

**SECTION 000101
PROJECT TITLE PAGE**

FOR

MILLINOCKET TOILET FACILITY

OWNER'S PROJECT NUMBER: 2019-10

**UPPER VALLEY ECONOMIC CORPORATION
36 SCHOOL STREET SUITE #4
SHERMAN, MAINE 04776**

**MILLINOCKET LAKE ROAD
ROUTE 157
T1R9 WELS , MAINE**

DATE: MARCH 11, 2020

PREPARED BY: CHUCK CAMPBELL

CHUCK CAMPBELL ARCHITECT PLLC

END OF SECTION

**SECTION 000102
PROJECT INFORMATION**

PART 1 GENERAL

2.01 PROJECT IDENTIFICATION

- A. Project Name: Restroom Facility.
- B. Owner's Project Number: 2019-10.
Project Location Address 1.
T1R9 WELS,
- C. The Owner, hereinafter referred to as Owner: Upper Vallet Economic Cprporation

2.02 NOTICE TO PROSPECTIVE BIDDERS

- A. These documents constitute an Invitation to Bid to and request for qualifications from General Contractors for the construction of the project described below.

2.03 PROJECT DESCRIPTION

- A. Summary Project Description: Restroom Facility.
- B. Contract Scope: Construction.
- C. Contract Terms: Lump sum (fixed price, stipulated sum).
- D. Fixed Contract Amount:

2.04 PROJECT CONSULTANTS

- A. The Architect, hereinafter referred to as Architect: Chuck Campbell Architect PLLC.
 - 1. Address: 127 Union Road.
 - 2. City, State, Zip: Waldoboro, ME 04572.
 - 3. Phone/Fax: 207-557-0448.
 - 4. E-mail: cmcarch@midcoast.com.

2.05 PROCUREMENT TIMETABLE

- A. Last Request for Substitution Due: 7 days prior to due date of bids.
- B. Last Request for Information Due: 7 days prior to due date of bids.
- C. Bid Due Date: [____], before [____] local time.
- D. Bid Opening: Same day, [____] local time.
- E. Bids May Not Be Withdrawn Until: 30 days after due date.
- F. Contract Time: 150 calendar days.
- G. The Owner reserves the right to change the schedule or terminate the entire procurement process at any time.

2.06 PROCUREMENT DOCUMENTS

- A. Availability of Documents: Complete sets of procurement documents may be obtained:
 - 1. From Owner at the Project Manager's address listed above.

2.07 BID SECURITY

- A. Bids shall be accompanied by a security deposit as follows:

1. Bid Bond of a sum no less than 5 percent of the Bid Amount on AIA A310 Bid Bond Form.
2. Certified check in the amount of 5% of bid .

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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END OF SECTION

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CONTRACTING FORMS AND SUPPLEMENTS**

PART 1 GENERAL

1.01 CONTRACTOR IS RESPONSIBLE FOR OBTAINING A VALID LICENSE TO USE ALL COPYRIGHTED DOCUMENTS SPECIFIED BUT NOT INCLUDED IN THE PROJECT MANUAL.

1.02 AGREEMENT AND CONDITIONS OF THE CONTRACT

- A. See Section 005200 - Agreement Form for the Agreement form to be executed.
- B. See Section 007200 - General Conditions for the General Conditions.
- C. The Agreement is based on AIA A101.
- D. The General Conditions are based on AIA A201.

1.03 FORMS

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in Contract Documents.
- B. Bond Forms:
 - 1. Performance and Payment Bond Form: AIA A312.
- C. Post-Award Certificates and Other Forms:
 - 1. Schedule of Values Form: AIA G703.
 - 2. Application for Payment Forms: AIA G702 with AIA G703 (for Contractors).
- D. Clarification and Modification Forms:
 - 1. Architect's Supplemental Instructions Form: AIA G710.
 - 2. Construction Change Directive Form: AIA G714.
 - 3. Change Order Form: AIA G701.
- E. Closeout Forms:
 - 1. Certificate of Substantial Completion Form: AIA G704.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 013216
CONSTRUCTION PROGRESS SCHEDULE**

PART 1 GENERAL

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 BAR CHARTS

- A. Include a separate bar for each major portion of Work or operation.
- B. Identify the first work day of each week.

3.03 REVIEW AND EVALUATION OF SCHEDULE

- A. Participate in joint review and evaluation of schedule with Architect at each submittal.
- B. Evaluate project status to determine work behind schedule and work ahead of schedule.
- C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.04 DISTRIBUTION OF SCHEDULE

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

**SECTION 031000
CONCRETE FORMING AND ACCESSORIES**

PART 1 GENERAL

PART 2 PRODUCTS

2.01 FORMWORK - GENERAL

- A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.
- B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions.
- C. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

PART 3 EXECUTION

3.01 ERECTION - FORMWORK

- 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 to adjacent materials.
- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
- D. Admixtures: comply with manufacturers' instructions for use of admixtures.
- E. 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.
- F. Leaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.02 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

END OF SECTION

**SECTION 032000
CONCRETE REINFORCING**

PART 1 GENERAL

PART 2 PRODUCTS

3.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Deformed billet-steel bars.
 - 2. Unfinished.
- B. Steel Welded Wire Reinforcement (WWR): Galvanized, deformed type; ASTM A1064/A1064M.
 - 1. Form: Flat Sheets.
- C. 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 recommendations, unless otherwise acceptable.

3.02 FABRICATION

- A. Locate reinforcing splices not indicated on drawings at point of minimum stress.

PART 3 EXECUTION

5.01 PLACEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. All steel bars and wire shall be of size, gauge and length indicated, accurately bent or formed to shapes detailed or scheduled by experienced shops using methods that will not injure the material.
 - 2. Steel reinforcing shall not be bent in a manner that will injure the material or the embedding concrete. Bars with kinks or bends not shown on the plans shall not be used. Heating of reinforcement for bending will not be permitted. Bars shall be bent only once.
 - 3. All details of reinforcement not shown or indicated on the drawings or specifically called for in the specifications shall conform to ACI 315.
 - 4. Lap all bars at splices, corners and intersections a minimum of 36 bar diameters unless otherwise indicated.
 - 5. Splices of reinforcement shall not be made at points of maximum stress. Splice lengths shall be a minimum of 36 bar diameters unless otherwise indicated.
 - 6. Where obstructions (pipes, conduit, ducts, etc) prevent the intended placement of reinforcing, provide additional reinforcing as directed by the engineer or his representative around the obstruction.
 - 7. Provide additional stirrups, ties, trim bars, etc., as directed around all openings, sleeves, pipes and conduits, which pass through structural elements.
- B. Do not displace or damage vapor barrier. Repair damage and reseal vapor retarder before placing concrete.

C. Comply with applicable code for concrete cover over reinforcement.

END OF SECTION

**SECTION 033000
CAST-IN-PLACE CONCRETE**

PART 1 GENERAL

2.01 SUBMITTALS

- A. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- B. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test result, or other circumstances warrant adjustments.
 - 1. provide cement manufacturer's letter of certification and chemical content test results stating that the Portland cement is in compliance with ASTM designation C 150.
- C. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.
- D. Welding certificates: Copies of certificates for welding procedures and personnel.
- E. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

2.02 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- E. Welding: Qualify procedures and personnel according to AWS D1.4 "Structural Welding Code -- Reinforcing Steel."

2.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 PRODUCTS

3.01 FORMWORK

- A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.
- B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances. Plywood, metal, metal-framed plywood faced or other panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of the exposed concrete surface.
- C. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

3.02 REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
- B. Steel Welded Wire Reinforcement (WWR): Plain type, ASTM A1064/A1064M.
 - 1. Form: Flat Sheets.

3.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type II - Moderate Portland type.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
- C. Fly Ash: ASTM C618, Class C or F.
- D. Calcined Pozzolan: ASTM C618, Class N.
- E. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.
- F. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

3.04 ADMIXTURES

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- B. Air Entrainment Admixture: ASTM C260/C260M.
- C. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

3.05 ACCESSORY MATERIALS

- A. Underslab Vapor Retarder: Sheet material complying with ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. The use of single ply polyethylene is prohibited.

3.06 CURING MATERIALS

- A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.

3.07 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- C. Normal Weight Concrete:
 - 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,000 pounds per square inch.
 - 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
 - 3. Calcined Pozzolan Content: Maximum 10 percent of cementitious materials by weight.
 - 4. Silica Fume Content: Maximum 5 percent of cementitious materials by weight.
 - 5. Water-Cement Ratio: Maximum 40 percent by weight.
 - 6. Total Air Content: 4 percent, determined in accordance with ASTM C173/C173M.
 - 7. Maximum Slump: 4 inches.

PART 3 EXECUTION

4.01 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
- C. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips: use strike-off templates or compacting-type screeds.

4.02 INSTALLING EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with item to be embedded.
 - 2. Install anchor bolts, accurately located, to elevations required

4.03 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement
 - 1. All steel bars and wire to be of size, gauge, and length indicated, accurately bent or formed to shapes detailed or scheduled by experienced shops using methods that will not injure the materials.
 - 2. Steel reinforcing shall not be bent in a manner that will injure the material or the embedding concrete. Bars with kinks or bends not shown on the plan shall not be used. Heating of reinforcement for bending will not be permitted. Bars shall be bent only once (no rebending or straightening allowed) unless shown as such on the drawings.
 - 3. All details of reinforcement not shown or indicated on the drawings or specifically called for in the specifications shall conform to ACI 315.
 - 4. Lap all bars at splices, corners and intersections a minimum of 36 bar diameters unless otherwise indicated.
 - 5. All intersecting concrete walls shall be tied with #4L bars 3'-0" long, bent 18"x18" spaced 12" on center, outside face only unless otherwise indicated
 - 6. Splices of reinforcement shall not be made at points of maximum stress. Splice lengths shall be a minimum of 36 bar diameters unless otherwise indicated and shall provide sufficient lap to transfer the stress between bars by bond and shear. Stagger splices of adjacent bars where possible. All splices and laps at corners and intersections shall be tied with wire at each end.
 - 7. Where obstructions (pipes, conduits, ducts, etc.) prevent the intended placement of reinforcing, provide additional reinforcing around the obstruction to match that reinforcing interrupted
 - 8. Provide additional stirrups, ties, trim bars, etc., as directed around all openings, sleeves, pipes, and conduits, which pass through structural elements.
 - 9. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

4.04 CONCRETE MIXING

- A. General: The concrete shall be mixed in the quantities required for immediate use, and any which has developed initial set or exceed the time limit of ASTM C 94 shall not be used. No retempering of mortar or concrete shall be allowed under any circumstances.
- B. Final proportions shall be in accordance with approved mix design.

4.05 PLACING CONCRETE

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Remove loose dirt, mud, standing water, and foreign matter from excavations or from cavities.
- C. Thoroughly clean reinforcement and other embedded items free from loose rust and other matter. Assure reinforcing is held securely in place.
- D. Equipment shall be maintained clean and of sufficient quantity and capacity to efficiently execute the work required.
- E. Do not add water to concrete during deliver, at project site, or during placement, unless approved by engineer.
- F. Before placing concrete, water may be added at project site, subject to limitations of ACI 301.
- G. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.
- H. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic to avoid cold joints.
 - 1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
 - a. concrete shall be vibrated into final position in forms with an internal type vibrating machine. The vibration shall have a frequency of not less than 8000 vibrations per minute.
 - b. The vibration shall be of sufficient intensity and duration to cause flow or settlement of the concrete and complete consolidation. Over vibration, especially of mixtures that are too wet, may cause segregation and will be avoided. A sufficient number of vibrators shall be provided to permit consolidation of each batch before the batch is delivered and without delaying the delivery.
 - c. The vibrations shall be applied directly to the concrete, and vibration through the forms shall not be permitted. Vibration shall be applied at the point of deposit and in the area of freshly deposited concrete. The concrete shall be placed in layers of uniform thickness.
 - d. Dropping of concrete a distance of more than 6 feet unless confined by closed chutes or pipes will not be permitted. The concrete shall be deposited at or as near as possible to its final position.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.
 - 3. When conditions make puddling difficult, or where reinforcement is congested, batches of mortar containing the same proportions of cement and sand used in the

- concrete shall be deposited in the forms. The operation of filling with the regularly specified mix shall be carried on at such a rate that the mix is at all times plastic and flows readily into the spaces between the bars.
4. In thin walls or inaccessible portions of the forms where rodding is impractical, the concrete shall be worked into place by tapping or hammering forms adjacent to the freshly deposited concrete.
 5. The contractor's attention is called to the importance of making the concrete dense, and shall provide sufficient labor to avoid air pockets and voids in exposed sections and leave smooth uniform surfaces after forms are removed.
 6. Should any honeycombed concrete be disclosed upon form removal, the contractor shall immediately cut out the said honeycombed portion back to solid concrete and shall fill the opening thus formed with concrete of the same proportions at that specified for the section of work in which the fault occurs.
 7. When placing fresh concrete upon hardened concrete, the latter shall be thoroughly roughened and cleaned of all loose materials, scum or latency. The bonding compound shall be applied and the new concrete placed while bonding agent is still tacky.
 8. The contractor's attention is called to the importance of properly and carefully placing concrete around reinforcement, as the reinforcement metal must not be exposed; and in cases where reinforcement metal becomes exposed on the surface, that portion of work must be removed and re-laid as the covering of same by plastering with cement mortar will not be allowed. All reinforcing rods or other reinforcing material shall be lightly tapped so that they will retain their original position.
 9. No concrete shall be retempered except as allowed in ASTM C 94 nor shall set concrete be used as aggregate.
- I. Deposit and consolidate concrete floors and slabs in a continuous operation, within limits of construction joints, until placement of panel is complete
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement. Reinforcement, unless otherwise indicated, shall be placed one-half the thickness of the slab.
 - a. Reinforcement, unless otherwise indicated, shall be placed one-half the thickness of the slab.
 3. Screed slab surface with a straight edge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps and hollows, before starting finishing operation.
- J. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing action, or low temperatures.
1. When air temperature has fallen to or is expected to fall below 40 Deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 Deg F and not more than 80 Deg F at point of placement.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.
 4. Contractor shall have on the job, ready to install, adequate equipment for heating the materials and the freshly placed concrete and for enclosing the work in accordance with the requirement specified herein.
- K. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows.

1. Cool ingredients before mixing to maintain temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature. Provide water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is contractor's option.
2. Cover steel reinforcement with water soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

4.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Maximum Variation of Surface Flatness:
 1. Exposed Concrete Floors: 1/4 inch in 10 feet.
 2. Under Seamless Resilient Flooring: 1/4 inch in 10 feet.
 3. Under Carpeting: 1/4 inch in 10 feet.
- B. Correct the slab surface if tolerances are less than specified.
- C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

4.07 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 1. All interior concrete floor slabs shall be finished true and smooth by steel troweling or finishing machine.
 2. Exterior floor slabs to have a broom finish.
 3. When a section of concrete floor is completed, it shall be left entirely undisturbed until the concrete is thoroughly hardened.
 4. Adequate provisions will be made to eliminate the possibility of accidental encroachment upon the newly concreted area.
- C. Float Finish: Consolidate surface with power-driven floats or by hand if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill in low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish.
- D. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven-trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor covering.
 1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view.
 2. Finish surfaces to the following tolerances, measured within 24 hours according to ASTM E 1155/e 1155M for randomly trafficked floor surface.
 - a. Tolerances will be in accordance with ACI Publication #117 - Class AX
Depression in floor between high spots shall not be greater than 3/16' in 10'-0" +/- 1/16", and the measurement will be taken by the straight edge method no later than the day after the floor has been poured.

4.08 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

END OF SECTION

**SECTION 033511
CONCRETE FLOOR FINISHES**

PART 1 GENERAL

PART 2 PRODUCTS

2.01 CONCRETE FLOOR FINISH APPLICATIONS

2.02

- A. High Gloss Clear Sealer:
- B. Slip Resistant Coating: High gloss clear sealer with plastic aggregate.

2.03 COATINGS

- A. High Gloss Clear Coating: Transparent, non-yellowing, water- or solvent-based coating.
 - 1. Composition: Acrylic polymer-based.
- B. Low Gloss Clear Coating: Transparent, non-yellowing, water- or solvent-based coating.
 - 1. Composition: Acrylic polymer-based.
 - 2. Nonvolatile Content: 15 percent, minimum, when measured by volume.

PART 3 EXECUTION

3.01 GENERAL

- A. Apply materials in accordance with manufacturer's instructions.

3.02 COATING APPLICATION

- A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
- B. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.
- C. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.
- D. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

END OF SECTION

**SECTION 040100
MASONRY**

PART 1 GENERAL

1.01 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 Concrete Reinforcement." Show elevations of reinforced walls.
- C. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with the requirements indicated:
 - 1. Each type of masonry unit required.
- D. Material Certificates: Signed by manufactures certifying that each of the following items complies with requirements.
 - 1. Each type of masonry unit required.
 - 2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
 - 3. Each material and grade indicated for reinforcing bars.
 - 4. Each type and size of joint reinforcement.
 - 5. Each type and size of anchor, tie and metal accessory
- E. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements. Coordinate with general contractor's procedures for enclosures and heating.

1.02 QUALITY ASSURANCE

- A. Source Limitation for Masonry Units: Obtain exposed masonry units of 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.
- B. 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 a one source or provider for each aggregate.

1.03 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 dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. 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 metal dispensing silo with weatherproof cover.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.04 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 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 square edge units for outside corners, unless indicated as bullnose.
- B. Concrete Masonry Units: ASTM C 90 and as follows:
 - 1. Unit compressive strength: Provide units with a minimum average net-area compressive strength of 1900 psi.
 - 2. Weight Classification: Normal weight.
 - 3. Size(width): Manufactured to dimensions 3/8 inch less than nominal dimension.
 - 4. Exposed Faces: Manufacturer's standard color and texture, unless otherwise directed.

2.02 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of Portland cement complying with ASTM C 150, Type I or Type II, and hydrated lime complying with ASTM C 207.
 - 1. Blue Circle Cement, Inc.: Eaglebond High Strength Type S
 - 2. Ciment Quebec, Inc.: Portland and Lime / Type S
 - 3. Dragon Cement and Concrete: Type S Masonry Cement

2.03 REINFORCING STEEL

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M; ASTM A 616/A 616M, including Supplement 1: or ASTM A 617/A 617M, Grade 60.

2.04 MASONRY JOINT REINFORCEMENT

- A. Interior Block Wall Reinforcement: Truss type, ASTM A641, mill galvanized, NO. 9 wire.
 - 1. available products: Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to, the following:
 - a. Duro-wall; Dur-O-Truss
 - b. Hohmann & Barnard; Truss-Mesh, #120
 - c. Wire-Bond; Series 300, Single Wythe
- B. Exterior Block Reinforcement: Truss type, ASTM A641, mill galvanized, No. 9 wire.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to, the following
 - a. Duro-wall; Dur-O-Truss
 - b. Hohmann & Barnard; Truss-Mesh, #120
 - c. Wire-Bond; Series 300, Single Wythe

2.05 MISCELLANEOUS ANCHORS

- A. Anchor Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dipped galvanized to comply with ASTM A 153, Class C; of diameter and length indicated and in the following configurations:

2.06 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 urethane or PVC.
 - 1. Holmann & Barnard: #NS - Closed Cell Neoprene
 - 2. Wire Bond: 3000 Horizontal.
- 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.
- C. 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 dipped galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.
 - 1. Available Products: Subject to compliance with requirements, positioners that may be incorporated into the work include, but are not limited to the following:
 - a. D/A 811; Dur-O-Wal, Inc.
 - b. D/A 816; Dur-O-Wal, Inc.
 - c. No. 376 Rebar Positioners; Heckman Building Products, Inc.
 - d. #RB Rebar Positioners; Hohmann & Barnard, Inc
 - e. #RB-Twin Rebar Positioner; Hohmann & Barnard, Inc.
 - f. Double O-Ring Rebar Positioner; Masonry Reinforcing Corporation of America.
 - g. O-Ring Rebar Positioner; Masonry Reinforcing Corporation of America.
- D. Grout Screen: Monofilament screen fabricated from high-strength, non-corrosive polypropylene polymers.
 - 1. Available Products: Subject to compliance with requirements, grout screen materials that may be incorporated into the work include, but are not limited to the following:
 - a. AA3260; AA Wire Products.
 - b. Dur-O-Stop; Dur-O-Wal, Inc.
 - c. MGS; Hohmann & Barnard.

2.07 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
 - 1. Available Products: Subject to compliance with requirements, products that may be used to clean unit masonry surfaces include, but are not limited to:
 - a. 202V Vana-Stop; Diedrich Technologies, Inc.
 - b. Sure Klean Vana Trol; ProSco, Inc.

2.08 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining, accelerators, retarders, water-repellent agents, antifreeze compounds or other admixtures, unless otherwise

indicated.

1. Do not use calcium chloride in mortar or grout.
- 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, Property Specifications, Thpe S.
- D. Grout for Unit Masonry: Comply with ASTM C 476
 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with table 5 of ACI 530.1/ASCR 6/TMS 602 for dimensions of grout spaces and pour height.
 2. Provide grout with a slump of 8 to 11 inches os measured according to ASTM C 143.
 - a. MORTAR MATERIALS

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 1. Verify that foundations are within tolerances specified.
 2. Verify that reinforcing dowels are properly placed.
 3. 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.

3.02 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 others 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. Bracing Walls During Construction: It is the sole responsibility of the masonry contractor to design and provide temporary bracing of masonry walls during construction. Refer to NCMA Tek Bulletin 3-4B and applicable OSHA standards. Provide 3' construction fencing around restricted zones.

3.03 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 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 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 thickness by more than 1/8 inch.

3.04 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 dimension at corners or jambs.
 - 1. One half running bond with vertical joint in each course centered on units in courses above and below.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4 inch horizontal face dimension at corners or jambs.
- D. 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 tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
- E. 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.
- F. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.
- G. Where Built-in items are to be embedded in cores of hollow masonry units, place a layer metal lath in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- I. Build non load bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.

3.05 MORTAR BEDDING AND JOINTING

- A. Lay hollow masonry units as follows:
 - 1. with full mortar coverage on horizontal and vertical face shells.
 - 2. Bed webs in mortar in starting course on footing and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
 - 3. For starting course on footing where cells are not grouted, spread out full mortar bed, including areas under cells.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.

3.06 MASONRY JOINT REINFORCING

- A. General: provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls,

1/2 inch elsewhere. Lap reinforcement a minimum 6 inches.

1. Space reinforcement not more 16 inches o.c. unless otherwise indicated.
2. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond opening.
 - a. Reinforcement above is in addition to continuous reinforcement.
- B. Cut or interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.07 CONTROL AND EXPANSION JOINTS

- A. General: Install control joints in unit masonry where indicated. Provide control joints in masonry partitions at changes in wall heights, at control joints in the wall bottom support material, within 8 feet of wall corners or intersections for walls greater than 16 feet, and at not less than 24 feet on center for straight walls. Built-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 preformed control joint gaskets designed to fit standard sash block.
 2. Joint reinforcement shall be discontinuous at control joint.
 3. Structural bond beam reinforcement shall be continuous through control joints.

3.08 LINTELS

- A. Provide masonry lintels where shown and where openings of more than 12 inches for brick size units and 24 inches for block size units are shown without structural steel or other supporting lintels
 1. Provide built in place masonry lintels. Use specially formed bond beam units with reinforcing bars placed as indicated and filled with coarse grout. Temporarily support built in place lintels until cured.
 2. Extend horizontal reinforcement beyond the opening a minimum of 40 bar diameters, but not less than 24 inches.
 3. Where steel lintels are utilized in concrete masonry openings, construct a bond beam above steel with 2 #4 bars. Extend 24 inches beyond the opening.
- B. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.09 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.
 1. Layout vertical reinforcement with specified jamb reinforcement 4 inches from each corner, control joint, and opening jamb. Space bars between at a uniform spacing that does not exceed the spacing specified, rounded to the nearest 8 inches. Maximum spacing shall not exceed 48 inches in any location.

2. Minimum splice length for deformed bar reinforcement shall be 48 bar diameters. Secure lap splices by tying with wire.
 3. Secure reinforcement in place before placing grout. For vertical reinforcement, use one of the following methods:
 - a. Secure bar at bottom of each grout lift by tying to dowels. Build masonry around reinforcement. Install rebar positioners at top of each bar and at a spacing of 192 bar diameters.
 - b. Install rebar positioners at the bottom course of the grout lift, located with 4 inches of the dowel to be spliced. Lay up masonry units. Set vertical bar in the rebar positioner, install additional rebar positioners at the top of the rebar, and at a maximum spacing of 192 bar diameters.
- 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.
 2. Definitions:
 - a. Grout Lift - Grout placed in one continuous operation. The maximum time span for the grout placement in one lift is 1-1/2 hours measured from the time water is added to the grout mix. The minimum time span between successive grout lifts is one hour.
 - b. Grout Pour - The height of masonry to be grouted prior to the erection of additional masonry.
 3. Provide cleanout holes at least 3 inches in least dimension for grout pours over 60 inches in height.
 - a. Provide cleanout holes at each vertical reinforcing bar.
 4. Where grouting of cells does not extend the full height of the wall, install specified grout stop at bottom of lift.
 5. Consolidate grout with mechanical vibrator.
 - a. Use low velocity vibrator with a 3/4 inch head.
 - b. Vibrate each cell in concrete masonry units twice. Insert vibrator to bottom of lift and activate for 1 to 2 seconds.
 - c. Perform initial consolidation at each cell immediately after grout placement.
 - d. Perform reconsolidation in each cell by reinserting vibrator when grout is still plastic.

