamel for all hollow metal door frames and doors.

2.3 PAINTING SYSTEMS

- A. Concrete Unit Masonry Block Filler: Factory formulated high performance latex block fillers:
 - 1. Benjamin Moore; Moorcraft Super Craft Latex Block Filler No. 285: Applied at a dry film thickness of not less than 8.1 mils.
 - 2. ICI Dulux Paints; 4160-XXXX Devguard Multi-purpose Tank & Structural Primer. Applied at a dry film thickness of not less than 2.0 mils.
 - 3. Sherwin Williams; Galvite HS Paint B50WZ3: Applied at a dry film thickness of not less than 2.0 mils.
- B. Miscellaneous Metals (Galvanized):
 - 1. Shop Primer
 - 2. One coat galvanized metal primer
 - 3. Two coats oil base exterior enamel
- C. Fiber Cement Siding, fascia, soffit, and trim
 - 1. Primer
 - 2. Two Coats: Devoe® WeatherKing® II Exterior Flat--100% Acrylic Latex House & Trim
 - 3. Two Coats: Benjamin Moore - Moorcraft Super Spec® Flat Latex House Paint 171

4. Two Coats: Sherwin Williams - Duration® Exterior Latex Coating
- D. Miscellaneous Metals:
1. Shop primer
 2. Two coats oil base exterior enamel
- E. Parking Striping & Island:
1. As indicated on drawings
- F. Exterior Metal Roof Decking and Miscellaneous metals:
1. Two Coats min. 4 mils ea. of Sherwin Williams Macropoxy 646 Epoxy paint or other approved equal. Touch up all field welds and screw attachment areas with same epoxy paint – 8 mils thick.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Applicator must examine the areas and conditions under which painting work is to be applied and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Applicator.
- B. Starting of painting work will be construed as the Applicator's acceptance of the surfaces and conditions within any particular area.
- C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.
- D. General: Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.
1. Remove all hardware, hardware accessories, machined surfaces, plates lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for the complete painting of the items and adjacent surfaces. Following completion of painting of each space or area, reinstall the removed items by workmen skilled in the trades involved.
 2. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program the cleaning and painting so that contaminants from the cleaning process will not fall onto wet, newly-painted surfaces.

3.2 CEMENTITIOUS MATERIALS

- A. Prepare cementitious surfaces of concrete, concrete block, cement plaster and fiber cement board to be painted by removing all efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.

3.3 WOOD

- A. Clean wood surfaces to be painted of all dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of the priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.
- B. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling, etc.
- C. When transparent finish is required, use spar varnish for backpriming.
- D. Backprime paneling on interior partitions only where masonry, plaster, or other wet wall construction occurs on backside.
- E. Seal tops, bottoms, and cut-outs of unprimed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to job.

3.4 FERROUS METALS:

- A. Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
- B. Touch-up shop-applied prime coats wherever damaged or bare, where required by other sections of these specifications. Clean and touch-up with the same type shop primer.

3.5 MATERIALS PREPARATION:

- A. Mix and prepare painting materials in accordance with manufacturer's directions.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir materials before application to produce a mixture of uniform density, and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and if necessary, strain the material before using.
- D. Apply paint in accordance with the manufacturer's directions. Use applicators and techniques best suited for the substrate and type of material being applied.

- E. Apply additional coats when undercoats, stains or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. Give special attention to insure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
- F. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only before final installation of equipment.
- G. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
- H. Finish doors on tops, bottoms and side edges the same as the exterior faces, unless otherwise indicated.
- I. Sand lightly between each succeeding enamel or varnish coat.
- J. Omit the first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.
- K. Scheduling Painting:
 - 1. Apply the first coat materials to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
 - 2. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not defer or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- L. Minimum Coating Thickness:
 - 1. Apply each material at not less than the manufacturer's recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.
- M. Prime Coats: Apply a prime coat of material which is required to be painted or finished, and which has not been prime coated by others.
 - 1. Recoat 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.
- N. Pigmented (Opaque) Finishes:
 - 1. Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfection will not be acceptable.