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 the 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 joint 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 a sample wall panel; leave one half of panel uncleaned for comparison purposes. Obtain 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 surface thoroughly with clean water.
5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces. Where efflorescence occurs, clean as recommended in NCMA TEK 8-3A

3.11 MASONRY WASTE DISPOSAL

- A. Excess Masonry Waste: Remove excess, clean masonry waste and legally dispose of off owner's property.

END OF SECTION

**SECTION 061000
ROUGH CARPENTRY**

PART 1 GENERAL

- A. This section includes the following:
 - 1. Framing with dimension lumber
 - 2. Wood blocking and nailers
 - 3. Wood furring
- B. 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, and finishing treated materials.
 - 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.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 DIMENSION LUMBER

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: Kiln-dry or MC15.
- C. Stud Framing (2 by 2 through 2 by 6):
 - 1. Species: Spruce-Pine-Fir.
 - 2. Grade: No. 2.
- D. Rafter and Small Beam Framing (2 by 6 through 4 by 16):
 - 1. Species: Spruce-Pine-Fir.
- E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 EXPOSED TIMBERS

- A. Moisture Content: Kiln-dry (20 percent maximum).
- B. Surfacing: S4S.
- C. Species: Hemlock.
- D. Grade: No. 2.

2.04 EXPOSED BOARDS

- A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- B. Moisture Content: Kiln-dry (15 percent maximum).
- C. Surfacing: S4S.
- D. Species: Pine.
- E. Grade: No. 2, 2 Common, or Construction.

2.05 FASTENERS

- A. 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/A 553M.
- B. Nails, Brads, and Staples: ASTM F 1667
- C. Power Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Bolts: Steel bolts complying with ASTM 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- F. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M)
- G. Expansion Anchors: Anchor bolts and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspection agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

2.06 METAL FRAMING ANCHORS

- A. General: Provide framing anchors made from metal indicated, of structural capacity, type, and size indicated, and as follows:
 - 1. Research/Evaluation Reports: Provide product acceptable to authorities having jurisdiction and for which model code research/evaluation report exist that show compliance of metal framing anchors, for application indicated, with building code in effect for project.
 - 2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- B. Galvanized Steel Sheet: Hot-Dip zinc-coated steel sheet complying with ASTM A 653/A 653M, G60(Z180) coating design.

PART 3 EXECUTION

3.01 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 a minimum number of joints or optimum joint arrangement.
- C. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.
- D. Securely attach rough carpentry work to substrate by fastening and anchoring as indicated, complying with the most stringent of the following:
 - 1. Published requirements of metal framing anchor manufacturer.
 - 2. Table 2304.10.1 "Fastening Schedule" in the 2015 IBC.
- E. Use common wire nails, unless otherwise indicated. 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 finish nails for exposed work, unless otherwise indicated. Countersink nail heads and fill with wood filler.

3.02 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 substrate 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.

3.03 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges if openings. Shim with wood as required for tolerance of finish work.

3.04 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Install structural members full length without splices.
- C. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes.
- D. Where built-up beams or girders of 2 inch nominal dimension lumber on edge are required, fasten together with two rows of 20d nails spaced not less than 32 inches o.c.. Locate one row near the top edge and the other near the bottom edge.

3.05 RAFTER FRAMING INSTALLATION

- A. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchor, if indicated on plans. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut a ridge, place directly opposite each other and nail to ridge or use metal ridge hangers.

END OF SECTION

**SECTION 061600
SHEATHING**

SECTION 061600 - SHEATHING (HEW ADVANTECH)

1.01 PART 1 GENERAL

- A. RELATED DOCUMENTS
- B. SUMMARY
 - 1. Section Includes:
 - a. Wall sheathing.
 - b. Roof sheathing.
- C. ACTION SUBMITTALS
 - 1. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
- D. QUALITY ASSURANCE
 - 1. Code Compliance: Comply with requirements of the following:
 - a. International Code Council Evaluation Service, ICC-ES ESR-1785.
- E. DELIVERY, STORAGE, AND HANDLING
 - 1. Outdoor Storage: Comply with manufacturer's recommendations:
 - a. Set panel bundles on supports to keep off ground.
 - b. Cover panels loosely with waterproof protective material.
 - c. Anchor covers on top of stack, but keep away from sides and bottom to assure adequate air circulation.
 - d. When high moisture conditions exist, cut banding on panel stack to prevent edge damage.
- F. WARRANTY
 - 1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of flooring and sheathing system that fail due to manufacturing defects within specified warranty period.

1.02 PART 1 PRODUCTS

- A. PERFORMANCE REQUIREMENTS
- B. WOOD PANEL PRODUCTS
 - 1. Oriented Strand Board: DOC PS 2-10.
 - 2. Thickness: As needed to comply with requirements specified, but not less than thickness indicated. Thickness shall satisfy minimum and maximum requirements for referenced performance category.
 - 3. Factory mark panels to indicate compliance with applicable standard.
- C. WALL SHEATHING
 - 1. Oriented-Strand-Board Wall Sheathing: Exposure 1, Structural I sheathing.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide Huber Engineered Woods LLC; AdvanTech Sheathing or a comparable product by one of the following:
 - 1)
 - b. Span Rating and Performance Category: Not less than [32/16, 1/2 Performance Category] [40/20, 5/8 Performance Category].
 - c. Edge Profile: [Square edge] [Tongue and groove].
 - d. Provide fastening guide on top panel surface with pre-spaced fastening symbols for 16-inches (406 mm) and 24-inches (610 mm) on center spacings.
 - e. Performance Standard: DOC PS2-10 and ICC-ES ESR-1785.
 - f. Exposure Time: Designed to resist weather exposure for 300 days.
- D. ROOF SHEATHING
 - 1. Oriented-Strand-Board Roof Sheathing: Exposure 1, Structural I sheathing.

- a. Basis-of-Design Product: Subject to compliance with requirements, provide Huber Engineered Woods LLC; AdvanTech Sheathing or a comparable product by one of the following:
 - 1)
 - b. Span Rating and Performance Category: Not less than [32/16, 1/2 Performance Category] [40/20, 5/8 Performance Category]
 - c. Edge Profile: [Square edge] [Tongue and groove].
 - d. Provide fastening guide on top panel surface with pre-spaced fastening symbols for 16-inches (406 mm) and 24-inches (610 mm) on center spacings.
- E. FASTENERS
- 1. General: Provide fasteners of size and type indicated that comply with requirements specified in this article by the authority having jurisdiction, International Building Code, International Residential Code, Wood Frame Construction manual, and National Design Specification.

1.03 PART 1 EXECUTION

A. INSTALLATION, GENERAL

- 1. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- 2. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- 3. Securely attach to substrate by fastening as indicated, complying with the following:
 - a. ICC-ES ESR-1539 or NES NER-272 for power-driven fasteners.
 - b. Chapter 23 in ICC's "International Building Code."
- 4. Use common wire nails unless otherwise indicated. 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. Install fasteners without splitting wood.
- 5. Coordinate [wall] [and] [roof] sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- 6. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

B. WOOD STRUCTURAL PANEL INSTALLATION

- 1. General: Comply with applicable recommendations in American Wood Council, "ASD/LRFD Manual for Engineered Wood Construction," 2012 edition for types of structural-use panels and applications indicated.
- 2. Fastening Methods: Fasten panels as indicated below:
 - a. Wall and Roof Sheathing:
 - 1) Nail to wood framing.
 - 2) Space panels 1/8 inch (3 mm) apart at edges and ends.
 - 3) Install fasteners 3/8 inch (9.5 mm) to 1/2 inch (12.7 mm) from panel edges.
 - 4) Space fasteners in compliance with requirements of authority having jurisdiction.

END OF SECTION

**SECTION 061753
SHOP-FABRICATED WOOD TRUSSES**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Shop Drawings: Show truss configurations, sizes, spacing, size and type of plate connectors, cambers, framed openings, bearing and anchor details, and bridging and bracing.

1.02 QUALITY ASSURANCE

- A. Designer Qualifications: Perform design by or under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.
- B. Source Limitations for connector plates: Obtain metal connector plates through one source from a single manufacturer.
- C. Comply with applicable requirements and recommendations of the following publications:
 - 1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction"
 - 2. TPI DSB, "Recommended Design Specifications for Temporary Bracing of Metal Plate Connected Wood Trusses"
 - 3. TPI HIB, "Commentary and Recommendations for Handling, Installing, and Bracing Metal Plate Connected Wood Trusses"
- D. Wood Structural Design Standard: Comply with applicable requirements in AFPA's "National Design Specifications for Wood Construction" and its "supplement"

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Comply with TPI recommendations to avoid damage and lateral bending. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

1.04 COORDINATION

- A. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work must follow erection of trusses.

PART 2 PRODUCTS

2.01 TRUSSES

- A. Wood Trusses: Designed and fabricated in accordance with TPI 1 and TPI DSB-89 to achieve structural requirements indicated.
 - 1. Connectors: Steel plate.
 - 2. Structural Design: Comply with applicable code for structural loading criteria.
 - 3. Design Roof Live and Dead Load: 115 lbs/sq ft.
 - 4. Roof Deflection: 1/240, maximum.

2.02 MATERIALS

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Provide dressed lumber, S4S, manufactured to actual sizes required by DOC PS 20 for moisture content specified
 - 3. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
- B. Grade and Species: Provide visually graded dimension lumber for truss chord and web members, of the following grade and species:
 - 1. Grade for chord members: Select Structural or No. 1
 - 2. Grade for Web Members: No. 2 or better
 - 3. Species: Southern pine, SPIB
 - 4. Species: Mixed southern pine, SPIB

2.03 FABRICATION

- A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- B. Fabricate metal connector plates to sizes, configurations, thicknesses. an anchorage details required to withstand design loads for types of joint designs indicated.
- C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- D. Connect truss members by metal connector plates located on securely embedded simultaneously in both sides of wood members by air or hydraulic press.

2.04 STEEL CONNECTORS: HOT-DIPPED GALVANIZED STEEL SHEET, ASTM A653/A653M STRUCTURAL STEEL (SS) GRADE 33/230, WITH G90/Z275 COATING; DIE STAMPED WITH INTEGRAL TEETH; THICKNESS AS INDICATED.

2.05 METAL FRAMING ANCHORS

- A. General: provide framing anchors made from metal indicated, of structural capacity, type, and size indicated and as follows:
- B. Galvanized Steel Sheet: Hot-Dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
- C. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches wide by 0,050 inch thick. Clip is fastened to truss through slotted holes to allow for truss deflection.

2.06 FASTENERS

- A. Galvanized Steel Sheet: Hot-Dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
- B. Truss Tie Downs (Hurricane or seismic ties): Bent strap tie for fastening roof trusses to wall studs below, 2 1/2 inches wide by 0.062 inch thick. Tie fits over top of truss and fastens to both sides of truss, face of top plates, and side of studs below.
- C. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches wide by 0.050 inch thick. Clip is fastened to truss through slotted holes to allow for truss deflection.

PART 3 EXECUTION

4.01 ERECTION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. Hoist trusses in place by lifting equipment suited to size and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- C. Install trusses in accordance with manufacturer's instructions and TPI DSB-89 and TPI BCSI 1; maintain a copy of each TPI document on site until installation is complete.
- D. Set members level and plumb, in correct position.
- E. Do not field cut or alter structural members without approval of Architect.
- F. Anchor trusses securely at bearing points; use metal framing anchors. Install fasteners through each fastener hole in metal framing anchor according to manufacturer's fastening schedules and written instructions.
- G. Securely connect each truss ply required for built-up girder truss.
- H. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.

END OF SECTION

**SECTION 062000
FINISH CARPENTRY**

PART 1 GENERAL

1.01 SUMMARY

- A. This setion includes the following:
 - 1. Exterior standing and running trim
 - 2. Interior standing and running trim
 - 3. Exterior railing
 - 4. Exterior wood ceiling

1.02 SUBMITTALS

- A. Product data for PVC trim

1.03 DELIVERY AND STORAGE

- A. Protect materials against weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.
- B. Deliver interior finish carpentry only when environmental conditions meet requirements specified for installation areas. If finish carpentry must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.04 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry until building is enclosed and weatherproof, wet work in space is completed and normally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Weather Limitations: proceed with installation only when existing and forecasted weather conditions permit work to be performed according to manufacturer's written instructions and warranty requirements and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.

PART 2 PRODUCTS

2.01 EXTERIOR STANDING AND RUNNING TRIM

- A. Wood Trim for Painted Applications: Kiln-dried, finger-jointed or solid lumber with surfaced (smooth) face and of the following species and grade.
 - 1. Grade: Finish or No. 2 eastern white pine; NELMA, NLGA

2.02 EXTERIOR SOFFITES AND CEILINGS

- A. Board Paneling: V-match, tongue-and-groove 1 inch by 6 inch board
 - 1. Species: Red or white cedar
 - 2. Grade: Clear No. 1
- B. Soffit vent strips: 2 inch wide aluminum vent strip. VAs70 Vent-A-Strip by Alcoa or approved substitute.

2.03 INTERIOR STANDING AND RUNNING TRIM

- A. Wood Trim for Opaque Finish(Painted): Finished lumber (S4S). either finger-jointed or solid lumber, of the following species and grades.
 - 1. Grade: premium or No. 2 eastern white pine; NELMA or NLGA
- B. PVC trim: solid polyvinyl chloride (PVC) material produces in stock sizes to match wood lumber and trim. Flame spread index of 25 in accordance with ASTM E84.
 - 1. Available Products.
 - a. Azek by Azek Building products.
 - b. Celtec 550 by Lumber Specialties, Inc.
 - c. Klear Lumber, LLC
 - d. Koma B
 - e. by Kommerling USA, Inc
 - f. Versatex by Wolfpac Technologies, Inc

2.04 EXTERIOR RAILING

- A. Exterior railing to be Vista Railing system "Traditional" or approved alternate.

2.05 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: Provide nails or screws of the following materials, in sufficient length to penetrate minimum Of 1-1/2 inches into substrate, unless otherwise recommended by manufacturer.
 - 1. Stainless Steel

2.06 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.

PART 3 EXECUTION

3.01 PREPARATIONS

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing finish carpentry, condition material to average prevailing humidity in installation area for a minimum of 24 hours.
- C. Prime lumber for exterior applications to be painted, including both faces and edges. Cut to required lengths and prime ends. Comply with requirements of division 9 Section "Painting"

3.02 INSTALLATION, GENERAL

- A. Do not use materials that are unsound., warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 2. Countersink fasteners, fill surface flush, and sand where face fastening is unavoidable.
 - 3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining finish carpentry with 1/32 inch maximum offset for flush installation and 1/16 inch maximum

offset for reveal installation.

4. Coordinate finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate finish carpentry.

3.03 STANDING AND RUNNING TRIM

- A. install with a minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.
 1. Match color and grain pattern across joint.
 2. Install trim after gypsum board joint finishing operations are completed.
 3. Drill pilot holes in cedar before fastening to prevent splitting. Fasten to prevent movement or warping, Countersink fastener heads on exposed carpentry work an fill holes.
 4. Fit exterior joints to exclude water.
 - a. Set and secure materials and components in place, plumb and level.
 - b. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.04 RAILING INSTALLATION

- A. Railing: Fasten railing per manufacturer's recommendations.

3.05 ADJUSTING

- A. Replace finish carpentry that is damaged or does not comply with requirements. Finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.06 CLEANING

- A. Clean finish carpentry on exposed and semiexposed surfaces. Touch up factory applied finishes to restore damaged or soiled areas.

END OF SECTION

**SECTION 068316
FIBERGLASS REINFORCED PANELING**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes the following:
 - 1. Glass-Fiber-reinforced panels.

1.02 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- B. Shop Drawings: Show locations, extent, and installation details of each glass-fiber-reinforced panel system component. Show method of attachment to adjoining construction.
- C. Samples for Selection: Manufacturer's sample of selections of plastic material showing the full range of colors and textures available for each component indicated.
 - 1. Sheet or Panel: 6-by-6-inch square sample of each glass-fiber-reinforced panel required.
 - 2. Trim: 12 inch long samples of each type of glass-fiber-reinforced panel component required. Include examples of joinery, corners, and field splices.
- D. Material Test Reports: From a qualified testing agency indicating compliance of each glass-fiber-reinforced panel component with requirements indicated, based on test performed by testing agency within the past five years,
- E. Maintenance Data: For each glass-fiber-reinforced panel component to include in maintenance manuals specified in Division 1.
 - 1. Include recommended methods and frequency for maintaining optimum conditions of panels under anticipated use conditions. Include precautions against using cleaning materials that may be detrimental to plastic finishes and performance.

1.03 QUALITY ASSURANCE

- A. Source Limitations: Obtain each color, grade, finish and type of glass-fiber-reinforced panel system component from a single source with resources to provide components of consistent quality in appearance and physical properties.
- B. Fire-Test-Response Characteristics: Provide impact-resist wall protection system components with the following surface burning characteristics, as determined by testing materials identical to those required in this section per ASTM E 84 by a testing and inspection agency acceptable to authorities having jurisdiction. Identify impact-resistant wall protection system components with appropriate markings of applicable testing and inspecting agency.
 - 1. Flame Spread: 25 or less.
 - 2. Smoke Developed: 450 or less.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering impact-resistant wall protection system products that may be incorporated into the work include, but are not limited to, the following
 - 1. Fire-X Glasbord with Surfascal by Kemlite Company

2.02 MATERIALS

- A. Plastic sheet Wall Covering Material: Semirigid, textured, chemical and stain resistant, high impact resistant, PVC or acrylic-modified vinyl plastic sheet; thickness as indicated, meeting the following:
 - 1. Barcol Hardness (scratch resistance) of 55 as per ASTM D-2583
 - 2. Panels will exhibit no more than a 0.038% weight loss after a 25-cycle Taber Abrasion Test using CS-17 abrasion wheels with 1000 g. wt.
 - 3. Gardner Impact Strength of 22 in.-lbs showing no visible damage on front side per ASTM D-3029
 - 4. FMRC (Factory Mutual Research Center) approved. Subject to the conditions of approval as described in FMRC report J.I. IV549.AM-embossed FXI .09" only.
 - 5. Meets USDA/FSIS Requirements.
 - 6. ICBO Report Number 4583.
 - 7. A Means of frontside identification and confirmation of meeting Class 1 (A) interior finish requirements after installation and while in service (without labels)
 - 8. Color and Texture: Refer to Division 9 Section "Color and Finish Schedule" for color and texture.
- B. Moldings: Harmonizing PVC (polyvinyl chloride) moldings.
- C. Fasteners: Non-corrosive drive rivets. Provide rivets in matching color to panel. Fasten in pattern recommended in stallation instructions.
- D. Adhesive: Type recommended by the manufacturer for use with material on the substrate indicated.
- E. Sealant: Type recommended by panel manufacturer; white.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with adjoining surface
 - 1. Complete finishing operations, including painting, before installing glass-fiber-reinforced panel system components.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. General: Before installation, clean substrate to remove dust, debris, and loose particles.

3.03 INSTALLATION

- A. prefit each panel before fastening and/or adhering in place. All cutting and drilling should be done prior to applying adhesive. Rivet holes should be predrilled using a bit that is 1/8" larger than the rivet.
 - 1. Do not use materials with chips, cracks, voids, stains or other defects that might be visible in the finished work.
- B. Follow adhesive manufacturer's recommendations for appropriate height of adhesive bead left by trowel. Use a "crosshatch" type pattern. Make sure adhesive extends to all edges of the panel. Adhesive should be applied directly to the back of the frp panel.
- C. Start on corner, install one piece corner molding. Apply silicone sealant in molding. Slide panel into molding and withdraw 1/8". This will provide the appropriate gap as

recommended. Begin in corner nearest molding and with laminate roller begin rolling out towards the edge without the molding.

- D. Continue rolling down and out working your way across the panel away from the previously installed panel or initial molding to remove all trapped air.
- E. Install fasteners as each panel is being put in place and before next molding is put on. This will help work out any air pockets and help ensure a flat installation. Install fasteners 16" on center both directions. Space perimeter holes at least 1" to 1-1/2" away from panel edge if possible. Remember to overdrill holes 1/8" larger than fastener.
- F. Plan ahead so fasteners will not interfere with moldings or other fixtures. Do not fasten perimeter of panels until panel has been rolled out. Drill holes into substrate through predrilled holes in panel. Try to center fastener as much as possible within predrilled hole.
- G. Start fastening at edge with installed molding and work toward the other side. Continue installing fasteners one row at a time until fastening is complete. Apply silicone sealant beneath rivets or fastener. Install other molding after fastening is complete.
- H. Install one piece division bar and caps or next molding by laying down bead of silicone sealant in molding and sliding onto the panel. Withdraw the molding 1/8", again to provide proper spacing. The free edge of the molding may be tacked in place if preferred before installing the next panel.
- I. Apply silicone sealant in all molding and around all panel edges, fasteners, and fixtures to provide a moisture proof installation.
- J. Factory Mutual Compliance: Panels must always be installed with mechanical fasteners.

3.04 **CLEANING**

- A. Remove any adhesive or excessive sealant from panel face using solvent or cleaner recommended by manufacturer.
- B. Remove surplus materials, rubbish, and debris resulting from installation on completion of work and leave installation area in neat, clean condition.

END OF SECTION

**SECTION 071113
BITUMINOUS DAMPPROOFING**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes cold-applied, emulsified-asphalt dampproofing applied to the following surfaces.
 - 1. Exterior face of masonry walls indicated to receive siding.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.
- B. Material Certificates: For each product, signed by manufacturer.

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 FIELD 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, but are not limited to, the following:
 - 1. Cold-Applied, Emulsified-Asphalt Dampproofing
 - a. Euclid
 - b. Karnak Corporation
 - c. Meadows, W.R., Inc.
 - d. Sonneborn, Div. of ChemRex, Inc.

2.02 BITUMINOUS DAMPPROOFING

- A. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class I or Type IV.
 - 1. Available Products:
 - a. Sealmastic, Type 2; W.R. Meadows
 - b. Hydrocide 700B; Sonneborn Building Products
 - c. Dampproofing Asphalt Coatings Semimastic; Euclid
 - d. Karnak 220 AF; Karnac Chemical Corp.
- B. Brush and Spray Coats: ASTM D 1227, Type III, Class I.

1. Available Products:
 - a. Sealmastic, Type I; W. \R. Meadows
 - b. Hydrocide 600; Sonneborn Building Products
 - c. Karnak 100 AF; Karnac Chemical Corp.
 - 1) Primers, Mastics, and Related Materials: Type as recommended by dampproofing 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.
- B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

3.02 APPLICATION, GENERAL

- A. Comply with manufacturer's 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 above grade, exterior, single wythe masonry walls

3.03 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. On Exterior Face of CMU Walls: Apply one brush or spray coat not less than 1.25 gal./100 sq.ft..

3.04 CLEANING

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

END OF SECTION

**SECTION 072100
THERMAL INSULATION**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes the following:
 - 1. Insulation under slabs-on-grade.
 - 2. Foundation wall insulation (supporting backfill).
 - 3. Concealed building insulation.
 - 4. Vapor barrier.

1.02 SUBMITTALS

- A. Product Data: For each type indicated.
- B. Samples for Verification: Full-size units for each type of exposed insulation indicated.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulation products.
- D. Research/Evaluation Reports: For foam-plastic insulation.

1.03 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.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and fro deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instruction for handling, storing, and protecting during installation.
- B. Protect plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 PRODUCTS

2.01 INSULATING MATERIALS

- A. General: Provide insulating materials that comply with the requirements and with referenced standards.

1. Preformed units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.
- B. Rigid insulation. Type 1; Extruded-Polystyrene Board Insulation, ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indices of 75 and 450, respectively:
 1. Type IV. 1.60 lb/cu.ft.
 2. Available products:
 - a. Foamular 250; Owens Corning
 - b. Styrofoam by Dow Chemical Co.
 - c. Amfoam-CM by Tenneco Building Products.
 3. Application: Foundation insulation. Rigid insulation below concrete slab-on-grade.
- C. Rigid Insulation, Type 2: Rigid, cellular polyisocyanurate thermal insulation with core formed by using HCFCs as blowing agents to comply with ASTM C 1289, classified by facer type as follows:
 1. Facer Type: Type II, felt or glass-fiber mat on both major faces.
 2. Thickness: as indicated on the drawings.
 3. Available Products:
 - a. Celotex Corporation.
 - b. Johns Manville Corporation.
 4. Application: Rigid insulation at exterior CMU.
- D. Batt Insulation: ASTM C 655, Type 1 (blankets without membrane facing); consisting of fibers manufactured from glass; with maximum flame-spread and smoke developed indices of 25 and 50 respectively; passing ASTM E 136 for combustible characteristics
 1. Available Products:
 - a. Certainteed Corporation.
 - b. Guardian Building Products.
 - c. Johns Manville Corporation
 - d. Owens Corning
- E. Sprayed Polyurethane Foam Sealant for Perimeter of Windows: 1- or -2 component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu.ft. density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
 1. Products:
 - a. Great Stuff Window & Door by Dow.
 - b. Froth-Pak by Insta-Foam Products, Inc.
 - c. Pur-Fill 1G by Todol Products, Inc.
 - d. Handi-Seal Window and Door Sealant by Fomo Products, Inc.

2.02 FOAM BOARD INSULATION MATERIALS

2.03 VAPOR BARRIERS

- A. Polyethylene Vapor Barrier: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.1 perm.
- B. Vapor Barrier Tape: Pressure sensitive tape of type recommended by vapor-barrier manufacturer for sealing joints and penetrations in vapor barrier.
 1. Available Products: 3M Builder's Sealing Tape No. 8086

2.04 AUXILIARY INSULATING MATERIALS

- A. Eave Ventilation Troughs: Preformed rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

1. Adhesive: Type recommended by insulation manufacturer for application.
2. Adhesive: Gun grade, interior and exterior, and compatible with insulation and substrates; complies with ASTM C557.

PART 3 EXECUTION

3.01 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. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.02 INSTALLATION OF PERIMETER AND UNDERSLAB INSULATION

- A. on vertical surfaces, set units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.
 1. If not indicated, extend insulation a minimum of 48" below exterior grade line.
- B. Protect below grade insulation on vertical surfaces from damage during backfilling. Set in adhesive according to insulation manufacturer's written instructions.
- C. Protect top surface of horizontal insulation from damage during concrete work.

3.03 INSTALLATION OF EXTERIOR WALL INSULATION

- A. On units of plastic insulation, install small pads of adhesive space approximately 24 inches o.c. both ways on inside face, as recommended by manufacturer. Fit courses of insulation between framing members and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry.

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. Seal joints between closed-cell (non-breathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:
 1. Use blanket widths and lengths that fill the cavities formed by framing members' If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 3. Provide attic insulation in two layers installing the first layer between framing members and installing the second layer perpendicular to the framing.
- D. Apply foamed-in-place insulation, by spray or froth method to a uniform monolithic density without voids into miscellaneous voids and cavity spaces where shown.

3.05 INSTALLATION OF VAPOR BARRIER

- A. General: Extend vapor barrier to extremities of area to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor barrier to cover miscellaneous voids in insulated substrates, including those filled with loose fiber insulation.
- B. Seal joints in vapor barrier over strapping by lapping not less than 2 feet. Fasten vapor barrier at perimeter; and at lap joints. Space fasteners 16" o.c.
- C. Seal overlapping joints in vapor barrier with adhesive or vapor barrier tape according to vapor barrier manufacturer's instructions. Seal butt joints and fastener penetrations with vapor-barrier tape. Locate all joints over framing members or other solid substrates.
- D. Firmly attach vapor barrier to substrates with mechanical fasteners or adhesives as recommended by vapor barrier manufacturer.
- E. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor barrier with vapor-barrier tape to create an airtight seal between penetrating object and vapor barrier.
- F. Repair any tears or punctures in vapor barrier immediately before concealment by other work. Cover with vapor-barrier tape or another layer of vapor barrier.

3.06 PROTECTION

- A. Protect installed insulation and vapor barrier from damage due to harmful weather exposure, 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

END OF SECTION

**SECTION 072500
VAPOR AND WEATHER BARRIERS**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes the following
 1. Vapor barriers under slabs-on-grade.
 2. Vapor barrier at ceilings.

1.02 REFERENCES

- A. ASTM International (ASTM).
 1. D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
 2. D1709 - Standard Test Method for Impact Resistance of Plastic Film by Free-Falling Dart Method.
 3. E96/E96M - Standard Test Method for Water Vapor Transmission of Materials.
 4. E154 - Standard Test Method for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walss, or as Ground Cover.
 5. E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 6. E1745 - Standard Test Method for Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: 12 inch square units for each type of vapor retarder, vapor barrier, or air barrier indicated.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulation products.
 1. Moisture emission tests.
 2. Surface alkalinity tests.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect 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

3.01 MANUFACTURERS

- A. Available Manufacturers and Products: Subject to compliance with requirements. manufacturers offering products that may be incorporated into the work include, but are not limited to, the following products listed in part 2 of this section.

3.02 VAPOR BARRIERS FOR UNDER SLABS

- A. Vapor barrier with extremely low permeance for critically sensitive, low permeance floor coverings such as rubber, vinyl, urethane, epoxy and methyl methacrylate, as well as linoleum wood, having the following qualities:

1. Minimum Permeance: ASTM E-96, not greater than 0.01 perms.
 2. Tensile Strength: ASTM E154 or D638, Class A - over 45 lbf/in.
 3. Puncture Resistance: ASTM E-154, Class B - over 1700 grams.
 4. Water Vapor Barrier: ASTM E-1745, meets or exceeds Class B.
 5. Thickness of Barrier (Plastic) ACI 302.1R-96, not less than 15 mils.
- B. Available Products: Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to, the following:
1. Stego Wrap, 15 mil thick vapor retarder by Stego Industries LLC
 2. Vaporguard by Reef Industries
 3. Sealtight Premoulded Membrane by W.R. Meadows, Inc.
- C. Vapor-Retarder/Barrier Tape (for slabs): Stego Wrap red polyethylene tape or tape as recommended by the manufacturer.
- D. Vaporlock edge tape, preformed 2" wide two-sided adhesive.

3.03 INTERIOR VAPOR RETARDER:

- A. On bottom face of trusses, use mechanically fastened vapor retarder sheet with the following qualities:
1. Minimum Permeance: ASTM E-96, not greater than 0.1 perms.
 2. Tensile Strength: ASTM E154 or D638, Class A - over 45 lbf/in.
 3. Puncture Resistance: ASTM E-154, Class B - over 1700 grams.
 4. Water Vapor Barrier: ASTM E-1745, meets or exceeds Class B.
- B. Available Products: Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to, the following:
1. Griffolyn by Reef Industries
 2. Stego Crawl Wrap
- C. Vapor-Retarder/Barrier Tape (for slabs): tape as recommended by the manufacturer.

3.04 WEATHER BARRIER

- A. Drainable Barrier Sheet: Non-woven and non-perforated polypropylene material with 1/16 inch gap created by spacers providing drainage space.
1. Width: 5 feet, minimum.
 2. Water Vapor Permeance: 16 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure A (Desiccant Method) at 73.4 degrees F.
 3. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for up to 120 days of weather exposure.
 4. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less (Class A), when tested in accordance with ASTM E84.
 5. Seam and Perimeter Tape: As recommended by sheet manufacturer.
- B. Available Products: Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to, the following:
1. Hydrogap by Benjamin Obdyke

PART 3 EXECUTION

5.01 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions applicable to products and application indicated.
- B. Extend barriers in thickness indicated to envelop entire area to be covered. Cut and fit tightly around obstructions. Remove projections that interfere with placement. Water-

Resistive Barriers: Install continuous barrier over surfaces indicated, with sheets lapped to shed water but with seams not sealed.

5.02 INSTALLATION OF UNDER-SLAB VAPOR BARRIER

- A. Moisture vapor barrier system shall be installed at all interior slabs and as otherwise indicated in the drawings in strict accordance with the manufacturer's printed instructions and as follows.
1. Snap chalk line along inside perimeter of foundation walls at top of slab elevation.
 2. Without wetting, clean a 3" wide band on the surface of the concrete below the chalk line at approximately mid-slab height. Remove dirt, residual form release, or other bond inhibiting surface contaminants. Grind smooth any surface projections within the band.
 3. While removing the contact paper on the backside, firmly press 2" wide vaporlock perimeter strip onto wall, parallel to the chalk line on the cleaned band at mid-slab elevation.
 4. Remove contact paper on face side.
 5. Apply a 12" wide strip of vapor barrier covering only the bottom 1" of contact surface on the perimeter strip. Cut, fit, and seal corner details with vapor barrier seaming tape.
 6. Align top edge of Iso-Strip isolation joint material to chalk line, and press material onto remaining 1" of exposed perimeter strip adhesive.
 7. Roll out vapor barrier material, overlapping edge rolls and all seams by 3". Tape all seams with vapor barrier seaming tape.
 8. All tears, punctures, etc. to be repaired and taped as required to maintain the watertight integrity of the vapor barrier system.

5.03 INSTALLATION OF CEILING VAPOR BARRIER

- A. Moisture vapor barrier system shall be installed at all interior ceilings and as otherwise indicated in the drawings in strict accordance with the manufacturer's printed instructions and as follows.
1. Provide complete and continuous vapor retarder at ceiling except where interrupted by openings or penetrations.
 2. Locate vapor retarder on interior side of insulation
 3. Install vapor retarder without tears, voids, or holes.
 4. Lap ends and edges 2 inches over adjacent sheets. Seal laps with tape

5.04 PROTECTION

- A. Protect installed vapor barriers from damage due to harmful weather exposure, physical abuse, and other causes. Provide temporary coverings or enclosures where vapor barriers are subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

**SECTION 073113
ASPHALT SHINGLES**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes asphalt shingles for steep roofs.

1.02 SUBMITTALS

- A. Product Data: Provide for each type of product specified, including details of construction relative to materials, dimensions of individual components, profiles, textures, and colors
- B. Samples: Submit for selection in the form of manufacturer's sample finishes showing the full range of colors and profiles available for each type of asphalt shingle indicated.

1.03 QUALITY ASSURANCE

- A. Fire-Test -Response Classification: Where products with a fire-test-response classification are specified, provide asphalt shingles identical to those tested according to ASTM E 108 or UL 790 and listed by UL or another testing and inspection agency acceptable to authorities having jurisdiction. Identify each bundle of asphalt shingles with appropriate markings indicating fire-test-response classification of applicable testing and inspecting agency.
- B. Wind-Resistance-Test Characteristics: Where wind-resistant asphalt shingles are indicated, provide products identical to those tested according to ASTM D 3161 or UL 997 and passed. Identify each bundle of shingles with appropriate markings of applicable testing and inspecting agency.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in manufacturer's unopened bundles or containers with labels intact.
- B. Handle and store materials at project site to prevent water damage, staining, or other physical damage. Store rolled goods on end. Comply with manufacturers' recommendations for job-site storage, handling and protection.

1.05 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installing asphalt shingles only when existing and forecasted weather conditions will permit work to be performed according to manufacturer's recommendations and warranty requirements, and when substrate is completely dry.

1.06 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the owner of other rights the owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the contractor under requirements of the contract documents.
- B. Special warranty: Submit a written warranty signed by the manufacturer agreeing to repair or replace asphalt shingles that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, deformation, or deterioration of asphalt shingles beyond normal weathering.
 - 1. Warranty Period: Manufacturer's standard but not less than 30 years after date of substantial completion.

1.07 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.
 - 1. Furnish 1 square coverage of asphalt shingles, identical to those installed, in unbroken bundles.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available products: Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to, the following:
 - 1. Ridge Vents:
 - a. Ridge Filter Shinglevent; Air Vent, Inc.
 - b. Ridge Filtervent; Air Vent, Inc.
 - c. Cobra Ridge Vent; GAF Building Materials Corporation.
 - d. Roll Vent; Obdyke; Benjamin Obdyke, Inc.
 - e. Trimline; Trimline Roof Ventilation Systems.
 - 2. Waterproof Underlayment:
 - a. Bituthane Ice and Water Shield; W.R. Grace & Co.

2.02 ASPHALT SHINGLES

- A. Asphalt Shingles: Architectural laminated Asphalt shingles
- B. Ridge Shingles: Manufacturer's standard, factory precut units to match asphalt shingles.
 - 1. Fire Resistance: Class A, complying with ASTM E108.
 - 2. Style: Laminated overlay.
 - 3. Color: as selected by owner.

2.03 SHEET MATERIALS

- A. Eave Protection Membrane:
 - 1. Eave Protection Membrane: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mil total thickness; with strippable treated release paper and polyethylene sheet top surface.
- B. Underlayment: Synthetic non-asphaltic sheet, recommended by manufacturer for mechanically fastened roofing underlayment without sealed seams.
 - 1. Minimum Requirements: Comply with requirements of ICC-ES AC188 for non-self-adhesive sheet.

2.04 ACCESSORIES

- A. Roofing Nails: Standard round wire shingle type, galvanized steel or aluminum roofing nails, minimum 3/8 inch head diameter, 12 gage, 0.109 inch nail shank diameter, 1-1/2 inch long and complying with ASTM F1667.

2.05 METAL FLASHINGS

- A. Metal Flashings: Provide sheet metal eave edge, gable edge and other flashing indicated.

- B. Steel Sheet Metal: Prefinished and galvanized steel sheet, 26 gage, 0.0179 inch minimum thickness, G90/Z275 hot-dipped galvanized.
- C. Aluminum Sheet Metal: Prefinished aluminum, 26 gage, 0.017 inch minimum thickness.

2.06 RIDGE VENT

- A. Ridge Vent: High density polypropylene, nonwoven modified polyester, or other UV-stabilized plastic design to be installed under asphalt shingles.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrate for compliance with requirements for substrates, installation tolerances, and other conditions affecting performance of asphalt shingles. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrate of projections and substances detrimental to application. Cover knotholes or other minor voids in substrate with sheet metal flashing secured with noncorrosive roofing nails.
- B. Coordinate installation with flashings and other adjoining work to ensure proper sequencing. Do not install roofing materials until all vent stacks and other penetrations through roof sheathing have been installed and are securely fastened against movement.

3.03 INSTALLATION - EAVE PROTECTION MEMBRANE

- A. Install eave protection membrane from eave edge to minimum 4 ft up-slope beyond interior face of exterior wall.

3.04 INSTALLATION - UNDERLAYMENT

- A. Underlayment At Roof Slopes Greater Than 4:12: Install underlayment perpendicular to slope of roof, with ends and edges weather lapped minimum 4 inches, stagger end laps of each consecutive layer, nail in place, and weather lap minimum 4 inches over eave protection.

3.05 INSTALLATION - FLASHING

- A. Install metal flashing and trim as indicated and according to details and recommendations of the "Asphalt Roofing" section of "The NRCA Steep Roofing Manual" and ARMA's "Residential Roofing Manual".

3.06 INSTALLATION - SHINGLES

- A. Install shingles in accordance with manufacturer's instructions manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Place shingles in straight coursing pattern with 5 inch weather exposure to produce double thickness over full roof area, and provide double course of shingles at eaves.

END OF SECTION

**SECTION 074623
WOOD SIDING**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes:
 - 1. Wood siding
 - 2. Trim, Anchorage, and accessories.

1.02 SUBMITTALS

- A. Product Data: Indicate profiles, sizes, fastening method, surface texture, and accessories
- B. Product sample.

1.03 PROJECT CONDITIONS

- A. Do not install siding on wet or frozen substrate.
- B. Do not install siding at temperatures below 40 degrees F.

PART 2 PRODUCTS

3.01 SIDING

- A. Manufacturer:
 - 1. Maibec
- B. Materials
 - 1. Eastern white cedar
 - a. Treated with bleaching oil'
- C. Trim
 - 1. Cedar 5/4"x6" corner boards
 - 2. Grade: Finish or No. 2 eastern white cedar; NELMA, NLGA

3.02 ACCESSORIES

- A. Preservative Treatment: Dip- or brush-type, non-discoloring.
- B. Nails: Hot dipped galvanized or stainless steel type; non-staining, of size and strength to securely and rigidly retain the work .
- C. Flashing: Aluminum as specified in Section 076200.
- D. Drainable housewrap: Hydrogap by Benjamin Obdyke

PART 3 EXECUTION

4.01 INSTALLATION

- A. Install drainable housewrap per manufacturer's recommendations.
- B. Install siding in accordance with manufacturer's instructions.
- C. Fasten siding in place, level and plumb.

END OF SECTION

**SECTION 076200
SHEET METAL FLASHING AND TRIM**

PART 1 GENERAL

1.01 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sheet Metal Flashing and Trim Manufacturers:

2.02 SHEET MATERIALS

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239 inch) thick base metal.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

2.04 EXTERIOR PENETRATION FLASHING PANELS

- A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

2.05 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Primer: Zinc chromate type.
- C. Concealed Sealants: Non-curing butyl sealant.
- D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- E. Plastic Cement: ASTM D4586/D4586M, Type I.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- B. Seal metal joints watertight.

END OF SECTION

**SECTION 079200
JOINT SEALANTS**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes sealants for the following applications, including those specified by reference to this section:
 - 1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces.
 - a. Exterior joints as indicated.
 - 2. Exterior joints in the following horizontal traffic areas.
 - a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
 - 3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces.
 - a. Perimeter joints of exterior openings where indicated
 - b. Vertical control joints on exposed surfaces of interior unit masonry walls and partitions.
 - c. Perimeter joints interior wall surfaces and frames of interior doors, and windows.
 - d. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - e. Other joints as indicated.
 - 4. Interior joints in the following horizontal traffic surfaces.
 - a. Control and expansion joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.

1.02 PERFORMANCE REQUIREMENTS

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

1.03 SUBMITTALS

- A. Product Data for each joint sealant product indicated: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
- B. Sample for 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. Warranties: Special warranties specified in this section.
- D. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

1.04 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.
 - 1. Deliver to manufacturer sufficient samples for testing.
 - 2. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
 - 3. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.

1.05 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.

1.06 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 application 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.

1.07 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which installer agrees 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.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees 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: Five years from date of substantial completion.
- C. 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 agent.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

- A. Available products: Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to, products listed in other Part 2 articles.
- B. Scope:
 - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints indicated below.
 - 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Other joints indicated below.
 - 3. Do not seal the following types of joints.
 - a. Intentional weep holes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.
 - 4. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
 - 5. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.

2.02 JOINT SEALANTS - GENERAL

- A. Compatibility: Provide joint sealants, backing, 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 owner from manufacturer's full range for this characteristic.

2.03 ELASTOMERIC JOINT SEALANT

- A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant, including those referencing ASTM C 920 classifications for type, grade, class, and use.
- B. Single-Component Nonsag Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - 1. Products: Provide one of the following.
 - a. Vulkem 116; Mameco International.
 - b. Vulkem 230; Mameco International.
 - c. Sikaflex - 1a; Sika Corporation.
 - d. NP 1; Sonneborn Building Products Div., Chemrex Inc.

- e. Dynamic; Tremco
- 2. Type and Grade: S (single component) and NS (nonsag).
- 3. Class: 25
- 4. Applications:
 - a. Joints between exterior metal frames and adjacent work.
 - b. Under exterior door thresholds.
 - c. Exterior joints for which no other sealant type is indicated.
- C. Mildew Resistant Silicone Sealant: Where joint sealants of this type are indicated provide products complying with the following:
 - 1. Products: provide one of the following:
 - a. 786; Dow Corning.
 - b. Sanitary 1700; GE Silicones.
 - c. 898 Silicone Sanitary Sealant; Pecora Corporation
 - d. PSI-611; Polymeric Systems, Inc.
 - e. Tremsil 600 White; Tremco'
 - 2. Type and Grade: S (single component), and NS (nonsag).
 - 3. Class: 25
 - 4. Additional Movement Capability: 50 percent movement in extension on 50 percent movement in compression for a total of 1005 movement.
 - 5. Applications:
 - a. Use for sealing interior joints with non-porous substrates in wet areas with ceramic tile or epoxy paint around sinks, and between equipment or counters and non-porous walls.
- D. Multicomponent Pourable Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - 1. Products: Provide one of the following:
 - a. Chem-calk 550; Bostik Inc.
 - b. Vulkem 245; Mameco International.
 - c. NR-200 Urexpan; Pecora Corporation.
 - d. Sikaflex - 2c SL; Sika Corporation.
 - e. SL 2; Sonneborn Building Products Div., ChemRex Inc.
 - f. THC-900, Trmco
 - 2. Type and Grade: M (multicomponent) and P (pourable)
 - 3. Class: 25
 - 4. Applications:
 - a. Joints in exterior and interior concrete slabs on grade.
 - b. At penetrations to slabs on grade.

2.04 LATEX JOINT SEALANTS

- A. Latex Sealant Standard: Comply with ASTM C 834 for each product of this description indicated.
- B. Latex Sealant: Where joint sealant of this type are indicated, provide products complying with the following:
 - 1. Products: Provide one of the following.
 - a. Chem-Calk 600; Bostik Inc.
 - b. NuFlex 330; NUCO Industries, Inc.
 - c. LC 160 All Purpose Acrylic Caulk; Ohio Sealants, Inc.
 - d. AC-20; Pecora Corporation.
 - e. PSI-701; Polymeric Systems, Inc.
 - f. Sonolac; Sonneborn Building Products Div., ChemRex Inc.
 - g. Tremflex 834; Tremco.
 - 2. Applications: Interior joints in field painted vertical and overhead joints not indicated otherwise below.

2.05 NONSAG JOINT SEALANTS

1. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - a. Movement Capability: Plus and minus 50 percent, minimum.
 - b. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 - c. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
2. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
 - a. Movement Capability: Plus and minus 50 percent, minimum.

2.06 ACCESSORIES

2.07 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.
- 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 promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.
 1. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 2. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
 - 3.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect joint to be sealed:
 1. Remove all foreign material 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 residue capable of interfering with adhesion of joint sealants.
 - a. Metal.

- b. Glass.
- c. Glazed surfaces of ceramic tile.

3.02 INSTALLATION

- A. General: Comply with joint sealant manufacturer's written instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated..
 - 1. Do not leave gaps between ends of sealant backing.
 - 2. Do not stretch, twist, puncture, or tear sealant backing.
 - 3. Remove absorbent sealant backing that have become wet before sealant application and replace them with dry materials.
- C. Install bond breaker backing tape behind sealants where sealant backings are not used between sealants and back of joints where backer rod cannot be used.
- D. Install sealant 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.
- E. 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 the do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per figure 5A in ASTM C 1193, unless otherwise indicated.

END OF SECTION

**SECTION 081113
HOLLOW METAL DOORS AND FRAMES**

PART 1 GENERAL

1.01 SUBMITTALS

- A. This section includes the following:
 - 1. Steel Doors
 - 2. Steel Door Frames

1.02 SUBMITTALS

- A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- C. Door Schedule: Use same reference designations indicated on drawings in preparing schedule for doors and frames.

1.03 QUALITY ASSURANCE

- A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.
- B. Source Limitations: Obtain steel doors and frames from the same manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. 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.
- C. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is detected. Minor damages may be repaired provided refinished items match new work and are acceptable to owner. Remove and replace damaged items that cannot be repaired as directed.
- D. Store doors and frames at building site under cover. Place units on minimum 4 inch high wood blocking. Avoid using nonvented 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. manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ceco Door Products; a United Dominion Company.
 - 2. Curries Company.
 - 3. Steelcraft: a division of Ingersoll-Rand
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with

the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.02 MATERIALS

- A. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.
- B. Exterior Doors: Thermally insulated. {CH#47366}
- C. Metallic-Coated Steel Sheets (Galvanized): ASTM A653/A 653M, Commercial Steel (CS), Type B, with an A60 (ZF180) zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.
- D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating, mill phosphatized; suitable for unexposed applications; stretcher-leveled standard of flatness where used for face sheets.

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 3 (16 gage) and Physical Performance Level A (Extra 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 3 (16 gage) and physical performance level A (Extra Heavy Duty), Model 2 (Seamless)
- D. Vision Lite System: Manufacturer's standard kits consisting of glass lite moldings to accommodate glass thickness and size of vision lite indicated.
- E. Door Thickness: 1-3/4 inch, nominal.

2.04 HOLLOW METAL 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 0.053 inch (16 gage) thick steel sheet for: Finish:
 - 1. Door openings wider than 48 inches.
 - 2. Level 3 steel door.
- C. Frames of 0.067 inch (14 gage) thick steel sheet for:
 - 1. Exterior, Level 3 steel doors.
- D. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames with 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 opening; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.
- F. Supports and Anchors: Fabricate 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 (ASTM A 510M) 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 STOPS AND MOLDINGS

- A. Moldings for glazed lites in doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.
- B. Fixed Frame Moldings: Formed integral with standard steel frames, minimum 5.8 inch high, unless otherwise indicated.
- C. Provide nonremovable stops on outside of exterior doors and on the outside of any locked room for interior windows and interior doors for glass, louvers, and other panels in doors.

2.06 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 galvanized steel sheet. Close top and bottom edges of door flush as an integral part of door construction or by addition of 0.053 inch thick galvanized steel channels with channel webs placed even with top and bottom edges.
- C. Interior Door Faces: Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from the following material:
 - 1. Galvanized sheet.
- D. Core Construction: Manufacturer's standard core construction that produces a door complying with SDI standards.
 - 1. Polyurethane for exterior doors.
 - 2. Sound deadened for interior doors.
- E. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch at jamb and heads, except not more than 1/4 inch between pairs of doors. Provide 3/4 inch at bottom.
- F. Clearances for Fire-Rated-Doors: As required by NFPA 80'
- G. Single-Acting, Door-Edge-Profile: Beveled edge.
- H. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames"
- I. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold or hot rolled steel sheet.
 - 1. Door Reinforcement: Lock and hinge stiles shall be reinforced with one piece, full height, 14 gage steel channel, drilled and tapped for hinge and strike, or the hinge reinforcement shall be 7 gage extra heavy duty steel plate, drilled and tapped for hinge screws. Provide not less than 12 gage channel reinforcement for closers and holders and 14 gage channel for rim exit devices.
 - 2. Frame Reinforcement: The hinge reinforcement for frames shall be 7 gage steel. Door closer reinforcing shall be 12 gage steel. Lock strike reinforcing shall be 14 gage.
- J. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval head for exposed screws and bolts.
- K. 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 for fully operable door assemblies.
 - 1. Unless otherwise indicated, provide thermal-rated assemblies with U-value of 0.41 or better.
- L. 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. Full hinge cut-outs for non-handed doors will not be acceptable.

2. For concealed overhead door closers, provide space, cutouts, reinforcement, and provisions for fastening in top rail of doors or head of frames, as applicable.
- M. Frame Construction: Fabricate frames to shape shown.
 1. Fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
 2. All welded joints shall be ground and dressed to be smooth, flush and invisible.
 3. Provide welded frames with temporary spreader bars.
- N. Reinforce doors and frames to receive surface applied hardware. Drilling and tapping for surface applied hardware may be done at project site.
- O. Locate hardware as indicated on shop drawings or, if not indicated, according to ANSI A250.8
- P. Glazing Stops: Manufacturer's standard formed from 0.032 inch thick steel sheet.
 1. Provide nonremovable stops on outside of exterior doors and on outside of any locked room for interior windows and interior doors for glass, louvers or other panel as in doors.
 2. Provide screw applied, removable, glazing stops on inside of glass, louvers, and other panels in doors.