O. Completed Work:

1. Match approval samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.6 CLEAN-UP & PROTECTION:

A. Clean-Up:

1. During the progress of the work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.
2. Upon completion of painting work, clean window glass and other paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

B. Protection:

1. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to the Architect.
2. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
3. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

END OF SECTION

SECTION 10420 – LETTERS AND SIGNS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Interior panel signage.
 - 2. Signage accessories.

1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.
 - 1. Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 2. Provide message list for each sign, including large-scale details of wording, lettering, artwork, and braille layout.
- C. Samples: For each sign material indicated that involves color selection.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PANEL SIGNS

- A. General: Provide panel signs that comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
- B. Manufacturers:
 - 1. Best
 - 2. Mohawk
 - 3. or approved equal

- C. Interior Signs: MP Graphic Blast Type
1. Rest Room Signs: Mens and Womens, one per restroom (ADA compliant)
 - a. Size 6 x 8 inch Pictogram & copy raised 1/32 inch, 1/4 inch thick plate, screw mounting, color as selected from standard selections.
 - b. Graphics, ADA, HC, and sex symbol
 - c. Raised lettering: Mens or Womens, include Braille lettering.
 2. Single Restroom Sign, one per restroom (ADA compliant)
 - a. Size 6 x 8 inch Pictogram & copy raised 1/32 inch, 1/4 inch thick plate, screw mounting, color as selected from standard selections.
 - b. Graphics, ADA, HC, and unisex symbol
 - c. Raised lettering: Family Restroom, include Braille lettering.
 3. Room Signs (ADA compliant) (include exit signs for each room, including lobby)
 - a. Size 6 x 8 inch Pictogram & copy raised 1/32 inch, 1/4 inch thick plate, screw mounting, color as selected from standard selections.
 - b. Raised Lettering, including Braille lettering for each room on the plan
 - c. Provide one per door.
- D. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of 5005-H15.
- E. Unframed Panel Signs: Fabricate signs with edges mechanically and smoothly finished to comply with the following requirements:
1. Edge Condition: Square cut .
 2. Corner Condition: Rounded to radius indicated.
- F. Frames: Fabricate frames to profile indicated; comply with the following requirements for materials and corner conditions:
1. Material: Acrylic plastic.
 2. Corner Condition: Square.
- G. Graphic Content and Style: Provide sign copy that complies with requirements indicated for size, style, spacing, content, mounting height and location, material, finishes, and colors of signage.

- H. Tactile and Braille Copy: Manufacturer's standard process for producing copy complying with ADA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2 braille. Produce precisely formed characters with square cut edges free from burrs and cut marks.
 - 1. Panel Material: Opaque acrylic sheet .
 - 2. Raised-Copy Thickness: Not less than 1/32 inch.
- I. Engraved Copy: Machine engrave letters, numbers, symbols, and other graphic devices into panel sign on face indicated to produce precisely formed copy, incised to uniform depth.
 - 1. Engraved Metal: Fill engraved copy with enamel.
 - 2. Engraved Opaque Acrylic Sheet: Fill engraved copy with enamel.

2.3 ACCESSORIES

- A. Mounting Methods: Use concealed fasteners fabricated from materials that are not corrosive to sign material and mounting surface.
- B. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.4 ALUMINUM FINISHES

- A. Clear Anodic Finish: Manufacturer's standard clear anodic coating, 0.018 mm or thicker, over a satin finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Locate signs and accessories where indicated, using mounting methods of types described and in compliance with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion and other defects in appearance.
 - 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using methods indicated below:
 - 1. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.

END OF SECTION

SECTION 10520 - FIRE-PROTECTION SPECIALTIES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Portable fire extinguishers.
 - 2. Fire-protection cabinets.
 - 3. Mounting brackets for fire extinguishers.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Fire Extinguishers: Include rating and classification.
 - 2. Fire-Protection Cabinets: Include door hardware, cabinet type, trim style, panel style, and details of installation.
- B. Samples: For each exposed cabinet finish.
- C. Maintenance data.

1.03 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
- C. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements of ASTM E 814 for fire-resistance rating of walls where they are installed.