2.07 ACCESSORY MATERIALS

- A. Bituminous Coating: Cold-Applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos.
- B. Bituminous Coating: Cold-Applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos.
 1. 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, with clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.

2.08 ADJUSTING AND CLEANING

- A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-dry primer.
- B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

2.09 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designation finishes.
- B. Comply with SSPC-PA1, "Paint Application Specification No. 1" for steel sheet finishes.
- C. Apply primers to doors and frames after fabrication.

2.10 GALVANIZED STEEL SHEET FINISHES

- A. Surface Preparation: Clean surfaces with non-petroleum solvent so that surfaces are free of oil or other contaminants. After cleaning, apply a conversion coating of the type suited to the organic coating applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair specified below to comply with ASTM A 780.
 1. Galvanizing Repair Paint: High-zinc-dust-content paint for re-galvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20'

- B. Prime Finish: Manufacturer's standard, factory-applied, baked, coat of rust inhibiting primer complying with ANSI A250.10 for acceptance criteria.

PART 3 EXECUTION

4.01 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. At exterior walls and masonry walls, coat inside of frame profile with bituminous coating to a thickness of 1/16 inch.
- C. 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. Except for frames located in existing walls or partitions, place frames before construction of enclosing walls and ceilings.

END OF SECTION

**SECTION 085200
WOOD WINDOWS**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes the following aluminum/vinyl clad wood framed window product types'
 - 1. Awning windows.
 - 2. Double hung windows.

1.02 PERFORMANCE REQUIREMENTS

- A. General: Provide wood windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified and that are of test size indicated below.
 - 1. Minimum size required by AAMA/WDMA 101/I.S.2
 - 2. Minimum size required by gateway performance requirements for determining compliance with AAMA/WDMA 101/I.S.2 for both gateway performance requirements and optional performance grades
 - 3. Size indicated.
- B. AAMA/WDMA Performance Requirements: Provide wood windows of the performance class and grade that comply with AAMA/WDMA 101/I.S.2.
 - 1. Performance Class and Grade:
 - a. Awning windows: HC30
 - b. Double Hung Windows: HC30

1.03 SUBMITTALS

- A. Product Data: Show component dimensions, anchorage and fasteners, glass, internal drainage details and [_____].
- B. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work, installation requirements and [_____].
- C. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements in excess of those prescribed by specified grade.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An installer acceptable to wood window manufacturer for installation of units required for the project.
- B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with experience and capability to conduct the testing as documented according to ASTM E 548'
- C. Source Limitations: Obtain wood windows through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of wood windows and are based on the specific system indicated
- E. Fenestration standards: Comply with AAMA/WDMA 101/I.S.2, "Voluntary Specifications for Aluminum, Vinyl (PVC) and wood windows and glass doors," for minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Provide WDMA certified wood windows with an attached label.
- F. Glazing Publications: Comply with published recommendations of glass manufacturers and GANA's "Glazing Manual" unless more stringent requirements are indicated.

1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify window openings by field measurements before fabrication and indicate measurements on shop drawings.
 - 1. Establish Dimensions: Where field measurements cannot be made without delaying the work, establish opening dimensions and proceed with fabricating wood windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.06 WARRANTY

- A. Correct defective Work within a 10 year period after Date of Substantial Completion.
- B. Provide 20 year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same.
- C.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Clad wood windows:
 - a. Andersen Windows and Doors.
 - b. Eagle Doors and Windows.
 - c. Marvin Windows and Doors.
 - d. Pella Corporation

2.02 WOOD WINDOWS

- A. Wood Windows: Wood frame and sash, factory fabricated and assembled.
 - 1. Exterior Finish: Plastic clad.
 - 2. Interior Finish: Primed.
 - 3. Color: selected by owner.
 - 4. Configuration: As indicated on drawings.
 - 5. Window Product Types: AP - Awning, hopper, projected window and double hung, in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
 - 6. Factory glazed; dry glazing method.
 - 7. Wood Species: Clear pine, preservative treated using treatment type suitable for required finish.
 - 8. Frame and Sash Members: Mortise and tenon joints. Glue and steel pin joints to hairline fit, weather tight.
 - 9. Vinyl Cladding: Extruded PVC, low sheen surface, factory fit to profile of wood members.
 - 10. Fasteners: Concealed from view.

2.03 COMPONENTS

- A. Glazing: Double glazed, clear, Low-E coated, argon filled, with glass thicknesses as recommended by manufacturer for specified wind conditions.
- B. Frames: [] inch wide by [] inch deep profile; flush solid wood glass stops of screw fastened type, sloped for positive drainage.
- C. Sills: Plastic clad wood, with [] inch nominal thickness; sloped for positive drainage; fits under sash and projects at least 1/2 inch beyond exterior face of wall; single piece full width of opening.

- D. Muntins/Grilles: Grilles permanently installed between panes of insulating glass.
 - 1. Pattern: Custom design, see drawings.
 - 2. Bar Width: 3/4 inch.
 - 3. Color: Match interior and exterior of frame.
- E. Operable Sash Weatherstripping: Nylon pile; permanently resilient, profiled to effect weather seal.
- F. Wood for Casings and Trim: Clear pine, clear preservative treated, of type suitable for required finish.

2.04 PERFORMANCE REQUIREMENTS

- A. Comply with AAMA/WDMA/CSA 101/I.S.2/A440 requirements for the specific window type in accordance with the following:
 - 1. Performance Class (PC): R.
- B. Design Pressure (DP): In accordance with applicable codes.

2.05 HARDWARE

- A. Double Hung Sash: Metal and nylon spiral friction slide cylinder, each sash, each jamb.
- B. Sash lock: Lever handle with cam lock.
- C. Operator: Lever action handle fitted to projecting sash arms with limit stops; baked enamel finish.
- D. Projecting Sash Arms: Cadmium plated steel, friction pivot joints with nylon bearings, removable pivot clips for cleaning.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install windows in accordance with manufacturer's instructions.
- B. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- C. Set sill members in bed of sealant as indicated, for weathertight construction.
- D. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in "Dissimilar Materials" paragraph in appendix B in AAMA/WDMA 101/I.S.s

3.02 ADJUSTING

- A. Adjust hardware for smooth operation and secure weathertight closure.

3.03 PROTECTION AND CLEANING

- A. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.
- B. Clean exposed surfaces immediately after installing window. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove

- nonpermanent labels and clean surfaces.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

**SECTION 087100
DOOR HARDWARE**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes the following:
 - 1. Commercial door hardware for the following:
 - a. Swinging doors.
- B. Related sections include the following:
 - 1. Division 8 section "Steel Doors and Frames".

1.02 SUBMITTALS

- A. Product Data: Include installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Verification: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of door hardware indicated.
- C. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule".
 - 2. Organization" Organize the door hardware schedule into door hardware sets indicating complete designations of every item required for the hardware schedule.
 - 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastening and other pertinent information.
 - d. Location of each door hardware set, cross-referenced to drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control system.
 - 4. Submittal Sequence: Submit initial draft of final schedule along with essential product data to facilitate the fabrication of other work that is critical in the project construction schedule. Submit the final door hardware schedule after samples, product data, coordination with shop drawings of other work, delivery schedules, and similar information has been completely accepted.
- D. Keying Schedule: Prepared by or under the supervision of supplier, detailing owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.
- E. Product Test Report: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by qualified testing agency, indicating current products complying with requirements.
- F. Maintenance Data: For each type of door hardware to include a maintenance manual specified in division 1.
- G. Warranties" Special warranties specified in this section.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.
- B. Supplier Qualifications: Door hardware supplier with warehousing facilities in project's vicinity and who is or employs a qualified architectural hardware consultant, available during the course of work to consult with contractor, architect, and owner about door hardware and keying.
- C. Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an architectural hardware consultant and who is experienced.
- D. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to project site.
- B. Tag each item or package separately with identification related to the final door hardware schedule, and include basic installation instructions with each item or package.
- C. Deliver keys to owner by registered mail or overnight package service.

1.05 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check shop drawings of the other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.06 WARRANTY

- A. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
 - 1. Closers: Ten years, minimum.
 - 2. Locksets and Cylinders: Three years, minimum.
 - 3. Other Hardware: Two years, minimum.

1.07 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for owner's continued adjustment, maintenance, and removal and replacement of door hardware

PART 2 PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in this section and the door hardware schedule at the end of part 3.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturer's products.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in the door hardware schedule at the end of part 3. Products are identified by using door hardware designations as follows:
 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in the door hardware schedule.
- C. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
 1. Applicable provisions of federal, state and local codes.
 2. Fire-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
 3. Hardware on Fire-Rated Doors: Listed and classified by UL (DIR), ITS (DIR), testing firm acceptable to authorities having jurisdiction or [] as suitable for application indicated.

2.02 HINGES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: Hinges:
 1. Hinges:
 - a. Hagar Companies (HAG).
 - b. McKinney Products Company, Div. of ESSEX Industries, Inc. (MCK)
 - c. PBB, Inc. (PBB)
 - d. Stanley Commercial Hardware; Div. of The Stanley Works (STH)
 2. Continuous Geared Hinges
 - a. Hagar Companies (HAG).
 - b. McKinney Products Company, Div. of ESSEX Industries, Inc. (MCK)
 - c. Pemko Manufacturing Co., Inc (PEM).
 - d. Zero International, Inc. (ZRO).
- B. Quantity: Provide the following, unless otherwise indicated:
 1. Two hinges: For door heights up to 60 inches.
 2. Three Hinges: For doors with heights 61 to 90"
 3. Four Hinges: For doors 91 to 120 inches.
 4. For door heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
- C. The following is a guide for hinge size and type for this project.

	Manufacturer	Interior	Exterior
1-3/4" doors	Stanley	FBB179-4 1/2"	FBB191-4 1/2"
up to 3'-0" wide	Hagar	BB1279-4 1/2"	BB1191-4 1/2"
	McKinney	TA-TB2714-4 1/2"	TA-TB2314-4 1/2"
- D. Template Requirements: Except for hinges and pivots to be installed entirely (both Leaves) into wood doors and frames, provide only template-produced units.
- E. Hinge Options: Comply with the following where indicated in the door hardware schedule or on drawings"
 1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:
 - a. Outswinging exterior doors.
 - b. Outswinging corridor doors with locks.
 2. Corners: Square.

- F. Continuous Geared Hinges: Minimum 0.120 inch thick, hinge leaves with minimum overall width of 4 inches; fabricated to full height of door and frame. Finish components after milling and drilling are complete. Fabricate hinges to template screw locations.
- G. Fasteners: Comply with the following:
 - 1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
 - 2. Wood Screws: For wood doors and frames.
 - 3. Threaded-to-the-Head Wood Screws: For Fire-rated wood doors.
 - 4. Screws: Phillips flat head screws; machine screws (drilled and tapped holes) for metal doors, wood screws for wood doors and frames. Finish screw heads to match surface of hinges.

2.03 MORTISED LOCKS AND LATCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Mechanical Locks and Latches:
 - a. Best Lock Corporation (BLC).
 - b. Corbin Russwin Architectural Hardware; Div. of Yale Security Inc.(CR).
 - c. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc. (SGT).
 - d. Schlage Lock Company; an Ingersoll-Rand Company (SCH).
- B. Mortise Locks: Stamped steel case with steel or brass parts, BHMA Grade 1; Series 1000.
 - 1. Provide one of the following manufacturers and designs:
 - a. Best H Series
 - b. Corbin/Russwin ML2000 Series
 - c. Sargent 8200 Series
 - d. Schlage L9000 Series
- C. Lock Trim: Comply with the following:
 - 1. Lever: Cast.
 - 2. Escutcheon (Rose): Forged.
 - 3. Dummy Trim: Match lever lock trim and escutcheons.
 - 4. Lockset designs: Provide the lockset design designated below or, if sets are provided by another manufacturer, provide designs that match those designated:
 - a. Best, 14 design
 - b. Crobin/Russwin, Newport design
 - c. Sargent, LNL design
 - d. Schlage, 0^A design
- D. Lock Functions as indicated in the hardware schedule shall be as follows:

A	04	80	57	EW
B	05	50	51	E
C	15	10	10	N
D	37	70	55	J
E	16	60	42	F
F	65	40	30	LF
- E. Lock Throw: Comply with testing requirements for length of bolts to comply with labeled fir door requirements, and as follows:
 - 1. Mortise Locks: Minimum 3/4 inch latchbolt throw.
 - 2. Deadbolts: Minimum 1 inch bolt throw.
- F. Backset: 2 3/4 inches, unless otherwise indicated.
- G. Where mortise deadlock functions are listed in the hardware set numbers, provide 2-3/4 inch backset mortise deadlock having a heavy gauge wrought steel case. The case size shall be no less than 3-3/4 by 2-3/4 by 1 inch with a bronze adjustable lock front 1-1/8 by 4-5/8 inches(bevel adjustment 1/8 inch in 2 inches).
- H. The deadlock shall be 3/4 inch throw cast or extruded bronze.
- I. The following manufacturers and model numbers will be acceptable

- | | | |
|----|---------|--------------|
| 1. | Best | 38H Series |
| 2. | Schlage | L9000 Series |

2.04 CYLINDERS AND KEYING

- A. ManufACTURES: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cylinders Doors: Same manufacturer as for locks and latches.
- B. Standards: Comply with the following:
- C. Cylinder Grade: BHMA Grade 1.
- D. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
 - 1. Number of pins: Six
 - 2. Mortise Type: Threaded cylinders with rings and straight or clover type cam.
- E. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
 - 1. Interchangeable cores: Core insert, removable by use of a special key, and usable with other manufacturer's cylinders.
- F. Construction Keying: Comply with the following:
 - 1. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 6 construction master keys
 - a. Furnish permanent cores to owner after installation.
- G. Keying System: Unless otherwise indicated, provide a factory registered keying system complying with the following requirements:
 - 1. Master Key System: Cylinders are operated by a change key and master key.
 - 2. Keyed Alike: Key all cylinders to the same change key.
 - a. Cylinders shall be master keyed.
- H. Keys: Provide nickel-silver keys complying with the following:
 - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE"
 - 2. Quantity: In addition to one extra blank key for each lock, provide the following:
 - a. Cylinder Change Keys: Three
 - b. Master Keys: Five

2.05 STRIKES

- A. Standards: Comply with the following:
 - 1. Strikes for Bored Locks and Latches: BHMA A156.2.
 - 2. Strikes for AUXiliary Deadlocks: BHMA A156.5.
- B. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
 - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

2.06 OPERATING TRIM

- 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. Baldwin Hardware Corporation (BH).
 - 2. Don-Jo Mfg., Inc. (DJO).

3. Ives: H. B. Ives (IVS).
 4. Stanley Commercial Hardware; Div. of The Stanley Works (STH)
- B. Standard: Comply with BHMA A156.6.
- C. Materials: Fabricate from stainless steel, unless otherwise indicated.
1. Push-Pull Design: Door Pulls; 1 inch diameter by 10" long.
Rockwood 111; Burns 26C; Quality 163-10"

2.07 CLOSERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Surface-Mounted Closers:
 - a. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc. (SGT)
- B. Standards: Comply with the following:
- C. Surface Closers: BHMA Grade 1
- D. Certified Products: Provide door closers listed in BHMA's "Directory of Certified Door Closers"
- E. Size of Units: Unless otherwise indicated, provide the following. Provide factory sized closers, adjustable to meet field conditions and requirements for opening force.
1. LCN:
 - a. Exterior: 4140 Series
 - b. Interior: 4010 Series.
 2. Sargent:
 - a. Exterior: 281
 - b. Interior: 281

2.08 PROTECTIVE TRIM UNITS

- 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. Metal Protective Trim Units:
 - a. Burns Manufacturing Incorporated (BM).
 - b. Hagar Companies (HAG).
 - c. Ives: H. B. Ives (IVS).
 - d. Rockwood Manufacturing Company (RM).
- B. Standard: Comply with BHMA A156.6.
- C. Materials: Fabricate protection plates from the following:
1. Stainless Steel: 0.050 inch thick: beveled top and 2 sides.
- D. Fasteners: Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine or self tapping screws.
- E. Fabricate protection plates as follows:
1. Push Plates: 16" high by 8" wide'
 2. Kick plates: 10" high by 1-1/2" less than door width for single doors and 1" less than door width for pairs of doors. Kick plates shall be applied push side of all doors where noted

2.09 STOPS AND HOLDERS

- 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. Stops and Bumper:
 - a. Burns Manufacturing Incorporated (BM).
 - b. Glynn-Johnson: an Igersoll-Rand Company (GJ).
 - c. Hagar Companies (HAG).

- d. Ives: H. B. Ives (IVS).
- e. Rockwood Manufacturing Company (RM).
- B. Standards: Comply with the following:
 - 1. Stops and bumpers: BHMA A156.16
 - 2. Door Silencers: BHMA A156.16
- C. Wall Stops: BMHA Grade 1. Wall type bumpers with concealed type flange shall be used where ever possible and shall be one of the following:
 - 1. Ives - 407 1/2
 - 2. Door Control;s - 3211T
 - 3. Rockwood - 409
- D. Floor Stops: Where wall type bumpers cannot be used, provide dome type, floor mounted stops of the proper height as follows:
 - 1. Ives - 436, 438
 - 2. Door Controls - 3310X, 3320X
 - 3. Rockwood - 440, 442
- E. Exterior doors striking masonry and door specified to have door stops and holders, shall have cast bronze wall or floor type door stops with hook or staple type holders to selectively hold doors in open position. the following will be acceptable:
 - 1. Ives - 445, 446
 - 2. Door Controls - 3237X, 3347X
 - 3. Rockwood - 473, 477
- F. Provide matching finishes for hardware units at each door or opening, to the greatest extent possible, and except as otherwise indicated. Reduce differences in color and textures as much as commercially possible where the base metal or metal forming process is different for individual units of hardware exposed as the same door or opening. In general, match items to the manufacturer's standard finish for the latch and lock set (or push-pull units if no latch sets) for color and texture.
- G. Silencers for Metal door Frames: BHMA Grade 1; neoprene or rubber, minimum diameter 1/2 inch: fabricated for drilled-in application to frame.

2.10 DOOR GASKETING

- 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. Door Gasketing:
 - a. National Guard Products, Inc. (NGP).
 - b. Pemko Manufacturing Co., Inc. (PEM)
 - c. Reese Enterprises, Inc. (RE).
 - d. Zero International, Inc. (ZRO).
 - 2. Door Bottoms:
 - a. National Guard Products, Inc. (NGP).
 - b. Reese Enterprises, Inc. (RE).
 - c. Zero International, Inc. (ZRO).
- B. Standard: Comply with BHMA A156.22.
- C. Weatherstripping: Provide continuous weather-strip gasketing on exterior doors, No. A626A by National Guard Products or approved substitute. Provide door bottom sweep No. 95WH by National Guard Products or approved substitute. Provide meeting stile gaskets No. 600A by National Guard Products or approved substitute.
 - 1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 - 2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
 - 3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

2.11 THRESHOLDS

- 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. Hagar Companies (HAG).
 - 2. Pemko Manufacturing Co., Inc. (PEM)
 - 3. Reese Enterprises, Inc. (RE).
 - 4. Zero International, Inc. (ZRO).
- B. Standard: Comply with BHMA A156.21
- C. Provide No. 896 with door bottom sweep No. 95WH by National Guard Products or approved substitute.

2.12 FABRICATION

- A. Manufacture's Nameplate: Do not provide manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire rated labels and as otherwise permitted on rim of lock cylinders only.
 - 1. Manufacturer's identification will be permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18 for finishes. Do not furnish manufacturer's standard materials or forming methods if different from specified standards.
- C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended. Provide Phillips flat head screws with finished heads to match surface of door hardware, unless otherwise indicated.
 - 1. Concealed fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Steel Machine or Wood Screws: For the following fire-rated applications:
 - a. Mortise hinges to doors'
 - b. Strike plates to frames.
 - c. Closers to doors and frames.
 - 3. Steel Through Bolts: For the following fire rated applications, unless door blocking is provided:
 - a. Surface hinges to doors.
 - b. Closers to doors and frames.
 - c. Surface mounted exit devices.
 - 4. Spacers for Sex Bolts: For through bolting of hollow metal doors.
 - 5. Fasteners for Wood Doors: Comply with requirements of DHI WDHS,2 "Recommended Fasteners for Wood Doors"

2.13 FINISHES

- A. Standard: Comply with BHMA A156.18
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one half of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and are assembled and installed to minimize contrast.
- D. Provide the following finishes:
 - 1. Primary Butts and Hinges: 26D
 - 2. Continuous Gear Hinges: 28
 - 3. Locks & Lock Trim: 26D
 - 4. Door Controls - Closers: Sprayed Alum. Finish
 - 5. Mortise Locks & Latches: 26D
 - 6. Door Stops: 26D/32D
 - 7. Weatherstripping: Aluminum
 - 8. Threshold: Aluminum
 - 9. Kickplates: 32D
 - 10. Pulls: 32D
 - a. Use secondary finish in kitchens, bathrooms, and other spaces containing chrome or stainless steel finished appliances, fittings, and equipment; provide primary finish on one side of door and secondary finish on other side if necessary.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine doors and frames, with installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installations.

3.02 PREPARATION

- A. Steel Doors and Frames: Comply with DHI A115 series.
 - 1. Surface Applied Door Hardware: Drill and tap dpprs and frames according to SDI 107.

3.03 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Mounting Heights: Mount door hardware units at heights indicated in the following applicable publications, unless specifically indicated or required to comply with governing regulation:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.
- C. Use templates provided by hardware item manufacturer.

3.04 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
 - 1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.05 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period so that, from open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- B. Six Month Adjustment: Approximately six months after date of substantial completion, installer shall perform the following:
 - 1. Examine and readjust each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.
 - 2. Consult with and instruct Owner's personnel on recommended maintenance procedures'
 - 3. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

3.06 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.

3.07 DEMONSTRATION

3.08 DOOR HARDWARE SCHEDULE

- A. The hardware sets listed below indicate the items of hardware required for each opening. It is the bidders responsibility to accurately furnish the proper quantities, items, sizes, weights and functions as required by the plans and specifications. If an opening has, through error, been omitted from the following hardware sets, it shall be the bidders responsibility to supply hardware of equivalent quality and quantity, as that to which is specified for a comparable opening.

ENTRANCE VESTIBULE DOOR

Continuous Gear Hinge
Lockset (function E)
Closer
Weatherstripping
Door Bottom Sweep
Kickplate
Threshold

TOILETS

Continuous Gear Hinge
Push Plate
Pull
Deadbolt (function A)
Closer
Kick plate
Door Stop

Silencers

UTILITY/SUPPLY

Hinges

Closer

Lockset (function A)

Kickplate

Door Stop

END OF SECTION

**SECTION 088000
GLAZING**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes glazing for the following products and applications, including those specified in other sections where glazing requirements are specified by reference to this section.
 - 1. Doors

1.02 SUBMITTALS

- A. Product Data for each glass product and glazing material indicated.
- B. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements
- C. Warranties: Special warranties specified in this section.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for project and whose work has resulted in construction with a record of successful in-service performance.
- B. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
- C. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this section or in referenced standards.
 - 1. GANA Publication: GANA's "Glazing Manual" and "Laminated Glass Design Guide".
- D. Insulating Glass Certification Process: Permanently marked either on spacers or on at least one component lite of unit with appropriate label of the following inspecting and testing agency.
 - 1. Insulating Glass Certification Council.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For insulating glass units that will be exposed to substantial altitude changes, comply with insulating glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.05 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

1.06 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. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to owner and signed by insulating glass manufacturer agreeing to furnish replacements for insulating glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to project site, within specified warranty period indicated below.
 - 1. Warranty Period: 10 years from date of substantial completion.

PART 2 PRODUCTS

2.01 HEATTREATED FLOAT GLASS

- A. Fabrication process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass installed, unless otherwise indicated.
- B. Clear Tempered Glass: ASTM C 1048; Type 1 (transparent glass, flat); Quality q3 (glazing select); Class 1 (clear), Kind FT (fully tempered), 1/4 inch thick.

2.02 INSULATING GLASS

- A. Insulating Glass Units: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article.
 - 1. Provide Kind HS (heat strengthened) float glass in place of annealed glass where needed to resist thermal stress induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance requirements" Article.
 - 2. Provide Kind FT (fully tempered) where safety glass or tinted glass is indicated.
- B. Overall unit thickness and thickness of each lite: Dimensions indicated in this Article are nominal and the overall thickness of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
- C. sealing System: Dual seal, with primary and secondary sealants as follows:
 - 1. Polyisobutylene and silicone.
- D. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
 - 1. Aluminum with mill or clear anodized finish.
 - 2. Desiccant: Molecular sieve of silica gel, or blend of both.
 - 3. Corner Construction: Manufacturer's standard corner construction.
- E. Insulating Glass, Type 1: Where glass of this designation is indicated, provide uncoated insulating glass units complying with the following:
 - 1. Overall Unit Thickness and Thickness of Each Lite: 16 and 3 mm
 - 2. Interspace: Air
 - 3. Indoor Lite: Type 1 (transparent glass, flat), Class 1 (clear) float glass.
 - 4. Outdoor Lite: Type 1 (transparent glass, flat) float glass.
 - 5. Application: Exterior hollow metal doors.
- F. Provide products of type indicated, complying with the following requirements:
 - 1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation'
 3. Colors of Exposed Glazing Sealants: As selected by owner from manufacturer's full range for this characteristic.
- G. Elastomeric Glazing Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid applied, chemically curing sealant, including those referencing ASTM C 920 classification for type, grade, class, and uses.
1. Additional Movement Capability: Where additional movement capability is specified in the glazing sealant schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements in ASTM C 920 for uses indicated.
- H. Low-Modulus Nonacid-Curing silicone Glazing sealant: Where glazing sealants of this designation are indicated, provide products complying with the following:
1. Products: Available products include the following:
 - a. 790; Dow Corning.
 - b. Silpruf; GE Silicones.
 - c. 864; Pecora Corporation
 - d. Omniseal; Sonneborn, Div. of ChemRex, Inc.
 - e. Spectrum 1; Tremco.
 2. Type and Grade: S 9(single component) and NS (nonsag).
 3. Class: 25.
 4. Addition movement capability: 50 percent movement in extension and 50 percent movement in compression for a total of 100 percent movement.
 5. Applications: Wet sealant installations.

2.03 GLAZING TAPES

- A. Back Bedding Mastic Glazing Tape: Preformed, butyl based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 806.3 tape, for glazing applications in which tape is not subject to continuous pressure.
 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. General: Provide products and material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- C. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- D. Setting Blocks: Elastomeric material with a shore A durometer hardness of 85, plus or minus 5.
- E. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- F. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking)

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine framing glazing, with installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offset at corners.
 - 2. Presence and functioning of weep system.
 - 3. Minimum required face or edge clearance.
 - 4. Effective sealing between joints of glass framing members.
- B. comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- C. Glazing channel dimensions, as indicated on drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by project conditions during installation.
- D. Protect glass edges from damage during handling and installation. Remove damaged glass from project site and legally dispose of off project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- E. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant -substrate testing.
- F. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- G. Do not exceed edge pressure stipulated by glass manufacturers for installing glass lites.
- H. Provide spacers for glass lites where the length plus width is larger than 50 inches as follows:
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8 inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

END OF SECTION

**SECTION 092116
GYPSUM BOARD ASSEMBLIES**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes the following:
 - 1. Interior gypsum wallboard.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1.04 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

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. Gypsum Board and related products:
 - a. G-P Gypsum Corp.
 - b. National Gypsum Company.
 - c. United States Gypsum Co.

2.02 INTERIOR GYPSUM WALLBOARD

- A. Panel Size: Provide maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Moisture and Mold Resistant Type: With moisture and mold resistant core and surfaces.
 - 1. Back and face side: Glass fiber mat resists growth of mold or mildew (per ASTM D 3273)
 - 2. Core: Noncombustible gypsum core (ASTM E 136).
 - 3. Thickness: 5/8 inch.
 - 4. Long Edges: Tapered.
 - 5. Basis of design Product: "DensArmor Plu: as manufactured by G-P Gypsum.

2.03 TRIM ACCESSORIES

- A. Interior trim: ASTM C 1047

1. Material: Plastic where abutting masonry construction'
2. Shapes:
 - a. LC-Bead: J-shaped; exposed long flange receives joint compound; use at exposed panel edges or where abutting different material.

2.04 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Joint Tape:
 1. Interior Gypsum Wallboard: Paper.
- C. Joint Compound for Interior Mold resistant Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 1. Prefilling: At open joints and damaged surface areas, use setting type taping compound.
 2. Embedding at First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting type taping compound,
 3. Fill Coat: For second coat, use setting type, sandable topping compound or drying type, all purpose compound.
 4. Finish Coat: For third coat, use drying type all purpose compound.

2.05 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 0.112 inch thick.

2.06 BOARD MATERIALS

2.07

- A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 2. Thickness:
 - a. Ceilings: 5/8 inch.

PART 3 EXECUTION

3.01 APPLYING AND FINISHING PANELS, GENERAL

- A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216
- B. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

- E. Attach gypsum panels to framing provided at openings and cutouts.
- F. Isolate perimeter of non load bearing gypsum board partitions at structural abutments, except floors. Provide 1/4 to 1/2 inch wide spaces at these locations, and trim edges with LC-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- G. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.

3.02 PANEL APPLICATION METHODS

- A. Single layer application:
 - 1. On ceilings apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
- B. Single Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.03 INSTALLING TRIM ACCESSORIES

3.04 FINISHING GYPSUM BOARD ASSEMBLIES

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:
 - 1. Level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where indicated to be covered with FRP panels.
 - 2. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, and for fire rated and sound rated assemblies, unless otherwise indicated.

END OF SECTION

**SECTION 093000
TILING**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes the following:
 - 1. Ceramic tile base.

1.02 SUBMITTALS

- A. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- B. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories and setting details.
- C. Tile Samples for selection: Manufacturer's color charts consisting of actual tiles of sections of tiles showing the full range of colors, textures, and patterns available for each type and composition of tile indicated. Include samples of accessories involving color selection.
- D. Grout Samples for selection: Manufacturer's color charts consisting of actual sections of grout showing the full range of colors available for each type of grout indicated.

1.03 QUALITY ASSURANCE

- A. Installer qualifications: Engage an experienced installer who has completed tile installations similar in material, design, and extent to that indicated for this project and with a record of successful in service performance.
- B. Source Limitations for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties without delaying the work.
- C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and label intact until time of use. Comply with the requirements of ANSI A 137.1 for labeling sealed tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregate where grading and other required characteristics can be maintained and contamination avoided.
- D. Store liquid latexes and emulsion adhesives in unopened containers and protected from freezing.

1.05 PROJECT CONDITIONS

- A. Environmental Conditions: Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.

1.06 EXTRA MATERIALS

- A. Deliver extra materials to owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

PART 2 PRODUCTS

2.01 MANUFACTURES

- A. Available Manufacturers and Products: Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to, those indicated in the following paragraph of Part 2.

2.02 PRODUCTS GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard Grade requirements, unless otherwise indicated.
 - 2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting Materials" and "Grouting Materials" article.
- C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
 - 1. As selected by owner from manufacturer's full range.

2.03 TILE PRODUCTS

- A. Glazed Wall Tile: Provide flat tile complying with the following:
 - 1. Size: 4-1/4 by 4-1/4 inch, nominal.
 - 2. Color(s): To be selected by owner from manufacturer's standard range.
 - 3. Face: Plain with cushion edges.
 - 4. Tile Type/Products: Available Products include the following:
 - a. American Olean Matte and Brite
 - 1) Dal-Tile: Semi-gloss
- B. Trim Units for Ceramic Tile: Provide tile trim units to match characteristics of adjoining flat tile and to comply with the following requirements:
 - 1. Size: as indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.
 - 2. Shapes: As follows, selected from manufacturer's standard shapes:
 - a. Ceramic tile base: Straight, flat tile with bullnose edge.
 - 1) 4x4 Base: S-4449

2.04 SETTING MATERIALS

- A. Provide setting and grout materials from same manufacturer.
- B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.

1. Prepackaged dry mortar mix combined with acrylic resin liquid latex additive.
 - a. For wall applications, provide nonsagging mortar that complies with paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4

2.05 GROUTING MATERIAL

- A. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
 1. Polymer Type: Acrylic resin in liquid latex form for addition to prepackaged dry grout mix.
 - a. Unsanded grout mixture for joints 1/8 inch wide and narrower.

2.06 MIXING MORTARS AND GROUT

- A. Mix mortars and grout to comply with referenced standards and mortar and grout manufacturer's written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

2.07 ELASTOMERIC SEALANTS

- A. General: Provide manufacturer's standard sanded acrylic caulking containing a mildew-cide or antimicrobial protection.
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.
- C. Products: Available products include the following:
 1. Keracaulk S by Mapei.
 2. CeramaSeal By Bostik Findley.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile'
 1. Verify that substrate for setting tile are firm; dry; clean; free from oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A 108 series of tile installation standards for installations indicated.
 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust latter in consultation with owner.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. remove coatings, including curing compounds, and other substances that contain soap, wax, oil, or silicone and are incompatible with tile setting materials by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy duty wire

- brush.
- B. Use trowlable leveling and patching compounds per tile setting material manufacturer's written instruction to fill minor cracks.
 - C. Blending: for tile exhibiting color variations within ranges selected during sample submittals, verify that tile has been blended in the factory and packaged so tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at project site before installing.

3.03 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A 108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedule.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation" comply with TCA installation methods indicated in ceramic tile installation schedules.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Grout tile to comply with the requirements of the following tile installation standards:
 - 1. For ceramic tile grouts (sand-portland cement, commercial portland cement, and latex-portland cement grouts), comply with ANSI A 108.10.
- E. Joint Sealants: Install sealant in tile joint at joint between concrete floor and tile base and at interior corners of tile base.

3.04 WALL TILE BASE INSTALLATION

- A. Install types of tile designated for wall installations to comply with requirements in the Ceramic Tile Wall Installation Schedule, including those referencing TCA installation methods and ANSI setting bed standards.
- B. Joint Widths: Install tile on walls with the following joint widths:
 - 1. Wall Tile Base: 1/16 inch.
 - 2. Set base to allow for 1/4 inch gap between floor and tile base. Fill gap with joint sealant.

3.05 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
 - 2. Unglazed tile may be cleaned with acid solution only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, that ensure tile is without damage or deterioration at the time of substantial completion.
 - 1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to the completed tile walls and floors. Protect installed tile work with carpet pad or other heavy covering during construction period to prevent staining, damage,

- and wear.
2. Prohibit foot and wheel traffic from tiled floor for at least 7 days after grouting is completed.
- D. Before final inspection, rinse neutral cleaner from tile surfaces.

3.06 CERAMIC TILE WALL INSTALLATION SCHEDULE

- A. Ceramic Tile Base Installation: Where wall installations of this designation are indicated, comply with the following:
1. Tile Type: Glazed wall tile.
 2. Installation Method: TCA W202 (thin set mortar bed over sound, dimensionally stable masonry or concrete).
 3. Setting Bed and Grout: ANSI A 108.5 with the following mortar and grout:
 - a. Latex-portland cement mortar.
 - b. Unsanded polymer-modified tile grout.
 - 1) Install tile, thresholds and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.19 , manufacturer's instructions, and TCNA (HB) recommendations.
 - 2) Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

END OF SECTION

**SECTION 099000
PAINTING AND COATING**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes surface preparation and field painting of the following:
 - 1. Exposed exterior items and surfaces.
 - 2. Exposed interior items and surfaces.
 - 3. Surface preparation, priming, and finish coats specified in this section are in addition to shop priming and surface treatment specified in other sections.
- B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the owner will select from standard colors and finishes available.
- C. Do not paint pre-finished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1.02 SUBMITTALS

- A. Product Data: For each paint system specified, include block fillers and primers.
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Preparation instructions and recommendations.
 - 3. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
 - 4. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
- B. Samples for Selection: Manufacturer's color chips showing the full range of colors available for each type of finish coat material indicated.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this project, whose work has resulted in applications with a record of successful in-service performance.
- B. Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.

- B. Store materials not in use in tightly covered containers in a well ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign material and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.05 PROJECT CONDITIONS

- A. Apply water based paints only when the surface temperature to be painted and surrounding air temperatures are between 50 and 90 deg F.
- B. Apply solvent thinned paints only when the temperatures of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.06 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package materials in unopened, factory sealed containers for storage and identify with labels describing contents. Deliver extra materials to the owner.
 - 1. Quantity: Furnish the owner with and addition 5 percent, but not less than 1 gallon or 1 case as appropriate. of each material and color applied.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to, products listed in the paint schedules'
 - 1. California Paint Co. (Cal).
 - 2. Benjamin Moore & Co. (Moore).
 - 3. ICI Dulux Paints (ICI).
 - 4. PPG Industries, Inc. (PPG).
 - 5. Sherwin Williams Co. (S-W).

2.02 PAINT MATERIALS - GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best quality professional paint materials of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be accepted.
 - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

- C. Colors: Provide color selections made by the owner. Allow for up to 5 different color selections.

PART 3 EXECUTION

4.01 EXAMINATION

- A. Examine substrates, area conditions, with the applicator present, under which painting will be performed for compliance with paint application requirements.
 - 1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as the applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

4.02 PREPARATION FOR SURFACES

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean the substrate of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
 - 1. Provide barrier coats over incompatible primers or remove and reprime.
 - 2. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral fiber reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - a. Use abrasive blast cleaning methods if recommended by paint manufacturer.
 - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause a finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
 - c. Clean concrete floors to be painted with 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
 - 3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming,

- fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- b. Prime, stain or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases and paneling.
 - c. When transparent or semi transparent finish is required, backprime with spar varnish.
 - d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
 - e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
4. Ferrous Metals: Clean ungalvanized ferrous metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.
 - a. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of SSPC-SP 10.
 - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 - c. Touch up bare areas and shop applied prime coats that have been damaged. Wire brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
 - d. Piece Marks: Remove piece marks or numbers and characters that identify components for erection prior to field painting. Applying a primer to cover the marks will also be acceptable.
 5. Galvanized Surfaces: Clean galvanized surfaces with a palm sander with 60 grit sandpaper so surface is free of surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
 6. Primed Hollow Metal Doors and Frames: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required, Sand primed surfaces exposed to view smooth and dust off.
 7. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.
- D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 3. Use only thinners approved by paint manufacturer and only within recommended limits.
- E. Tinting: Tint primer of colors such as reds, yellows, and oranges with gray basecoat system designed to help provide color coverage.
1. Do not tint prime or base coat for multi-colored finishes.

4.03 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the schedules.
 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 3. Provide finish coats that are compatible with primers used.

4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings to these areas as required, to maintain the system integrity and provide desired protection.
 5. Paint interior surfaces of ducts with flat, nonspecular black paint where visible through register grilles.
 6. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 7. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer on metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces. When using colors such as red, yellow or orange, an extra coat of finish may be necessary.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
- C. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
 2. Rollers: Use rollers of carpet, velvet back, or high pile sheep's wool as recommended by the manufacturer for the material and texture required.
 3. Spray equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.
- F. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- G. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.
- H. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will no be acceptable.
- I. Transparent (Clear Finishes): Use multiple coats to produce a glass smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats.
- J. Completed work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

4.04 CLEANING:

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
 1. After completing painting, clean glass and paint spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

4.05 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by owner.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
 1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

4.06 EXTERIOR PAINT SCHEDULE

- A. Smooth wood: Provide the following finish systems over smooth wood ceilings, trim, railings, and other smooth exterior wood surfaces:
 1. Semigloss, Acrylic Enamel Finish: 2 finish coats over a primer'
 - a. Primer: Exterior, alkyd or latex, wood primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer.
 - 1) Cal: Trouble -shooter 100% Acrylic Latex primer 45100
 - 2) ICI: 2000-1200, Dulux-Pro Exterior Acrylic Primer.
 - 3) Moore: Super Spec Latex Exterior Primer #169.
 - 4) PPG: Speedhide Exterior Latex Primer, 6-609
 - 5) S-W: A-100 Exterior Latex Wood Proimer B42W41 Series.
 - b. First and second coats: Semigloss, waterborne, exterior, acrylic enamel applied at a spreading rate as recommended by the manufacturer.
 - 1) Cal: 100% Acrylic Latex House & Trim Paint, Satin Gloss 40200.
 - 2) ICI: 2406-XXXX, Dulux-Pro Exterior Latex Semi-Gloss Finish.
 - 3) Moore: Super Spec Latex House & Trim Paint #170'
 - 4) PPG: Speedhide Exterior Semi-Gloss Latex, 6-900 Series.
 - 5) S-W: SuperPaint Exterior Latex Gloss, A84 Series.
- B. Exposed wood timber: Provide the following finish systems over exposed wood timbers.
 1. High performance epoxy: Applied as recommended by manufacturer. 3 coats.
 - a. Moore: Corotech High Performance (V410)
- C. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is required on shop primed items.
 1. Semigloss Acrylic Enamel Finish: 2 finish coats over a rust inhibitive primer.
 - a. Primer: Rust inhibitive metal primer applied at a spreading rate recommended by the manufacturer.
 - 1) Cal: Larcoloid Latex Metal Primer 51108.
 - 2) ICI: 4020-XXXX, Devflex DTM Flat Interior/Exterior Waterborne Primer & Finish.
 - 3) Moore: DTM Acrylic Semi Gloss M29
 - 4) PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.

- 5) S-W: DTM Acrylic Primer/Finish B66W1 Series.
- b. First and Second Coats: Semigloss, exterior, acrylic latex enamel applied at spreading rate recommended by the manufacturer.
 - 1) Cal: 100% Acrylic Latex Satin Gloss 2010 402XX.
 - 2) ICI: 4206-XXXX, Devflex Interior/Exterior Acrylic Semi Gloss Enamel.
 - 3) Moore: DTM Acrylic Semi Gloss M29.
 - 4) PPG: Speedhide Exterior Semi Gloss Latex, 6-900 Series.
 - 5) S-W: DTM Acrylic Coating Gloss (Waterborne) B66W200 Series.

4.07 INTERIOR PAINT SCHEDULE

- A. Concrete Masonry Units: Provide the following finish systems over interior concrete masonry block units:
 - 1. Semi gloss, Acrylic enamel finish: 2 finish coats over a block filler.
 - a. Block Filler: High performance, latex based, block filler applied at a spreading rate as recommended by the manufacturer.
 - 1) Cal: Wibur & Williams Mason Cote Block Filler 3751.
 - 2) ICI: 3100-1200, Ulte Hide Gripper Interior/Exterior Block Surfacer.
 - 3) Moore: Super Craft Latex Block Filler #285.
 - 4) PPG: 6-7 Speedhide Interior/Exterior Masonry Latex Block Filler.
 - 5) S-W: PrepRite Block Filler B25W25 Series.
 - b. First and Second Coats: Semigloss, acrylic latex, interior enamel applied at a spreading rate recommended by the manufacturer.
 - 1) Cal: Premium 100% Acrylic Latex Semi Gloss 563XX.
 - 2) ICI: 1416-XXXX Ultra Hide Latex Semi Gloss.
 - 3) Moore: Super Spec Latex Semi Gloss Enamel #276.
 - 4) PPG: Speedhide Interior Latex Semi Gloss Enamel 6-510 Series.
 - 5) S-W: ProMar 200 Interior Latex Semi Gloss B31W200 Series.
- B. Hi-Build Primer for Mold Resistant Gypsum Board (ceilings): Provide the following finish systems over interior mold resistant gypsum board surfaces.
 - 1. High-Build Primer: Latex based, interior primer applied at spreading rate recommended by the manufacturer.
 - a. Cal: Hide-A-Spray, 91-20.
 - b. ICI: 1040-1200, Prep & Prime High Build Fill & Seal.
 - c. S-W: Preprite High Build Interior Latex Primer.
- C. Gypsum Board: Provide the following finish system over interior gypsum board surfaces:
 - 1. Flat Acrylic Ceiling Finish: 2 Finish coats over a primer.
 - a. Primer: Hi Build Primer.
 - b. First and second coats: Flat, Acrylic latex based, interior paint applied at spreading rate as recommended by the manufacturer.
 - 1) Cal: Premium Acrylic Latex Flat 533XX.
 - 2) ICI: 1210-XXXX, Ultra Hide Latex Flat Interior Wall Paint.
 - 3) Moore: Super Spec Latex Flat #275.
 - 4) PPG: Speedhide Interior Flat Latex. 6-70 Series.
 - 5) S-W: ProMar 200 Latex Flat Wall Paint B30W200 Series.
- D. Woodwork: Provide the following paint finish systems over new, interior wood surfaces including, but not limited windows, interior wood and PVC trim:
 - 1. Semigloss, Acrylic Enamel Finish: 2 finish coats over a wood undercoat.
 - a. Undercoat: Alkyd or acrylic latex based, interior wood undercoater, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer.
 - 1) Cal: ASAP "30" 50300.
 - 2) ICI: 1020-1200, Ultra Hide Acrylic Primer Interior Wood Undercoater.
 - 3) Moore: Super Spec Latex Enamel Undercoater & Primer Sealer #253.

- 4) PPG: Speedhide Interior Acrylic Enamel Undercoater, 6-855.
 - 5) S-W: Preprite Classic Latex Primer B28W101 Series.
- b. First and Second Coats: Semigloss, acrylic latex, interior enamel applied at spreading rate recommended by the manufacturer.
 - 1) Cal: Premium 100% Acrylic Semi Gloss 563XX.
 - 2) ICI: 1416-XXXX Ultra Hide Latex Semi Gloss Interior wall and trim enamel.
 - 3) Moore: Super Spec Latex Semi Gloss Enamel #276.
 - 4) PPG: Speedhide Interior Latex Semi Gloss Enamel 6-510 Series.
 - 5) S-W: ProMar 200 Interior Latex Semi Gloss B31W200 Series.
- E. Ferrous Metal: Provide the following finish systems over ferrous metal:
1. Semigloss, Acrylic Enamel Finish: One finish coat over an enamel undercoater and a primer.
 - a. Primer: Quick drying, rust inhibitive, alkyd based or epoxy metal primer, as recommended by the manufacturer of the substrate, applied at a spreading rate as recommended by the manufacturer.
 - 1) Cal: Larcoloid Rust Inhibiting Metal Primer 21150'
 - 2) ICI: 4020-XXXX, Devflex DTM Flat Interior/Exterior Waterborne Primer & Finish.
 - 3) Moore: IronClad Latex Low Lustre Metal & Wood Enamel #363.
 - 4) PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
 - 5) S-W: DTM Acrylic Primer/Finish B66W1 Series.
 - b. Undercoat: Semigloss, acrylic latex, interior enamel, as recommended by the manufacturer for this substrate, applied at spreading rate as recommended by the manufacturer.
 - 1) Cal: Premium 100% Acrylic Semi Gloss 563XX.
 - 2) ICI: 1416-XXXX Ultra Hide Latex Semi Gloss Interior wall and trim enamel.
 - 3) Moore: Super Spec Latex Semi Gloss Enamel #276.
 - 4) PPG: Speedhide Interior Latex Semi Gloss Enamel 6-510 Series.
 - 5) S-W: ProMar 200 Interior Latex Semi Gloss B31W200 Series.
 - c. Finish Coat: Semigloss, acrylic latex, interior enamel applied at spreading rate recommended by the manufacturer.
 - 1) Cal: Premium 100% Acrylic Semi Gloss 563XX.
 - 2) Moore: Super Spec Latex Semi Gloss Enamel #276.
 - 3) PPG: Speedhide Interior Latex Semi Gloss Enamel 6-510 Series.
 - 4) S-W: ProMar 200 Interior Latex Semi Gloss B31W200 Series.

END OF SECTION

**SECTION 101400
SIGNAGE**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes the following types of signs:
 - 1. Panel signs.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- B. Samples: Submit one sample of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
 - 1. Samples for selection of color, pattern, and texture:
 - a. Cast acrylic sheet and plastic laminate: Manufacturer's color charts consisting of actual sections of material including the full range of colors available for each material required.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by the authorities having jurisdiction...
 - 1. Interior code signage: Provide signage as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:
 - a. Signs for accessible spaces:
- B. Design Concept: The drawings indicate sizes, profiles, and dimensional requirements of signs and are based on the specific types and models indicated. Sign units by other manufactures may be considered provided deviations in dimensions and profiles do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.

1.04 PROJECT CONDITIONS

- A. Field measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. coordinate fabrication schedule with construction progress to avoid delay.

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. Manufacturers of panel signs:
 - a. Mohawk Sign Systems.
 - b. Welch Architectural Signage.

2.02 MATERIALS

- A. Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet, in sizes and thicknesses indicated, with a minimum flexural strength

of 16,000 psi when tested according to ASTM D 790, with a minimum allowable continuous service temperature of 176 deg F, and of the following general types:

1. Opaque Sheet: Where sheet material is indicated as "Opaque" provide colored opaque acrylic sheet in colors and finishes as selected from the manufacturer's standards.
- B. Colored Coatings for Acrylic Plastic Sheet: Use colored coatings, including inks and paints for copy and background colors, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are nonfading for the application intended.

2.03 PANEL SIGNS

- A. Substrate: Fabricate signs from 1/8 inch thick matte clear acrylic with edges mechanically and smoothly finished to eliminate cut marks. Background color to be subsurface.
 1. Background color: As selected by owner from manufacturer's standard colors.
 2. Edge Condition: Straight.
 3. Corner Condition: Rounded to 3/8 inch radius.
 4. Size: 6 by 6 inch, unless noted otherwise.
- B. Copy: Helvetica
- C. Letterform: Route copy into face of substrate 1/32 inch deep. Chemically weld (inlay) computer precision cut tactile copy into routed letter openings so that tactile copy is embossed in substrate and remains at least 1/32" above surface of substrate.
 1. Height: 5/8 inch minimum letter height.
- D. Braille: Use engrave process for all braille areas. Engrave braille dots into surface of clear material.
- E. Symbols of Accessibility:
 1. Accessible elements: Provide international symbol of accessibility.
 - a. Provide male and female symbols as required for toilets.
- F. Provide characters complying with ADA accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by grade 2 braille.

2.04 FINISHES

- A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by owner from the manufacturer's standards.
 1. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 [____], unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

2.05 SIGN TYPES

- A. Color and Font: Unless otherwise indicated:
 1. Character Font: Helvetica, Arial, or other sans serif font.
 2. Character Case: Upper case only.
 3. Background Color: Clear.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.

1. Install signs level and plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
 2. Locate signs in accordance with approved shop drawings and ADA requirements.
- B. Wall Mounted Panel Signs: Attach panel signs to wall surfaces using the methods indicated
1. Vinyl Tape Mounting: Use double sided foam tape to mount signs to smooth, non porous surfaces. Do not use this method for vinyl covered or rough surfaces.

3.02 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to the manufacturer's instruction. Protect units from damage until acceptance by owner.