1.04 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

1.05 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 1. Portable Fire Extinguishers:
 - a. J.L. Industries, Inc.
 - b. Larsen's Manufacturing Company
 - c. Potter-Roemer; Div. of Smith Industries, Inc.
 2. Fire Protection Cabinets:
 - a. J.L. Industries, Inc.
 - b. Larsen's Manufacturing Company
 - c. Potter-Roemer; Div. of Smith Industries, Inc.
 3. Mounting Brackets:
 - a. J.L. Industries, Inc.
 - b. Larsen's Manufacturing Company
 - c. Potter-Roemer; Div. of Smith Industries, Inc.

2.02 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1, clear.

2.03 PORTABLE FIRE EXTINGUISHERS

- A. General: Provide fire extinguishers of type, size, and capacity for each cabinet and other locations indicated.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 1-A:10-B:C, 5-lb (2.3-kg) nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.04 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Enameled-steel sheet.

- D. Recessed-Mounted Cabinet: Cabinet box recessed into wall; with trim.
- E. Door Material: Steel sheet.
- F. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - 1. Provide manufacturer's standard.
 - 2. Provide manufacturer's standard hinge permitting door to open 180 degrees.
- G. Finishes:
 - 1. Manufacturer's standard baked-enamel paint for the following:
 - a. Exterior of cabinet door, except for those surfaces indicated to receive another finish.
 - b. Interior of cabinet and door.

2.05 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Horizontal.

2.06 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub), frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
 - 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
 - 2. Miter and weld perimeter door frames.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging. Remove and replace damaged, defective, or undercharged units.
- B. Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- C. Fire-Protection Cabinets: Fasten fire-protection cabinets to structure, square and plumb.
 - 1. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
- D. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.
- E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- F. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair. Provide protection necessary to prevent damage during remainder of construction period.

END OF SECTION

SECTION 10800 - TOILET ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions, Division 1 Specification Sections, Addenda, Supplemental Instructions, and Change Orders, apply to this section.

1.02 SUMMARY

- A. Extent of each type of toilet accessory is described in the schedule in this section.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions for each toilet accessory.

Samples or color charts on items requiring selection.

1.04 QUALITY ASSURANCE

- A. All accessories shall come from a single manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

Bradley Corporation or equal (basis for design)
Bobrick Washroom Equipment or approved equal
American Specialties or approved equal
Xlerator Hand Dryers or approved equal

2.02 ACCESSORIES LIST

- | | | |
|----|--|-------------------------------|
| A. | TPH-Recessed
Dual Roll Toilet Tissue
Dispenser | Bradley 5412 |
| B. | SP – Surface Mounted
Soap Dispenser | Bradley 6324
Bobrick B-822 |
| C. | GB-Grab Bars with
concealed mounting | Bradley Series 800 |
| D. | Trash Receptacle
Recessed | Bradley 344 |

- | | | |
|----|--|---|
| E. | Trash Receptacle w/ Towel Dispenser Recessed | Bradley 227 |
| F. | Stainless Steel Mirror | Bradley 748 – 18”x30” (one above each lavatory) |
| G. | Hand Dryers | Xlerator XL-SB |

PART 3 - EXECUTION

3.01 INSPECTION

- A. Installer must examine substrates, previously installed inserts and anchorages necessary for mounting of toilet accessories, and other conditions under which installation is to occur, and must notify contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION

- A. Install toilet accessory units in accordance with manufacturer's instructions, using fasteners which are appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored in locations indicated. Coordinate all recessed units with wall framing to insure proper flush fit.

3.03 ADJUST AND CLEAN

- A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly.

Clean and polish all exposed surfaces after removing protective coatings.

END OF SECTION

SECTION 10811 - RAPID DRYING ELECTRIC HAND DRYER

PART 1 - GENERAL

1.01 SUMMARY

- A. Warm air, rapid drying, high efficiency, self contained electric hand dryers.