3.03 PANEL SIGN SCHEDULE

A. Types:	Sizes:	Quantity
Mens Restroom	Provide 8" x 6"	One for each room
Womens Restroom	Provide 8" x 6"	One for each room
Utility Room	Provide 8" x 6"	One for each room

END OF SECTION

**SECTION 102113
TOILET COMPARTMENTS**

PART 1 GENERAL

1.01 SUMMARY

A. SECTION INCLUDES

1. Solid Color Reinforced Composite (SCRC) Substrate:
2. Compact Laminate (CL/Solid Phenolic), Moisture Resistant Substrate:
 - a. Toilet partitions.
 - b. Screen Style: Wall hung.

1.02 SUBMITTALS

- A. 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.
- B. Shop Drawings: Submit manufacturer's shop drawings for each product specified, including the following:
 1. Plans, elevations, details of construction and attachment to adjacent construction.
 2. Show anchorage locations and accessory items.
 3. Verify dimensions with field measurements prior to final production of toilet compartments.
- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- D. PROJECT CONDITIONS
 1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.
 2. SEQUENCING
 - a. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

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. Bobrick Washroom Equipment, Inc.
 2. Accurate Partitions Corporation.
 3. General Partitions Mfg. Corp.
 4. Global Steel Products Corp.
 5. Santana.
 6. Sanymetal.

2.02 MATERIALS

- A. General: provide materials that have been selected for surface flatness and smoothness. Exposed surfaces that exhibit pitting, scam marks, roller marks, stains, discoloration, telegraphing of core material, or other imperfections on finished units are unacceptable.
- B. Solid Plastic, Polymer Resin: High-density polyethylene (HDPE) with homogenous color throughout. Provide material not less than 1 inch thick with seamless construction and

eased edges in color and pattern as follows:

1. Color and Pattern: One color and pattern in each room as selected by owner from manufacturer's full range of colors and patterns.
- C. Pilaster shoes and sleeves (caps): ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 inch thick and 3 inches high, finish to match hardware.
- D. Full-Height (continuous) Brackets: Manufacturer's standard design for attaching panels and screen walls and pilasters of the following material:
 1. Material: Clear Anodized Aluminum.
- E. Hardware and Accessories: Manufacturer's standard design, heavy duty operating hardware and accessories of the following material:
 1. Material: Stainless Steel.
- F. Overhead Bracing: Manufacturer's standard continuous, extruded aluminum head rail with antigrip profile in manufacturer's standard finish.
- G. Anchorage and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome plated steel or brass, finish to match hardware, with theft resistant type heads. Provide sex type bolts for through bolt applications. For concealed anchors, use hot dip galvanized or other rust resistant, protective coated steel.

2.03 FABRICATION

- A. General: Provide standard doors, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment mounted hardware, accessories, and grab bars, as indicated.
- B. Overhead Braced and Floor Anchored Compartments: Provide manufacturer's standard corrosion resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Doors: Unless otherwise indicated, provide 24 inch wide in swinging doors for standard toilets compartments and 36" wide out swinging doors with a minimum 32 inch wide clear opening for compartment indicated to be handicapped accessible.
 1. Hinges: Manufacturer's standard self closing type that can be adjusted to hold door open at any angle up to 90 degrees.
 2. Latch and Keeper: Manufacturer's standard surface mounted latch unit with combination rubber faced door strike and keeper designed for emergency access. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.
 3. Coat Hook: Manufacturer's standard combination hook and rubber tipped bumper, sized to prevent door from hitting compartment mounted accessories.
 4. Door Bumpers: Manufacturer's standard rubber tipped bumpers at all out swinging doors or entrance screen doors.
 5. Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction at out swinging doors. Provide units on both sides of doors at compartments indicated to be handicapped accessible.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level. Provide clearances of not more than 1/2 inch between pilasters and panels and not more than 1 inch between panels and walls. Secure units in position with manufacturer's recommended anchoring devices.
 1. Secure pilasters to walls with not less than 1 full height bracket attached to each side of pilaster.

- B. Overhead Braced and Floor Anchored Compartments: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than 2 fasteners. Hang doors and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

3.02 **ADJUSTING AND CLEANING**

- A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. set hinges on in swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out swinging and swing doors in entrance screens to return to fully closed position.
- B. Provide final protection and maintain conditions that ensure toilet compartments and screens are without damage or deterioration at time of substantial completion.

END OF SECTION

**SECTION 102800
TOILET, BATH, AND LAUNDRY ACCESSORIES**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes the following:
 - 1. Toilet and bath accessories.
 - 2. Warm air dryer.

1.02 SUBMITTALS

- A. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- B. Setting drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required Use designations indicated in the toilet and bath accessory schedule and room designations indicated on drawings and product schedule.
- D. Maintenance Data: For accessories to include in maintenance manuals specified in division 1. Provide list of replacement parts and service recommendations.

1.03 QUALITY ASSURANCE

- A. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in the same areas, unless approved by owner.
- B. Product options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the toilet and bath accessory schedule.
 - 1. Other manufacturers' products with equal characteristics may be considered. See division 1 Section "Product Requirements".

1.04 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the work.

1.05 WARRANTY

- A. General warranty: Special warranty 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 requirementManufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within a minimum warranty period indicated.
 - 1. Minimum Warranty Period: 10 years from date of substantial completion.

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. Toilet and bath accessories:
 - a. Bobrick Washroom Equipment, Inc.
2. Warm Air Driers:
 - a. Bobrick Washroom Equipment, Inc.

Available Products: Subject to compliance with requirements, products that may be incorporated into the work include, those indicated in the toilet and bath accessory schedule at the end of part 3.

2.02 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312 inch minimum nominal thickness, unless otherwise noted.
- B. Sheet Steel: ASTM A 366/A 366M, cold rolled, commercial quality, 0.0359 inch minimum nominal thickness, surface preparation and metal pretreatment as required for applied finish.
- C. Galvanized Sheet Steel: ASTM A 653/A 653M, G60.
- D. Chromium Plating: ASTM B 456, Service condition Number SC 2 (moderate service), nickel plus chromium electro deposited on base material.
- E. Baked-Enamel Finish: Factory applied, gloss white, baked acrylic enamel coating.
- F. Mirror Glass: ASTM C 1036, Type 1, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.
- G. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- H. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.03 FABRICATION

- A. General: One, maximum 1-1/2 inch diameter, unobtrusive stamped manufacturer logo, as approved by owner, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.
- B. General: Names or labels are not permitted on exposed faces of accessories. On interior surface not exposed to view or on back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.
- C. Surface-Mounted Toilet Accessories" Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless steel hinge. Provide concealed anchorage where possible.
- D. Powder Coated Framed Glass Mirror Units: Fabricate frames for glass mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.
 1. Provide galvanized steel backing sheet, not less than 0.034 inch thick and full mirror size, with nonabsorbive filler material. Corrugated cardboard is not acceptable filler material.
- E. Mirror Unit Hangers: Provide mirror unit mounting system that permits rigid, tamper and theft resistant installation as follows:

1. One piece, galvanized steel, wall hanger device with spring action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 2. Heavy Duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
- F. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to owner's representative.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb and firmly anchored in locations and at heights indicated.
- B. Secure mirrors to walls in concealed, tamper resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacture's written instructions for substrate indicated.
- C. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to methods in ASTM F 446.
- D. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.02 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.03 TOILET AND BATH ACCESSORY SCHEDULE

- A. Combination Towel Dispenser/Waste receptacle: Where this designation is indicated, provide stainless steel combination unit complying with the following:
 1. Products: Available products include the following:
 - a. No. 3949 Bobrick washroom Accessories.
 2. Surface mounted with uni-door: Designed for surface mount; towel dispenser in unit's upper compartment designed to dispense minimum of 600 C-fold or 800 multifold paper towels; waste receptacle in unit's lower portion secured by single door with continuous hinge and tumbler locksets and with minimum 8.5 gal. capacity, reusable, vinyl liner.
- B. Toilet Paper Dispenser: Where this designation is indicated, provide toilet tissue dispenser complying with the following:
 1. Products available include the following:
 - a. Bobrick No. B-2890.
 2. Type: Single jumbo roll.
 3. Mounting: Surface mounted with concealed fasteners.
 4. Material: Stainless steel.
- C. Soap Dispenser: Where this designation is indicated, provide soap dispenser complying with the following:
 1. Products available include the following:
 - a. Bobrick No. B-2112.
 2. Liquid Soap Dispenser: Horizontal tank type; Surface mounted type, minimum 40 oz. capacity tank with stainless steel piston, springs, and internal parts designed to dispense soap in measured quantity by pump action; and stainless steel cover with unbreakable window refill indicator.

- a. Soap Valve: Designed for dispensing soap in liquid form.
- D. Grab Bars: Where this designation is indicated, provide stainless steel grab bar complying with the following:
 - 1. Products: Available products include the following:
 - a. Bobrick No. B-5806 Series.
 - 2. Stainless Steel Nominal Thickness: Minimum 0.05 inch.
 - 3. Mounting: Concealed with manufacturer's standard flanges and anchors.
 - 4. Gripping Surfaces: Manufacturer's standard slip resistant texture.
 - 5. Outside Diameter: 1-1.4 inch for medium duty applications.
- E. Sanitary Napkin Disposal Unit: Where this designation is indicated, provide stainless steel sanitary napkin disposal unit complying with the following"
 - 1. Products: Available products include the following:
 - a. Bobrick No. B-254'
 - 2. Surface Mounted Type: With seamless exposed walls; self closing top cover; locking bottom panel with stainless steel continuous hinge; and removable, reusable receptacle.
- F. Mirror Unit: Where this designation is indicated, provide mirror unit complying with the following:
 - 1. Products available include the following:
 - a. Bobrick No. B-165 2436.
 - 2. Stainless Steel, Channel Framed Mirror: Fabricate frame from stainless steel channels in manufacturer's standard satin or bright finish with square corners mitered to hairline joints and mechanically interlocked.
- G. Warm Air Dryer: Where this designation is indicated, provide warm air dryer complying with the following:
 - 1. Products: Available products include the following:
 - a. No. B-7128 by Bobrick.
 - 2. Automatic Hand Dryer: Surface mounted, warm air hand dryer with no touch operation controlled by electronic sensor and with manufacturer's standard, stainless steel cover.
- H. Diaper Changing Station: Where this designation is indicated, provide infant care product complying with the following:
 - 1. Products: Available products include the following:
 - a. No. KB200 by Koala Kare.
 - 2. Horizontal, Surface Mounted Unit: Diaper changing station with surface mounted, mildew resistant, molded polyethylene body that folds horizontally against wall when not in use; Projects not more than 4 inches from wall when closed; and is engineered to support a minimum of 250 lbs static weight when opened. Provide unit with pneumatic shock absorbing operating mechanism and built-in dispenser for sanitary liners.

END OF SECTION

**SECTION 312316
EXCAVATION**

PART 1 GENERAL

1.01 DESCRIPTION

- A. Perform the following items of work, as shown on the drawings and specified herein:
 - 1. Do all excavating and furnish all materials necessary for embankment construction, as required to complete the work of this contract, including the furnishing and compaction of additional materials as needed.
 - 2. Completely remove from the site all excavated material which is not approved by the engineer for use as embankment material. This provision does not apply to topsoil which will remain the property of the owner.
 - 3. Establish subgrades as indicated on the drawings and specified hereunder.
 - 4. Perform cutting and removal of existing pavement to the extent required for the work under this contract.
 - 5. Protect all trees, shrubs, and plantings not to be removed under this contract.
 - 6. Protect all utilities on site for the duration of the work.
- B. Related Work Specified Elsewhere"
 - 1. Quality Control.

1.02 DEFINITIONS

1.03

- A. The work involved includes removal, haul and disposal of materials to prepare for construction and the placing and compaction of materials to construct embankments.
- B. Excavation shall be designated as common, rock, unclassified or muck.
 - 1. Common excavation shall consist of removal of earth, of boulders, solid mortared stone masonry and concrete masonry when each is less than two cubic yards in volume and of rock which can be removed with ordinary excavating machinery. Grubbing shall be considered as common excavation.
 - 2. Rock Excavation shall consist of removal of solid rock which cannot be excavated without the use of explosives or ripping equipment and of boulders, solid mortared stone masonry and concrete having a volume of two cubic yards or more.
 - 3. Unclassified excavation shall consist of removal of materials without consideration to their composition.
 - 4. Muck excavation shall consist of soils and organic materials which are not suitable for use in embankment.
- C. Embankment construction shall consist of constructing roadway embankments, including preparation of the areas upon which they are placed; site grading around buildings and structures,; the construction of parking areas, lawns, berms, and dikes; the placing and compacting of approved materials within areas where unsuitable material has been removed; and the placing and compacting of embankment material in holes, pits and other depressions within the roadway area or construction site limits.
- D. Related Work Specified Elsewhere (When Applicable)
 - 1. Stripping and Stockpiling of Topsoil; Trench Excavation-Earth; Trench Excavation-Ledge; Borrow and Bedding Material,; Trench Backfilling, Compaction, Control and Testing,, Temporary Erosion Control and Dewatering are specified elsewhere in this division.

1.04 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies
 - 1. All work shall be performed and completed in accordance with all local, state or federal regulations.

2. The general contractor shall secure all necessary permits from, and furnish proof of acceptance by, the local and state departments having jurisdiction and shall pay for all such permits, except as specifically stated elsewhere in the contract documents.
- B. Grades and Elevations:
1. The contractor shall establish the lines and grades in conformity with the drawings and maintain same to properly perform the contract installation.
- C. Compaction
1. The contractor shall compact all embankment materials in accordance with this specification.
 2. Density testing shall be performed by an independent testing laboratory retained by the owner and acceptable to the engineer and contractor.
 3. Independent testing laboratory shall determine in place densities in accordance with ASTM D 1556 or other methods approved by the engineer.
 4. Independent testing laboratory shall submit one copy of the following reports to the owners representative and the contractor.
 - a. Test reports on material
 - b. Field density test reports
 - c. One moisture density curve for each type of soil encountered.
 5. Location of Tests:
 - a. One test per 300 feet of completed roadway subgrade just prior to placement of subbase gravels and additional tests at depths as required by the engineer.
 - b. Two test on finished subgrade in parking area just prior to placing the subbase gravels and additional tests at depths as required by the engineer.
 6. If the test results fail to meet the requirements of these specifications, the contractor shall correct the situation and obtain a passing test. The cost of reworking the material to obtain a passing test shall be borne by the contractor and no allowance will be made for delays in performance of the work. All testing and retesting shall be conducted by the independent testing laboratory costs of retesting will be paid for by the owner. The cost of retesting will be determined by engineer and the owner will invoice contractor for this cost. If unpaid after 60 days, the invoice amount will be deducted from the contract price.

1.05 JOB CONDITIONS

- A. Disposition of Utilities:
1. The locations of utilities shown on the plans are from a previous project on this site. It shall be the responsibility of the contractor to determine the actual locations of any utilities within the project area.
 2. Rules and regulations governing the respective utilities shall be observed in executing all work in this section. active utilities shall be adequately protected from damage, and removed or relocated only as indicated or specified. Inactive and abandoned utilities encountered in excavation and grading operations shall be removed, plugged or capped. Report in writing to the engineer, the locations of such abandoned utilities. Extreme care shall be taken when performing work in the vicinity of existing utility lines, utilizing hand excavation in such areas, as far as practicable. If, in the progress of excavation, any utility should become damaged and result in any damage to public or private property, the general contractor shall restore to the original condition, at no cost to the owner, anything which has been damaged or disturbed.

PART 2 PRODUCTS

2.01 DEFINITION OF GRAVEL, SAND, AND SILT CLAY

- A. The term "gravel", "coarse sand", "fine sand", and "silt-clay" as determinable from the minimum test data required in this classification arrangement and as used in subsequent word descriptions are as follows:
1. Gravel - Materials passing sieve with 75 mm (3 inch) square openings and retained on the 2'00 mm (No. 10) sieve.
 2. Coarse Sand - Materials passing the 2'00 mm (No. 10) sieve and retained on the 0.425 (No. 40) sieve.
 3. Fine Sand - Material passing the 0.425 (No. 40) sieve and retained on the 0.075 mm (No. 200) sieve.
 4. Silt-Clay (combined silt and clay) - Material passing the 0.075 mm (No. 200) sieve.
 5. Boulders (retained On 77 mm (3-inch) sieve) should be excluded from the portion of the sample to which the classification is applied, but the percentage of such material, if any, in the sample should be recorded.
 - 6.

2.02 SOIL MATERIALS

- A. Use of Excavated Material:
1. To the extent they are needed, all suitable materials from the specified excavation may be used in the construction of required embankment and slope protective devices (riprap).
 2. Surplus excavated materials suitable for filling operations shall not be wasted, but will be stockpiled for future use within the owners property. This specified location will be determined at the start of construction.
 3. Unsuitable materials shall consist of grubbing or other materials which contain rock of size exceeding specifications, organic materials, or other materials of a deleterious nature. Silts, clays and granular materials with more than 8 % passing the number 200 sieve shall be considered unsuitable for embankment in the frost penetration zone under paved areas when sufficient water is available to cause heaving.
- B. Embankment material shall consist of suitable approved common excavation and/or common, or gravel borrow. rock excavation and/or common borrow to eliminate voids.

PART 3 EXECUTION

3.01 SAFETY

- A. Comply with applicable local, state and federal safety regulations or in the absence thereof, with the provisions of the Manual of Accident Prevention in Construction of the Associated General Contractors of America, Inc.
- B. Provide shoring, sheeting and/or bracing at excavations as required to prevent cave-ins of excavation, and to assure complete safety of existing structures, utilities and pavements that are to remain in place.

3.02 COMMON EXCAVATION

- A. Common excavation areas shall be maintained in such condition that the excavation will be well drained.
- B. Roadway excavation, in general, shall proceed in a direction upgrade. Subgrades shall be promptly rolled to prevent absorption of water.

3.03 EXCAVATION FOR UTILITY SERVICES

- A. water, storm drainage, electric services, utility structures, sanitary sewer piping will be installed under the work of the respective sections.
- B. Excavate to the specified elevations.
- C. Excavate to the length and width required to safely install, adjust, and remove any forms, bracing, or supports necessary for the installation of the work.
- D. Cut utility trenches wide enough to allow inspection of installed utilities.
- E.

3.04 MINIMUM LIMITS FOR EARTH EXCAVATION

- A. Earth excavation must be carried to the following limits, unless otherwise indicated herein or on the drawings.
 - 1. Subgrades for site work shall be as follows:
 - a. Area to receive topsoil - four (4) inches below finish grades.
 - b. Utility structures - bottom of structure or as shown on the site details and 18 (18) inches outside wall extremities.
 - c. On-site bituminous concrete paved surfaces, as noted on the drawings.
 - d. Off-site paved areas, as noted on the drawings.
- B. In open excavations material will be classified as rock only when the following conditions prevail"
 - 1. When the natural compound, natural mixture, and/or chemical element cannot be broken and removed from its existing position and state by a 3/4 yard backhoe or D8 dozer and requires the use of drills, or the use of explosives.
 - 2. note: When during the process of excavation, rock is encountered such material shall be uncovered and exposed, and the owner's representative shall be notified by the contractor before proceeding further. The area in question shall then be measured as stipulated in paragraph B, following. The contractor shall not proceed with excavation of material claimed as rock until material has been classified by the engineer, or prior to the survey, he shall forfeit his right to extra payment in the subject area.
- C. The contractor will provide qualified personnel, acceptable to both the owner and the engineer, to take cross-section of rock before removal of same, and to provide computations of cross section within the payline limits.
- D. Excavate rock, encountered in grading areas within the contract, to depths as follows:
 - 1. Under pavements and surfaced areas - to six inches below the required subgrade for such areas.
 - 2. Under lawn areas - to two feet below finished grade, unless approved otherwise by owner
- E. Blasting - obtain written permission and approval of method from the local authorities before proceeding with rock excavation. Explosives shall be stored, handled, and employed in accordance with the provisions of the "Manual of Accident Prevention in Construction: of the Associated General Contractors of America, Inc.

3.05 COLD WEATHER PROTECTION

Protect excavations against freezing when atmospheric temperature is less than 35 deg F.

3.06 COMPACTION

- A. General: Control soil compaction during construction to the satisfaction of the engineer and/or resident project representative by providing compaction to at least the minimum percentage of maximum density as specified for each area classification.
- B. Percentage of Maximum Density Requirements: Unless otherwise specified, compact soil to not less than the following percentages of maximum dry density for soils which exhibit a

well drained moisture density relationship (determined in accordance with ASTM D 1557) and to not less than the following percentages of relative dry density (determined in accordance with ASTM D 2049) for soils which do not exhibit a well drained moisture density relationship.

1. Lawn or vegetated Areas: Compact top 6 inches of subgrade and each layer of backfill material to 90 percent maximum dry density as determined by AASHTO T-180, Method C or D.
 2. Pavements: Compact top 12" of excavation subgrade and each layer of fill material to 95 percent maximum dry density as determined by AASHTO T-180, Method C or D.
- C. Moisture Control: Where subgrade or a layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material at a rate such that free water does not appear 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.
- E. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry.
- F.

3.07 EMBANKMENT

- A. Compaction Equipment
1. Provide sufficient equipment units of suitable types to spread, level and compact fills promptly upon delivery of materials.
 2. The contractor may use any compaction equipment or device which he finds convenient or economical, but the engineer retains the right to disapprove equipment which, in his opinion, is of inadequate capacity or unsuited to character of material being compacted.
 3. The contractor shall be responsible for the proper placement and compaction of backfill material. Any settlement that occurs shall be repaired by the contractor at his own cost and expense. If pipelines and/or structures are damaged or displaced, they shall be repaired at the contractor's expense.
- B. Areas to be filled or backfilled shall be free of construction debris, refuse, compressible or decaying materials and standing water.
- C. Place acceptable soil materials in layers to required subgrade elevations, for each area classification listed below.
1. In excavations, use satisfactory excavated or borrow material.
 2. Under grasses areas, use satisfactory excavated or borrow material.
 3. Under pavements, use satisfactory excavated or borrow material or combination of both.
- D. Grub areas a depth of 12" where fills are to be less than five feet in depth as shown on the drawings.
- E. When existing ground surface has a density less than that specified under "compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.
- F. Placement and Compaction: Place fill materials in layers no thicker than 10".
- G. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification.
- H. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- I. Place backfill and fill materials evenly to required elevations adjacent to structures. Take care to prevent wedging action of fill against structures by carrying the material uniformly around structure to approximately the same elevation in each lift.

- J. When water and sewer piping is laid in filled areas, place the fill before any pipe is placed and compact as specified to a depth or not more than 2 feet above the proposed top of pipe. A trench shall then be excavated to the required grade, and of sufficient width to permit thorough tamping of the fill under the bells and around the pipe.
- K. At the end of each day's work the embankment shall be shaped and rolled to minimize infiltration of water.
- L. General: Uniformly grade areas within limits of construction smooth finished surface within specified tolerances.
 - 1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 feet above or below the required subgrade elevations.

3.08 MAINTENANCE

- A. Repair and re-establish grades to specified tolerances in settled, eroded or rutted areas.
- B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, reshape, and compact to required density prior to further construction.

3.09 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash and debris, and dispose of it off the owner's property. This provision does not apply to stockpiled topsoil which shall remain

END OF SECTION

**SECTION 312513
EROSION CONTROL**

**EROSION CONTROLS
1.01 DESCRIPTION**

CONSTRUCTION OPERATIONS SHALL COMPLY WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS PERTAINING TO EROSION CONTROL.

PART 2 PRODUCTS

END OF SECTION

**SECTION 220000
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PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings, Addenda, General Provisions of Contract, including General and Supplementary conditions and General Requirements apply to work specified in this Section.

1.02 DEFINITIONS

- A. ADA: Designed to meet the requirements of the Americans with Disabilities Act.
- B. Adaptable: Designed so in the future it can be easily adapted to meet most of the essential requirements of the Americans with Disabilities Act with minor additions and adjustments, such as change of height of counter or addition of a lift seat.
- C. Concealed: Shall mean in walls, in chases, above ceilings, within enclosed cabinets, otherwise enclosed.
- D. Equal: Shall mean essentially the same as that product specified, but a model of a different manufacturer
- E. Exposed: Shall mean in finished spaces, in closets, under counters, behind and/or under equipment and/or otherwise visible.
- F. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
- G. Materials: Shall mean any product used in the construction, including but not limited to: fixtures, equipment, piping and supplies.
- H. Others: Shall mean provided by sections other than this section. If not purposely assumed by another section, shall be provided by the Contractor.
- I. Piping: Shall mean pipe, fittings, hangers and valves.
- J. Provide: Shall mean the furnishing and installing of materials.
- K. Reviewed equal: Shall mean that the Architect or a designated Consultant, not the contractor, shall make final determination whether materials are an equal to that which is specified.
- L. Substitution: Shall mean of materials of significantly different physical, structural or electrical requirements, performance, dimensions, function, maintenance, quality or durability, than that specified.

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1.03 ALTERNATES

There are no alternates in this section of the project.

1.04 DESCRIPTION OF WORK

A. Work Included

1. Furnish all labor, materials, equipment, transportation, and perform all operations required to install complete plumbing systems in the building, in accordance with these specifications and applicable drawings.
2. Provide the following:
 - a. Sanitary, waste and vent systems.
 - c. Domestic hot and cold water system.
 - e. Pipe, valve and fittings
 - f. Water specialties
 - g. Drainage specialties
 - j. Plumbing fixtures and accessories
 - k. Insulation
 - l. Well system including Well Pump, Piping, Pressure Tank & Controls.
3. Specifications and accompanying drawings do not indicate every detail of pipe, valves, fittings, hangers, fixtures and equipment necessary for complete installation; but are provided to show general arrangement and extent of work to be performed.

1.05 PERMITS

- A. This Contractor shall be responsible for providing and filing all Plans, Specifications and other documents, pay all requisite fees and secure all permits, inspections and approvals necessary for the legal installation and operation of the systems and/or equipment furnished under this Section of the Specifications.
- B. The Contractor shall frame under glass/ clear plastic all permits, secured by him, adjacent to the respective system and/or equipment and required to be displayed by Code, law or ordinance. Those permits secured but not required to be displayed shall be laminated in plastic and included in the Owner's maintenance manual.

1.06 CODES AND ORDINANCES

- A. All work performed under this Section of the Specifications shall be done in accordance with applicable Federal Laws, Maine State Laws, Uniform Plumbing Code, Subsurface Wastewater Disposal Rules, and local plumbing codes and ordinances. The following standards are also to be followed when applicable:

ADA	Americans With Disabilities Act
ANSI	American National Standards Institute

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ASHRAE Engineers	American Society of Heating, Refrigeration and Air Conditioning
ASTM	American Society for Testing and Materials
BOCA	Building Officials & Code Administrators International, Inc.
NFPA	National Fire Protection Association (a.k.a. NFC, National Fire code)
NEMA	National Electrical Manufacturer's Association
OSHA	Occupational Safety and Health Act
UL	Underwriter's Laboratories

- B. If an obsolete code section or standard is specified, the latest replacement issue of each Code or standard for the application, in effect at the time of bidding, shall be used. Code requirements are the minimum quality and/or performance acceptable. Where the Specifications and/or Drawings indicate more stringent requirements, these requirements shall govern.

1.07 QUALITY ASSURANCE

- A. Use sufficient qualified workmen and competent supervisors in execution of this portion of the work to ensure proper and adequate installation of the system throughout. Work performed shall conform to manufacturers' recommendations, good standard practice and industry standards.
- B. Technical training of workmen installing the systems specified, by the systems manufacturer, shall be mandatory prior to commencement of work. Documentation of such certification shall be made available to the Architect upon request within 5 business days
- C. Any work deemed unacceptable by the Engineer, Architect or Clerk of the Works shall be redone correctly, at no additional cost to the owner.

1.08 ELECTRONIC DRAWINGS AND FILE SHARING

Plans and specifications may be made available in electronic format on request. Plans may be provided in either Adobe (.pdf) or CAD (.dwg or .dxf) formats and will be compressed using WinZip (.zip format). Recipient is responsible to obtain the necessary software to open the files. Note: CAD drawings will be made available to successful bidders only after a contract is awarded.

CAD drawings are produced with AutoCAD 2006 and may be provided in either the 2000 or 2004 file formats. Upon request for CAD files a release form will be provided which must be signed and returned to the Engineer prior to transmission of electronic files. Physical mailing address, telephone numbers and e-mail address for this office are indicated on each drawing. A signed release will not be required for Adobe based files.

All contract documents are copyrighted material. No portion of materials may be reproduced or duplicated except as indicated in the release form. Where release forms are not required (Adobe based files), materials may be printed for use by the intended recipient only and may not be reproduced or copied in any other manner unless written

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permission is obtained.

1.09 MATERIALS AND SUBSTITUTIONS

All materials and equipment shall be new and of the latest design of respective manufacturers. All materials and equipment of the same classification shall be the product of the same manufacturer, unless specified otherwise.

- A. Any proposal for substitution of Plumbing equipment shall be made in writing PRIOR TO OPENING OF BIDS. Submit full details for consideration and obtain written approval of the Architect. The phrase "or approved equal" shall be intended to mean that the Architect, not the contractor, shall make final determination whether or not substitute materials are an equal to that which is specified. The contractor shall be responsible to certify within his submittals that any equipment to be considered as an "approved equal" meets or exceeds the requirements of this specification in all aspects and will physically fit within the space provided and still provide adequate space adjacent to the equipment for service. If requested by the Architect the contractor shall provide said certification in the form of scale drawings before review will be made. Architect will not be responsible to provide drawings for substituted materials unless the substitution is agreed upon prior to opening of bids. Architect's decision on acceptability of substitute materials shall be final.
- B. Approval by Architect for such substitution shall not relieve the Plumbing Contractor from responsibility for a satisfactory installation and shall not affect his guarantee covering all parts of work
- C. Any material or equipment submitted for approval which are arranged differently or is/are of different physical size from that shown or specified shall be accompanied by shop drawings indicating different arrangements of size and method of making the various connections to equipment. Final results will be compatible with system as designed.
- D. Materials and equipment determined as an "approved equal" and /or substitutions must meet the same construction standards, capacities, code compliances, etc. as the equipment (i.e. manufacturer, model, etc.) specified.
- E. Any additional cost resulting from the substitution of equipment shall be paid by this Contractor.

1.10 PLANS AND SPECIFICATIONS FOR SUPPLIERS

This Contractor shall provide his Suppliers, and any related subcontractors, with a copy of the specification pages, and letter sized photocopies of equipment details and schedules, that pertain to the item to be supplied.

1.11 SHOP DRAWINGS & SUBMITTALS

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- A. As soon as possible after award of Contract (but not longer than 21 calendar days), before any material or equipment is purchased, Plumbing Contractor shall submit to the Architect no less than ten (10) copies of shop drawings for approval. If shop drawings are not submitted within the allotted time frame all substitutions included the late shop drawings will be invalid and the equipment specified must be provided. Any costs resulting from delays in the project schedule due to failure to submit shop drawings related to this section in a timely manner shall be the responsibility of the Plumbing Contractor.
- B. Each item shall be properly identified, preferably by fixture/equipment tag number (such as WC-3), and shall describe in detail the material and equipment to be provided, including all dimensional data, performance data, pump curves, computer selection print-outs, etc. Capacities indicated are minimums. Equipment submitted with capacities below specified parameters will be refused.
- C. Corrections or comments made on the shop drawings do not relieve the contractor from compliance with requirements of the drawings and specifications. Shop drawing review is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades and performing his work in a safe and satisfactory manner.
- D. Should any materials or products be purchased and/or installed without prior review and comment the contractor shall be required to remove or replace those products and/or materials if directed by the Architect at his own expense. If the materials are not removed (or replaced) or if the project is delayed as a result the Architect reserves the right to order the withholding of payment until the situation is resolved in a manner satisfactory to the Architect.
- E. Plumbing shop drawings shall be separate from Mechanical shop drawings. All submittals shall have a clear area on the front no less than 4inches x 3inches to be reserved exclusively for the Engineers' shop drawing stamp or they will be refused for re-submittal.
- F. It is desirable for shop drawings to be submitted electronically, including all documentation outlined in paragraph "A" above. Hard copies of shop drawings must be original documents or good quality photocopies of original documents (photocopies of color samples are not acceptable). Faxed copies of submittal sheets will be refused.
- G. Review must be obtained on all items specified in Section 2 Products or shown on the drawing, and any significant items implied or otherwise required but not specified.
- H. Format
1. Related items shall be stapled or Bound together as a package. The number of copies of each package shall be as listed above. Examples of packages of related items include:

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- a. Hangers and Supports
- b. Identification
- c. Insulation
- d. Valves
- e. Piping
- f. Plumbing Fixtures with accessories
- g. Drainage Specialties
- h. Water Specialties
- i. Pumps

2. If due to circumstances beyond his control, the contractor is unable to include all the related items in the submitted package, he shall insert in its place a plain sheet of paper with a notation stating that the item will be submitted separately.

1.12 PRODUCT HANDLING

Use all means necessary to protect materials before, during and after installation, and to protect the installed work and materials of all other trades. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

1.13 AS-BUILT DRAWINGS

Keep in good condition at the job, apart from all other prints used in actual construction, one complete set of all blueprints furnished for this job. On this special set of blueprints, record *completely and accurately* all differences between the work as actually installed and the design as shown on the drawings. These record prints must be kept up to date by recording all changes within one week of the time that the changes are authorized. At the completion of the work, this set of drawings shall be delivered to the Architect for the Owner electronically in the form of CAD drawings. If a complete record of changes is not made and electronic CAD drawings not provided by the Plumbing Contractor, a record shall be made by the Engineers, and *the cost of the record shall be paid by the Plumbing Contractor*. Copies of the plumbing CAD drawings may be made available electronically to the Contractor if desired. Drawings shall be dated accordingly and clearly identified as "AS-BUILT". Contact the Architect directly or the Engineer via e-mail at mechsyst@maine.rr.com. Specify required CAD format when requesting the files. CAD drawings were generated using AutoCAD 2006 and utilize both paper space and model space with external references to various other drawings. Files will be compressed and will require "WinZip" (<http://www.winzip.com>) for extraction. A release form will be provided which must be signed and returned to the Engineer prior to transfer of files.

1.14 MAINTENANCE MANUAL

On completion of this portion of the work, and as a condition of its acceptance, submit for review two copies of a manual describing the system. Plumbing equipment manuals shall be separate from mechanical manuals. All manuals shall be original copies, not

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photocopies, or they will be refused for resubmittal. Prepare manuals in durable 3-ring binders approximately 8.1/2" by 11" in size with at least the following:

- A. Project name on the spine and front cover, and identification on the front cover stating the project name, general nature of the manual, and name, address and telephone number of the General and Plumbing Contractors.
- B. Neatly typewritten index.
- C. Complete instructions regarding operation and maintenance of all equipment involved.
- D. Complete nomenclature of all frequently replaceable parts and supplies, their part numbers, and name, address and telephone number of the vendor.
- E. Copy of all guarantees and warranties issued, and dates of expiration.
- F. Shop drawings and equipment/fixtures manufacturer's catalog pages. Clearly indicate the precise item included in this installation and delete, cross out or otherwise clearly indicate, all manufacturers' data with which this installation is not concerned.

1.15 OBJECTIONABLE NOISE AND VIBRATION

All equipment shall operate without objectionable noise and vibration. Should objectionable noise or vibration be transmitted to any occupied part of the building by apparatus or piping, as determined by the Architect, the necessary changes eliminating the noise or vibration shall be made by this Contractor at no extra cost to the Owner.

1.16 GUARANTEE

This Contractor shall guarantee all materials and workmanship furnished by him or his sub-contractors to be free from all defects for a period of no less than one (1) year from date of final acceptance of completed system and shall make good, repair or replace any defective work which may develop within that time at his own expense and without expense to the Owner. Any additional costs required to extend manufacturer's guarantee and warranty for the period specified, shall be included in Contractor's base bid.

1.17 DEVIATIONS, DISCREPANCIES AND OMISSIONS

- A. The drawings are intended to indicate only diagrammatically the intent, extent, general character and approximate locations of plumbing work. Work indicated, but having details obviously omitted, shall be furnished complete to perform the functions intended without additional cost to the Owner. This shall include but not be limited to:
 - 1. All items that are required to meet all applicable codes and referenced standards.

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2. Piping for cold and hot water supply, drain, vent, gas, etc. to each plumbing fixture/equipment shown on the drawings, or scheduled as required.
 3. Shut-off valves on lines feeding individual fixtures without integral stops.
 4. Minor single phase electrical wiring, or control wiring, between Plumbing provided items that require it, unless indicated on the Electrical Drawings.
 5. Plumbing related items indicated on the drawings of other trades.
 6. Items indicated on one plumbing drawing but not shown on a corresponding drawing.
 7. Items implied on the plumbing drawings but not shown.
 8. All plumbing related items clearly shown in dark print on the Plumbing drawings but not included in the specification, unless it is noted as being provided by the owner or other contractor or unless other sections assume the responsibility.
- B. The drawings and specifications are complimentary to each other and what is called for in one shall be as binding as if called for by both. In the event of conflicting information on the drawings, or in the specifications, or between drawings and specifications, or between trades, that which is better, best, most expensive, or most stringent shall govern.

1.18 WORKPLACE SAFETY

- A. The Trade Contractor alone shall be responsible for the safety, efficiency and adequacy of his plant, appliances and methods, and for any damage, which may result from their failure of their improper construction, maintenance, or operation.

1.19 CHANGE ORDERS

- A. No change shall be made from the work, equipment, or materials under this section except as directed in writing by the Architect or Engineer of record.
- B. All requests for change in contract price and scope shall be accompanied by a breakdown list of materials with unit and extended prices and labor hours with unit and extended price, plus markups that have been applied.

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PART 2 - PRODUCTS

2.01 GENERAL

- A. Unless otherwise indicated, the materials to be furnished under this contract shall be new and the standard products of manufacturers regularly engaged in the production of such equipment, and shall be the manufacturer's latest standard design that complies with the specification requirements.
- B. All materials and equipment of the same classification shall be the product of the same manufacturer, unless specified otherwise. An entire product line may be rejected if one, or more, of the products submitted is not an equal to that specified.
- C. Unspecified items shall be by the same manufacturer and level of quality and as similar items specified, whenever possible. Whenever items have no similarity to those specified in this section, provide the equivalent item as specified in other Division 22 Sections. When no similarity exists in other sections, the Contractor shall submit for review an appropriate commercial/institutional quality item, complete to perform the functions intended, using his best discretion. The Architect or a designated Consultant, not the contractor, shall make final determination whether materials are of suitable quality and perform the functions intended.

2.02 HANGERS AND SUPPORTS

- A. General
 - 1. All hangers and supports shall be especially manufactured for that purpose and shall be the pattern, design and capacity required for the location of use.
 - 2. Piping specified herein shall not be supported from piping of other trades.
 - 3. All steel hangers shall be factory painted.
 - 4. Hangers shall be heavy-duty steel adjustable clevis type, plain for steel, cast iron and plastic pipe, and copper plated for piping in direct contact with copper tubing (i.e. copper hot water piping) shall be equal to Carpenter & Paterson Inc., Fig. 100 (Fig. 100CT copper plated).
 - 5. Hangers shall go outside of insulation for domestic water piping. Each hanger shall be furnished with metal shield; Fig. 100 SH.
 - 6. Exposed vertical risers $\frac{3}{4}$ inch and smaller shall be supported at 6 foot intervals between floor and ceiling with split ring type hangers; copper plated for piping in direct contact with copper tubing equal to Carpenter & Paterson Inc., Fig.81 (Fig. 81CT copper plated). ALL PIPING DROPS TO FIXTURES SHALL BE ANCHORED SOLID TO WALL WITH A STEEL SUPPORT BRACKET WITH ADJUSTABLE CLIP, ESPECIALLY PIPING

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TO FLUSH VALVES

7. Piping suspended from walls and partitions shall be supported by steel support bracket with adjustable clips equal to Carpenter & Paterson Inc., Fig. 69. All attachments to bar joists shall be from top chord.

B. Hanger Rods & Attachments

1. Hanger rods shall be galvanized all thread rod. Rod size shall be as follows:

<u>Pipe Size</u>	<u>Rod Size</u>
3/8" to 2"	3/8"
2.1/2" to 3.1/2"	1/2"
4" to 5"	5/8"
6"	3/4"

2. All nuts for hanger rods and hangers to be galvanized steel.
3. Provide lag points with rod couplings for fastening to wood, toggle bolts in concrete blocks and compound anchor shields and bolts in poured concrete.
4. Provide toggle bolts with rod couplings for fastening in the pre-cast concrete plank decks.
5. Provide and install angle iron supports for pipe hangers in locations as required. Angle iron supports shall be adequate size for span and piping or equipment.
6. Hot and cold water piping at each fixture shall be securely fastened in wall with split ring type hanger fastened to studs within wall.

2.03 SEISMIC RESTRAINT

All seismic restraints shall be in accordance with the International Building Code.

A. Piping Suspended by Hangers

Piping suspended by individual hangers 12 inches or less in length, need not be braced. The following piping shall be braced:

1. Fuel Oil, Fuel Gas, 1 inch and larger
 - a. Brazed or Soldered Joints - Transverse bracing every 20 feet and longitudinal every 40 feet.
 - b. Threaded or Mechanical Joints - Transverse bracing every 10 feet and longitudinal every 20 feet.

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- B. Piping Risers
 - 1. All vertical pipe risers shall be laterally supported with a riser clamp at each floor.
 - 2. No-hub joints shall be braced or stabilized between floors.
- C. Equipment
 - 1. All floor/pad mounted equipment including: water heaters, above ground water storage tanks, pneumatic pressure tanks, expansion tanks and boilers shall be anchored to the floor.
 - 2. Suspended equipment shall be cross braced in all directions.

2.04 IDENTIFICATION

- A. Tag each new pump /equipment, and switch with 2½ inches x ¾ inch rectangular engraved nameplates with white letters on black, #2060-20 by Seton Name Plate Corp. or reviewed equals. Nameplates shall be mechanically fastened to equipment (adhesives are not acceptable). Embossed labels are not acceptable.
- B. Identify all new water and drain piping with “Set Mark” snap-around pipe markers by Seton Name Plate Corporation or reviewed equal. Markers shall include both identification and arrows indicating direction of flow. Markers shall be placed on pipe segments 5 feet and longer, and spaced no less than 10 feet apart. Heating hot water piping shall be labeled differently from Domestic hot water piping. On parallel runs of piping, plumbing markers shall be grouped together, and grouped with heating markers whenever practical.

<u>Legend</u>	<u>Background/Letter Color</u>
“Cold Water”	Green/ white letters
“Domestic 120°F Water”	Yellow/ black letters
“Domestic 120°F Return”	Yellow/ black letters
“Domestic 140°F Water”	Yellow/ black letters
“Gas”	Yellow/ black letters
“Plumbing Vent”	Green/ white letters
“Compressed Air”	Green/ white letters
“Roof Drain”	Green/ white letters
“Sanitary Drain”	Green/ white letters

- C. Tag all new valves with Seton #M4506 1½ inch square brass tags and #6 bead chains, stamped with the following identification: “CW”, “HW”, “HWR” or “140HW”. Tag shall be consecutively numbered. DO NOT DUPLICATE EXISTING VALVE IDENTIFICATION NUMBERS. Fixture stops, control valves or valves adjacent to equipment, the use of which is obvious, are not to be tagged.
- D. Provide valve charts identifying valve number, valve identification and service (i.e. Apt. 203, HW). Mount charts in Boiler Room and Mechanical Room in 8½ inch x 10 inch and 8½ inch x 11 inch self-closing aluminum frame with plastic windows.

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Provide additional copies for maintenance manuals.

2.05 INSULATION

A. All Domestic Water Piping, All Above Slab Storm Water Piping, and Radon Vent Piping in Unheated Areas

1. Exposed Piping: Insulate exposed piping above slab/grade with Owens Corning Evolution SSL II paper free ASJ with tough, wrinkle resistant, easy to-clean jacket, or approved equal. Install with great care for appearance, turning any writing or seams toward the wall. Or reviewed equal.
 - a. Option: use standard Owens Corning fiberglass insulation with ASJ or approved equal, and carefully and neatly cover it with a white PVC plastic covering material. Covering shall be applied in no less than 4 foot lengths with shingle joints. Longitudinal joints shall be on the top or back sides so as to be out of sight and sealed with adhesive materials provided with the jacketing. Material shall be butted to finish walls or Insulation. Jacketing material shall be Zeston pre-cut, pre-curved 0.030 thickness. Or reviewed equal.
2. Concealed piping and piping in Mechanical rooms: Insulate with well installed and sealed Armaflex Pipe Insulation with pressure sealing lap adhesive, or equal.
 - a. Option: use standard Owens Corning fiberglass insulation with ASJ or approved equal.
3. Thickness as follows:
 - a. Hot water mains, recirculated hot water branches and recirculation returns: 1 inch thick minimum.
 - b. Unrecirculated hot water branches: 1" thick.
 - c. Cold water piping: ½" thick minimum.
 - d. Pex run-outs to individual fixtures, any temperature (if any): ½ inch thick to allow bending.
4. Insulate any below grade hot water piping run outs with ½" Armaflex closed cell piping insulation.

B. Fittings

1. All fittings and valves shall be covered with a one piece PVC insulated fitting cover secured.
2. The ends of insulation on exposed pipes at valves, flanges, unions, etc., shall be finished neatly with covering to match jacket and secure with mastic.
3. Valves, flanges and unions on hot water piping shall not be insulated.

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C. Installation

All insulation work shall be executed by skilled insulation workmen regularly in the trade.

2.06 VALVES

A. General

1. Valves shall be provided as shown and as required to make the installation and its apparatus complete in operation; locate to permit easy operation, replacement and repair.
2. All valves must be so constructed that they may be repacked under pressure while open.
3. Check valves shall be installed in all lines where flow may reverse from intended direction.
4. Valves shall have name and/or trademark of manufacturer as well as working pressure stamped or cast on valve body.
5. Valves shall comply with Manufacturer's Standards Society (MSS) specifications and be so listed.

B. Types and Manufacturers

All valves shall be of one manufacturer and by one of the manufacturers listed. The following list is provided as a means of identifying the quality and type required.

1. Gate Valves 3 inches in size and smaller

Shall have bronze bodies, rising stem, solid wedge, union bonnet, rated for 150# WSP, 300# WOG:

	<u>Soldered Ends</u>	<u>Screwed Ends</u>
Milwaukee	1169	1151
Stockham	B-124	B-120
NIBCO	S-134	T-134
Hammond	IB648	IB629

2. Globe Valves 2 inches in size and smaller

Shall have bronze bodies, union bonnet, renewable composition disc for service intended, rated for 150# WSP, 300# WOG:

	<u>Soldered Ends</u>	<u>Screwed Ends</u>
Milwaukee	1590-T	590-T
Stockham	B-24-T	B-22-T
NIBCO	S-235-Y	T-235-Y

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Hammond IB423 IB413T

3. Angle valves

Same general description and manufacturers as globe valves above, only outlet at 90 degree angle from inlet.

4. Ball valves 1¼ inches in size and smaller

Shall have bronze bodies, Type 316 stainless steel stems and balls, reinforced Teflon seats and seals, blowout proof stems and adjustable stem gland. Shall be equipped with suitable packing for service intended. Ports shall be "full port". Rated for 400# WOG and 350°F:

	<u>Soldered Ends</u>	<u>Screwed Ends</u>
Milwaukee	BA-350S	BA-300S
Apollo	82-200	82-100
Watts	B-6081	B-6080
NIBCO	-----	-----
Hammond	8614	8604

5. Ball valves 1½ inches in size and larger

Shall have bronze bodies, Type 316 stainless steel stems and balls, reinforced Teflon seats and seals, blowout proof stems and adjustable stem gland. Shall be equipped with suitable packing for service intended. Ports shall be "conventional port". Rated for 400# WOG and 350°F:

	<u>Soldered Ends</u>	<u>Screwed Ends</u>
Apollo	70-200	70-300
Watts	B-6000-SS	B-6001-SS
NIBCO	S-585-66	T-585-66
Hammond	8514	8503

6. Check Valves 2 inches in size and smaller

Shall be horizontal swing type with bronze body, Teflon disc. Rated for 125# WSP, 200# WOG:

	<u>Soldered Ends</u>	<u>Screwed Ends</u>
Milwaukee	1509-T	509-T
Stockham	B-310-T	B-320-T
NIBCO	S-413-Y	T-413-Y
Hammond	IB945	IB904

7. Spring loaded check valves 2" and smaller:

Bronze body, bronze trim, stainless steel spring, stainless steel center guide pin, Class 125, Teflon seat unless only bronze available.

	<u>Solder or Screwed Ends</u>
ConBraCo	61 series

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Grinnell	3600SJ
Mueller	203BP
Nibco	S480Y
Val-Matic	S1400 series.

8. Drain Valves

Shall be conventional ball valves and provided with hose nipples and threaded metal cap on chain. Watts B-6001-CC or reviewed equal.

9. Balancing Valves

Circuit Solver, ½" as manufactured by ThermOmegaTech shall be self-contained and fully automatic without additional piping or control mechanisms. Shall regulate the flow of recirculated domestic hot water based on water temperature entering regardless of system operating pressure. When fully closed shall bypass a minimum flow to maintain dynamic control of the recirculating loop. Shall be factory adjustable, set at 120 deg F all internal components shall be constructed of stainless steel, 200 PSIG maximum working pressure.

2.07 DOMESTIC WATER PIPING

A. Interior Exposed, High temperature and Supportive

1. All exposed piping carrying domestic water, all piping with a temperature above 140 deg. F., all piping supporting inline equipment, and piping within 6 ft of the water heaters, shall be hard-drawn type "L" copper tube with cast or wrought fittings and made up with Silvacbrite 100 lead-free solder. Care shall be taken not to over flux.

B. Interior Concealed

All concealed hot (below 141) and cold water piping above finish floor (not buried) shall be one of the following:

1. Type L Copper and fittings, all sizes
2. PEX, sizes 1-1/2" and smaller
 - a. Uponor AquaPEX (PEX-a) (cross linked polyethylene tubing) piping and cold expansion fittings, specifically designed for domestic water. ASTM F 876, Fittings for PEX Tube: ASTM F 1960, insert type and matching PEX tube dimensions. Manifold (if used): Uponor multiple-outlet, corrosion-resistant assembly.
 - b. Piping shall be installed in a neat and orderly manner. No wild spaghetti installations will be tolerated. Piping shall be run straight and parallel, and level or sloped slightly to low points with no droops

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exceeding 1/8". Use PEX bend supports to keep turns tight and steel channel supports to keep piping supported. Any work that in the opinion of the Architect or Engineer of Record that does not meet these standards will be removed and redone at the Contractor's expense.