1.02 PERFORMANCE REQUIREMENTS

- A. Operating protocol: Hand drying shall be accomplished in two sequential phases:

1. Phase 1: Loose water droplets blown from hands with strong, controlled air blast:
 - a. Air velocity in linear feet per minute (LFM):
 - 1) At outlet: 16,000 LFM.
 - 2) At average hand position of 4 inches below outlet: 14,000 LFM.
 - b. Approximate time: 3 to 4 seconds.
 - c. Water removed: 75 percent.
2. Phase 2: Residual moisture evaporated and hands warmed by heated air stream.
 - a. Minimum air temperature at average hand position of 4 inches below air outlet: 130 degrees F when room temperature is 72 degrees F.
 - b. Water removed: 25 percent.

- B. Total drying time required to remove 5 to 6 grams of water: Varies depending on conditions from 10 to 15 seconds.

- C. Maximum moisture remaining on hands at end of drying cycle: 0.2 grams.

1.03 SUBMITTALS

- A. Submit in accordance with Section 01330 - Submittal Procedures:

1. Product data: Include detailed description of dryer explaining operating protocol, drying method, and performance. Provide block diagram of basic components.
2. Shop drawings showing dimensions, method of attachment, and required supports.
3. Electrical wiring diagrams for connection of hand dryers.
4. Manufacturer's installation and maintenance instructions.

1.04 QUALITY ASSURANCE

- A. Hand dryers shall be certified by Underwriters Laboratory (UL), Inc. and shall bear UL labels.

1.05 WARRANTY

- A. Provide under provisions of Section 01770 - Closeout Procedures: 5 year warranty for hand dryer to be free of defects.

PARTS 2 - PRODUCTS

2.01 HAND DRYER

- A. Type: Warm air, electric, rapid drying hand dryer.
- B. Nominal size: 11-3/4 inches wide by 12-11/16 inches high by 6-11/16 inches deep.
- C. Weight: 16 pounds.
- D. Power requirements: 110/120 volt, 12.5 amp, 60 Hz.

2.02 COMPONENTS

- A. Combination blower and motor: Series commutated, through-flow discharge, vacuum type powered by 5/8 HP, 20,000 RPM motor providing air velocities of:
 - 1. At outlet: 16,000 LFM.
 - 2. At average hand position of 4 inches below outlet: 14,000 LFM.
- B. Air heater:
 - 1. 900 watts.
 - 2. Located following blower and capable of heating air stream up to 135 degrees F measured at average hand position of 4 inches below air outlet.
 - 3. Protect with automatic resetting thermostat to open when air flow is restricted and close when air flow is resumed.
- C. Air outlet: Designed to focus air stream, enhance force, and deliver warm air at average hand position of 4 inches below outlet.
- D. Electronic controls: Infrared sensor automatically turns dryer on when hands are held under air outlet. Removal of hands causes dryer to stop within 2 seconds. Electronic sensor shuts off dryer after 35 seconds if hands are not removed or inanimate object is placed across air outlet.

2.03 ENCLOSURE

- A. Material: One piece, heavy duty, rust-resistant, rib-reinforced, die-cast zinc alloy.
- B. Finish: Stainless Steel Cover
- C. Mounting: Cover mounted to wall plate with tamperproof bolts.

- D. Wall plate: Injected molded, rib reinforced plate with metal L brackets for attaching cover. Provide plate with ten 5/16 inch diameter holes for surface mounting to wall and two 7/8 inch diameter holes for electrical wiring.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Coordinate requirements for blocking to ensure adequate means for support and installation of hand dryers.
- B. Coordinate requirements for power supply, conduit, disconnect switches, and wiring.

3.02 INSTALLATION

- A. Comply with manufacturer's written installation instructions and approved shop drawings.
- B. Mount dryers 45 inches above floor surface:
- C. Install dryers securely to supporting substrate so that fixtures are level and aligned with each other. Use type and length of fastener as recommended by manufacturer for type of substrate.

3.03 TESTING AND CLEANING

- A. Inspect installation to verify secure and proper mounting. Test each dryer to verify operation, control functions, and performance. Correct deficiencies.
- B. Clean surfaces and wash with mild soap. Do not use abrasives.
- C. Protect dryers from damage from subsequent construction operations. If damage occurs, remove and replace damaged units.

END OF SECTION