- d. All PEX piping shall be insulated as indicated under Insulation. Use Armaflex insulation on piping run outs to individual fixtures to allow bending.
 - e. Provide the correct spacing of hangers (w/ saddles) for PEX; every 3' or as recommended by the Manufacturer. Do not use the spacing designated for CPVC or copper piping unless using steel u-shaped support channels under insulation. Provide a support bracket at rough-ins.
 - f. All work shall be done in accordance with the manufacturer's recommendations.
- 4. All buried water and trap primer piping shall be AquaPEX or type "K" soft copper tubing. No joints below slab.
 - 5. All buried hot water piping shall be insulated and sealed with 1/2" Armaflex. **Do not direct bury copper hot water piping.**
 - 6. All exposed, uninsulated water piping near fixtures in finished areas shall be chromium plated I.P.S. copper or red brass pipe or tubing and fittings. Valves shall also be chrome plated brass or bronze. Any chrome trim with wrench marks shall be removed and new trim installed.
 - 7. Type of tubing shall be stamped or printed on each length by Manufacturer.

2.08 WELL INCLUDING PUMP, PIPING, PRESURE TANK AND CONTROLS

- A. A new complete well system well including: drilled well, casing, well cap, pump, piping, controls, wiring, tanks and accessories, shall be provided by a professional Well Driller, hired as a subcontractor by this Plumbing Contractor. Well driller shall have at least 5 years in the business and a solid reputation. See detail on drawing. Coordinate with G.C.
 - 1. Pump (with panel) shall be submersible type, stainless steel, Noryl impeller, built in check valve, 1 Hp 230V, single phase, 10 GPM @ 120' and 50 psi. Dayton or reviewed equal.
 - 2. Well tank shall be 86 Gal, 40 Psi precharged, butyl rubber diaphragm. Amtrol WELL-X-TROL Model WX-302 or equal.
 - 3. Provide everything required for a complete system.
 - 4. If yield is less than 10 GPM, then consult with the Engineer of Record for guidance before proceeding with installation
 - 5. Provide a separate price for drilling cost per foot of depth for beyond 100 feet.

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2.09 PIPE EXPANSION FITTINGS AND LOOPS

Provide expansion loops on hot water supply (120 degrees and above) and recirculating return lines where shown and on any straight pipe lengths over 100 feet that occur as a result of relocating piping to meet field conditions. Loop shall be 2 feet long by 4 feet offset, and located near center of length. Anchors shall be bolted collars held by angular braces in direction of piping near opposite ends of the pipe. Provide guides on each expansion joint.

2.10 SANITARY WASTE AND VENT PIPING

A. All Vent Piping, and Most Sanitary Waste and Storm Water Piping

Piping and fittings shall be PVC Schedule 40 polyvinyl chloride plastic, as per ASTM-A-2665 or latest standard. Solvent as per ASTM-D-2564. Exposed vent piping above roof shall be **black** PVC or CPVC or cast-iron for appearance and solar heat dissipation of frost.

2.11 PIPE SLEEVES AND ESCUTCHEONS

A. Sleeves

1. Contractor shall set sleeves for all piping penetrating walls and floors. Sleeves through masonry shall be steel pipe sleeves two sizes larger than pipe. Piping passing through walls other than masonry shall be provided with # 24 gauge galvanized steel tubes with wired or hemmed edges.
2. Sleeves set in concrete floors shall finish flush with underside, but extend minimum of 1 inch above finish floor. Weld clips to sleeves for support in concrete pre-cast planks of a size that will be covered by concrete topping. Sleeves set in partitions shall finish flush with each side.
3. Space between sleeves and pipes shall be sealed to make smoke and water tight with 3M Brand Fire Barrier Caulk CP25 or Putty 303.
4. Masonry sleeves shall be Schedule 40 steel pipe.
5. This Contractor has the option to use the Pro-set system on lieu of the above.

B. Exterior Sleeves

Where piping passes through exterior walls, provide and install a complete pipe sleeve/hydrostatic wall closure system.

1. Wall sleeve shall be schedule 40 steel pipe, two pipe sizes larger than carrier pipe. Sleeve shall be the same length as the thickness of the wall served.
2. The hydrostatic closure device shall consist of identical interlocking links of

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solid synthetic rubber compounded to resist ozone, water, chemicals and extreme temperature variations. Each link shall be connected by corrosion resistant bolts and nuts to form a belt that is to fit snugly around the pipe. Under each bolt and nut there shall be a metal pressure plate so that when each nut is tightened the rubber links will expand between the pipe and sleeve to form a continuous, air tight and water tight seal.

3. Units to be Link-Seal system Model LS wall seal by Thunderline Corp. or reviewed equal.

C. Escutcheons

Where piping passes through finish walls, floors, ceilings and partitions, provide and set two piece nickel plated steel floor and ceiling plates.

2.12 PLUMBING FIXTURES

A. LV-1 Lavatory, Public, Wall Mounted - ADA

1. AMERICAN STANDARD 0954.000 Murro Universal Design wall hung lavatory, for concealed arm support, 4" centers, vitreous china, rear overflow, self-draining deck, color "white". 0059.020 shroud/Knee Contact Guard, vitreous china. Or reviewed equal

2. Zurn Single Basin Metering Faucet Model ZL.

Polished chrome-plated single basin lavatory, slow-closing metering faucet with an integral brass 3-3/4" [95mm] centerline spout, and a vandal-resistant, ADA compliant color-coded handle. Easily adjustable cycle time, preset to 10 seconds at 80 PSI. Unit is furnished with a water-conserving spray outlet which reduces flow to .25 GPC [1.0 GPM] (complying with ANSI A112.18.1 Standard for flow), integral shank filter, mounting hardware and a 1/2" NPSM coupling nut for standard lavatory riser

3. P-trap, chrome, chrome plated angle supplies, wheel stops, wrought escutcheons. Or reviewed equal. Must fit inside shroud/knee guard.

B MB-1 Mop Basin

1. The mop basin shall be Fiat MSB-2424, molded stone or reviewed equal. The molding shall be done in matched metal dies under heat and pressure resulting in a one-piece homogeneous product. Size of unit shall be 24"x24"x10" high.

The drain body shall be cast brass, chrome plated, complete with cast brass lock nut and gaskets. A combination dome strainer and lint basket made from #302, 16 gauge stainless steel attached with tamper proof screws shall be included. The drain body shall provide for a lead caulked joint to be 3" I.P.S.

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Provide the following accessories:

- a. Stainless steel wall guard, MSG-2424
- b. Service faucet with vacuum breaker; integral stops and wall brace plate #830-AA, or reviewed equal by Moen.
- c. 30" Hose with 3/4" coupling at one end; Plate #832-AA.
- d. Mop Hanger, stainless steel, 24" long with (3) holders, Plate #889 CC.
- e. Silicone sealant #833-AA.
- f. Vinyl bumper guard #-77-AA.

C. UR-1 Urinal, Wall - ADA

1. AMERICAN STANDARD 6590.001EC Washbrook Universal, 0.125 to 1 GPF, 3/4" top spud, siphon jet, 2" threaded outlet, water saver, color "White", vitreous china, wall mounted. Or reviewed equal by Kohler Manufacturing Company, Crane, Universal-Rundle, Toto or Eljer.
2. Sloan Royal 186-0.125, 0.125 GPF chrome, quiet exposed flush valve with check angle stop, ADA lever handle, and wall flange. Sweat solder adapter kit. Or reviewed equal by Zurn.
3. Provide adjustable floor mounted carrier as specified under Plumbing Specialties, Drainage. Set rim at 17" AFF.

D. WC-1 Water Closet, Floor, left hand lever operation, – ADA

1. AMERICAN STANDARD 3641.001 elongated Right Width, Right Height, Flowise flushometer toilet, 1.28 to 1.6 GPF, white, vitreous china, 1.1/2" top spud, floor mounted, siphon jet action, bolt caps, rim 17" above finished floor. Elongated open front right with seat included. Or reviewed equal.
2. Sloan Royal WES-111-YO, dual flush, chrome, quiet exposed flush valve for 1.1/1.6 GPF, wall flange, 1" screwdriver angle check stop, vacuum breaker, spud coupling flange, ADA green handle, sweat solder adapter kit, two adhesive backed wall plates (place one over flush valve, one over toilet paper dispenser). Rough-in flushvalve with handle on open side of fixture. Or reviewed equal, by Zurn or Delany.
3. Install water closet solidly to floor; any wobbly water closets will be redone and all costs, direct and incidental, paid for by this contractor.

E. WC-2 Water Closet, Floor, right hand lever operation , – ADA

1. AMERICAN STANDARD 3641.001 elongated Right Width, Right Height, Flowise flushometer toilet, 1.28 to 1.6 GPF, white, vitreous china, 1.1/2" top spud, floor mounted, siphon jet action, bolt caps, rim 17" above finished floor. Elongated open front right with seat included. Or reviewed equal.
2. Sloan Royal WES-111-YO, dual flush, chrome, quiet exposed flush valve

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for 1.1/1.6 GPF, wall flange, 1" screwdriver angle check stop, vacuum breaker, spud coupling flange, ADA green handle, sweat solder adapter kit, two adhesive backed wall plates (place one over flush valve, one over toilet paper dispenser). Rough-in flushvalve with handle on open side of fixture. Or reviewed equal, by Zurn or Delany.

4. Install water closet solidly to floor; any wobbly water closets will be redone and all costs, direct and incidental, paid for by this contractor.

2.13 PLUMBING SPECIALTIES, DRAINAGE

A. Carriers

1. Wall hung fixtures including water closets, lavatories, lav-decks and drinking fountains shall be supported with adjustable floor mounted carriers to fit building conditions, piping system, and fixtures specified. Each carrier shall be provided with a wall finishing frame. All carriers shall be secured to the floor with tie down lugs.
2. Carriers shall be as manufactured by Zurn or reviewed equal.

B. Traps

1. Traps of material and design as approved by the State and shall be furnished and installed at all fixtures and appliances. Trap each fixture separately, keeping all trap screws below water line; vent each trap. Make offsets in vent piping with 45-degree angle fittings when possible. Pitch horizontal vents toward waste lines, group vents and take through roof as shown. All traps, at fixtures and appliances shall be provided with accessible clean outs.

C. Cleanouts

Provide cleanouts for soil and waste where shown on the drawings and as required by code.

1. Floor Cleanouts (FCO)

All floor cleanouts in concrete or tile shall be flush with finish floor.

- a. Type "1", Round, for finished areas

2. Wall Cleanouts

All wall cleanouts shall be Zurn Z-1445 cleanout tee with threaded plug. Polished nickel bronze cover, Zurn ZANB-1462 or reviewed equal.

3. Flashing

Flash each above grade floor clean out with Chloraloy® 240 thermoplastic

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elastomeric sheet membrane for concealed waterproofing, or other approved flashing material, extending 24" beyond perimeter of clean out and lock into clamping collar.

D. Floor Drains (FD)

1. All floor drains above grade shall be complete and each provided with flashing flange, flange device, and 24"x24", Chloraloy® 240 thermoplastic elastomeric sheet membrane for concealed waterproofing, or other approved flashing material, lock into drain clamping collar.
2. Traps for floor drains shall be deep seal traps.
 - a. Type "1" Round,

Cast iron body, flashing collar, nickel bronze, 7" adjustable strainer head w/ funnel, trap primer connection. Zurn ZN-415-7E-P or equal by Josam, Wade or Smith.

2.14 PLUMBING SPECIALTIES, WATER

A. Trap Primer (TP)

1. Type "1" General

Precision Plumbing Products Inc. Model PR-500 Self-adjusting automatic trap primer. Provide distribution unit where indicated. Or reviewed equal. NOTE: As the trap primer may be on a line larger than 1/2", submitting / providing a "flow through" type trap primers smaller than the actual pipe size is not acceptable.

B. Thermometer (T)

Units to be dial type, 4.1/2" with 30° to 180° range; Trerice Universal angle or reviewed equal.

C. Pressure Gauge (P.G.)

Furnish and install pressure gauges with gauge cocks on piping where shown on drawings. The dial range shall be such that the normal pressure shall be approximately mid-way of dial. Gauges shall be Trerice No. 600 or equivalent by Weiss or Nurnburg, 4.1/2" dial size, cast aluminum case, with brass "T" handle cocks and No. 872 bronze pressure snubbers on water units.

D. Vacuum Relief Valve

Watts Model N36 or reviewed equal.

EI. Mixing Valves (MV)

1. Type "1" Master Mixer

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Symmons Tempcontrol 6-700 thermostatic mixing valve – ½'

2.16 ELECTRIC HOT WATER HEATER (EWH-1)

- A. AO Smith DEL-30 Low Boy Electric Hot Water Heater or equal

- B. GLASSLINED TANK
30 Gallon Capacity

- C. ELEMENTS
Zinc plated copper sheaths for longer life. Medium watt density means lower surface temperature to minimize scale build-up and more surface to heat water.
Element sizes 4.5 KW

- D. CONTROLS
Temperature control (adjustable through a range of 130° to 170°F on single element and 120° to 181°F on dual element) and manual reset high temperature cutoff per element

- E. COMPLIANCE
Meets the standby loss Requirements of the U.S. Department of Energy and current edition of ASHRAE/IES 90.1.

2.17 PAINTING

Painting shall be provided for all steel/iron equipment supports, steel/iron fuel piping, exposed flanges, fittings and valves within boiler rooms, basements and outside and where specified elsewhere within this section. Painting shall consist of no less than two (2) coats of rust inhibiting paint, Rust'O'leum or approved equal. Paint shall be capable of withstanding temperatures of up to 250°F. Colors shall be as follows:

Equipment supports	Flat black
Fuel Gas Piping outside	Grey

2.18 VALVE BOXES, ACCESS DOORS AND PANELS

- A. Furnish General Contractor with valve boxes, access doors/ panels for all locations where service access is required behind walls, above sheetrock and masonry ceilings, and below floors for equipment, piping, valves, and specialties furnished under Division 15.

- B. Shall be located in closets, storage rooms and/or other non-public areas whenever possible, in a workmanlike manner, positioned so that junction can be easily reached

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and the size shall be sufficient for this purpose . When required in corridors, lobbies or other habitable areas, they shall be located as directed by the Architect.

- C. Units shall have 16-gauge steel frame and 14-gauge steel hinged door panel. Door shall have concealed spring hinges allowing door to be opened to 175°.
- D. Units shall be factory primed for field painting by Section 09900.
- E. Provide UL-rated 1-1/2 hour Class B access panels where required to comply with applicable Code requirements.

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PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection

1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that plumbing may be installed in strict accordance with all pertinent codes and regulations and the reviewed Shop Drawings.

B. Discrepancies

1. In the event of discrepancy, immediately notify the Architect. Do not proceed with installation in areas of discrepancy until such discrepancies have been fully resolved.

3.02 COORDINATION WITH OTHER TRADES

A. Before installation, participate in a coordination meeting with the Clerk of the Works, Construction Manager, Mechanical/HVAC, Fire Protection and Electrical trades. Establish and resolve areas of conflict and congestion, especially those indicated on the drawings. Priority to be given to HVAC equipment and large ductwork, then gravity piping, then small ductwork, then piping based on descending order of size. Special consideration given to allow access to valves, dampers etc.

B. Failure to coordinate will result in this contractor removing and relocating his piping at no additional expense to the owner.

3.03 INSTALLATION OF PIPING AND EQUIPMENT

A. General

1. Install all piping promptly, making pipe generally level and plumb, free from traps, and in a manner to conserve space for other work.
2. Provide uniform pitch of at least ¼ inch per foot for all horizontal waste and soil piping 3" or less. For piping 4" and above, slope at 1/8" minimum per foot
3. Inspect each piece of pipe, tubing, fittings, and equipment for defects and obstructions; promptly remove all defective material from the jobs site.
4. Install pipes to clear all beams and obstructions. Do not cut into or reduce the size of load carrying members without the approval of the Architect.

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5. Allow room between all piping and other obstructions to allow for the installation of the specified pipe insulation.
6. Plumbing vents
 - a. Back vent all plumbing fixtures.
 - b. Pitch all vents at 1/64" per foot minimum toward waste lines for proper drainage to prevent unintended traps.
 - c. Install vent piping with each bend 45 degrees minimum from the horizontal, wherever structural conditions will permit.
 - d. Group plumbing vents and take through roof as shown.
 - e. Increase vents 3" and smaller one size before going thru roof. Make size transition a minimum of 12" below the surface of flat roofs and 72" (or as structure permits) below sloped roofs.
 - f. Terminate 18" to 24" above roof.
 - g. If installing in locations other than as shown on the drawings, line up with other plumbing vents for a neat appearance.
 - h. Do not install plumbing vents within 10 feet of an operable window or door or within 25 feet of a ventilation air intake.

6. All risers and off-sets shall be substantially supported.

7. Pipe hangers shall be placed on center as follows:

<u>MATERIAL</u>	<u>HORIZONTAL</u>		<u>VERTICAL</u>	
Copper 1-1/4" & less	6'		6'	
1-1/2"	6'		10'	
2" & up		10'		10'
PVC, DWV	4'		4'	
Steel	10'		10'	

8. Arrange all piping to maintain required grade and pitch to lines to prevent vibration. Expansion loops to anchors shall be provided where shown on drawings.
9. Make all changes in pipe size with reducing fittings.
10. All low points in water piping shall be drained with 1/2" gate valve with hose nipple and metal cap.
11. No piping shall be installed in such a manner to permit back-siphonage or flow of any liquid in water piping under any conditions.
12. No water piping shall be installed outside of building or in an exterior wall unless adequate provisions are made to protect such pipe from freezing.
13. All piping and drain openings left unattended will be capped, plugged or securely covered to prevent accidental entry of foreign matter. Roof drains in use will be provided with domes.

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B. Joints and Connections

1. Smoothly ream all cut pipe; cut all threads straight and true; apply best quality Teflon tape to all male pipe threads but not to inside the fittings; use graphite on all clean out plugs. DO NOT use Teflon tape on gas piping.
2. Smoothly ream all cut P.V.C. pipe. Clean and use solvent for fitting connection and in strict accordance with the manufacturer's recommendations.
3. Make all joints in copper water tube with solder applied in strict accordance with the manufacturer's recommendations.

C. Coordinate with the concrete contractor to depress the finished floor where indicated on drawings. Install floor drains at low points of surface areas to be drained. Adjust grates of drains 1/32" below finished floor, unless otherwise indicated. Finished floor shall be depressed according to the following drainage area radii:

1. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
2. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
3. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

3.04 STERILIZATION AND FLUSHING OF PIPES

- A. After preliminary purging of the system, chlorinate the new potable water system in accordance with the current recommendations of the American Water Works Association, and in accordance with all pertinent codes and regulations. Chlorinate only when the building is unoccupied.
- B. Upon completion of the sterilization, thoroughly flush the entire potable water system.
- C. After sterilization and flushing are complete, a sample shall be collected from the end of the longest main, or at any other location selected by the Architect, and a water analysis test provided. The test must prove the water acceptable or additional disinfecting of system performed. A copy of the test report shall be submitted to the Architect.

3.05 CLOSING IN UNINSPECTED WORK

- A. Do not cover up or enclose work until it has been properly and completely inspected and approved.

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- B. Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required and after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Architect and at no additional cost to the Owner.

3.06 TESTING OF PIPING

Tests shall be applied to the plumbing installation as required by codes and where as directed by the Architect, and in all cases before work is covered by earth fill or pipe covering.

- A. Sanitary piping shall be tested when all underground work is complete (before covering) and again, after all piping is installed, but before it is further closed in. Sanitary systems shall be securely stopped, except at the highest point, and the entire system filled with water to the point of overflow for 24 hours. All leaks shall be repaired. Cracked pipes and fitting shall be removed and replaced. No doping of soil pipe or fittings will be allowed. Plan testing around expected weather and temperature conditions or provide protection so that pipes do not freeze.
- B. New domestic water piping shall be filled and subjected to a hydrostatic pressure test of 150 psi for 8 hours with no leaks. If leaks are detected they shall be repaired and the test repeated until work is tight. NOTE: Testing with compressed air only is NOT ACCEPTABLE.
- C. Testing of Fuel Gas piping shall conform to NFPA 54.

3.07 CLEANING

Prior to acceptance of the buildings, thoroughly clean all exposed portions of the this installation, removing all labels and all traces of foreign substance, using only a cleaning solution approved by the manufacturer of the plumbing item, being careful to avoid all damage to finished surfaces. Additional attention may be required to thoroughly clean any used, re-used or owner provided fixtures. Clean out all strainers and aerators and adjust or replace washers, cartridges, etc.

3.08 INSTRUCTIONS

On completion of the job, this Contractor shall provide a competent technician to thoroughly instruct the Owner's Representative in the care and operation of the system. The time of instruction shall be arranged with the Owner.

3.09 RECYCLING

Discarded materials, both new and removed, shall be recycled whenever practical through metal salvage dealers (piping, etc.), paper salvage (cardboard shipping containers, etc.), wood products, etc. The Plumbing Contractor shall retain the salvage value of discarded

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materials and may use this value to offset his project bid price if so desired. Toxic materials such as adhesives, coolants, etc. SHALL be disposed of in a manner acceptable to the State of Maine Department of Environmental Protection.

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3.10 HAZARDOUS MATERIALS

Mercury or any other material deemed by the Federal Environmental Protection Agency or the State Department of Environmental Protection to be hazardous shall not be used in any components of the plumbing systems.

END OF SECTION

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PART 1 - GENERAL

1.01 RELATED DOCUMENTS

General Provisions of Contract, including General and Supplementary conditions and General Requirements (if any) apply to work specified in this Section.

1.02 ALTERNATES

There is no alternates in this section of the work..

1.03 INTENT

It is the intent of the drawings and specifications to provide for the installation of heating, ventilating and air conditioning systems which are safe, quiet, and economical in operation and complete in all respects. All materials and equipment necessary to accomplish the intent shall be furnished and installed by the mechanical contractor.

1.04 DEFINITIONS

ATC Automatic Temperature Control
EC Electrical Contractor (Division 26)
GC General Contractor
PC Plumbing Contractor

1.05 DESCRIPTION OF WORK

A. Work Included

1. Furnish all labor, materials, equipment, transportation and perform all operations required to install complete heating, ventilating and air conditioning systems in the buildings, in accordance with these specifications and applicable drawings.
2. All temperatures are expressed in degrees Fahrenheit.
3. Perform demolition and removal as required.
4. Work to be performed shall include, but is not limited to, the following:
 - a. Energy Recovery Unit
 - b. Mini-Split Systems
 - c. Sheetmetal
 - d. Insulation
 - e. Temperature control
 - f. Tests and balance
5. Specifications and accompanying drawings do not indicate every detail of

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pipe, valves, fittings, hangers, ductwork and equipment necessary for complete installation; but are provided to show general arrangement and extent of work to be performed.

6. Before submitting proposal, Mechanical Contractor shall be familiar with all conditions. Failure to do so does not relieve Mechanical Contractor of responsibility regarding satisfactory installation of the system.
7. Mechanical contractor shall be responsible for rigging to hoist his own (and his sub-contractors') materials and equipment into place.
8. Mechanical contractor and his sub-contractors shall be responsible for start-up of all equipment provided under this section.

B. Related Work Described Elsewhere

1. Excavation and backfill
2. Cutting and patching
3. Firestopping between building construction and pipe sleeves and between building construction and ductwork,
4. Electrical conduit and wiring, except as noted below
5. Roofing, curb openings and framing of openings.
6. Setting of sleeves in masonry work (sleeves provided by Mechanical Contractor)
7. Door louvers

D. Mechanical Electrical Work

1. Provide and erect all motors, temperature controls, limit switches as specified.
2. Power supply to switches, fused switches, outlets, motor starters, to line terminals of equipment, and all related wiring and fuses to properly connect and operate all electrical equipment specified shall be furnished and installed under Division 26, "ELECTRICAL". Division 26 shall not mount electrical equipment to indoor mechanical equipment without the consent of Division 26. Division 26 shall not drill wiring holes in equipment casings but shall make use of factory wiring knockouts when present. Coordinate all wiring between Mechanical and Electrical to provide a complete and operating system.
3. All power wiring provided under this section shall be in accordance with the latest rules and regulations of the National Fire Underwriters, National Electric code, National Fuel Gas Code, and Local Codes Division 26. Install all wiring under the supervision of the Division 26. Any wiring that is not installed according to these standards, and which does not match wiring installed by Division 26 in type, quality and appearance shall be corrected by Division 26 at the expense of this section.

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4. Automatic Temperature Control (ATC) Systems

Electric wiring for ATC systems shall be furnished and installed by ATC Contractor under supervision of Division 26. Any wiring that is not installed according to these standards, and which does not match wiring installed by Division 26 in type, quality and appearance shall be corrected by Division 26 at the expense of this section. Low voltage wiring shall be plenum rated and installed in an organized manner. Conduit for low voltage wiring shall not be required.

5. Energy Recovery Unit and Mini-Split

- a. Division 26 to wire to unit mounted disconnect switch with overload protection provided with unit.
- b. Division 26 to provide 120 volt power from exhaust fans to motor operated dampers associated with each fan, where provided. Dampers and actuators to be provided by ATC Contractor.

6. Automatic Temperature Control (ATC) Panel

Division 26 shall provide a dedicated 120 volt, 15 amp circuit breaker for each temperature control panel. Wiring from circuit breaker to temperature control panels will be provided and installed by the ATC Contractor. Division 26 shall also provide a duplex convenience receptacle on a separate circuit within 6 feet of panel.

1.06 PERMITS

- A. This Contractor shall be responsible for providing and filing all Plans, Specifications and other documents, pay all requisite fees and secure all permits, inspections and approvals necessary for the legal installation and operation of the systems and/or equipment furnished under this Section of the Specifications.
- B. The Contractor shall frame under glass/ clear plastic all permits, secured by him, adjacent to the respective system and/or equipment and required to be displayed by Code, law or ordinance. Those permits secured but not required to be displayed shall be laminated in plastic and included in the Owner's maintenance manual.

1.07 CODES, ORDINANCES AND PERMITS

- A. All work performed under this Section of the Specifications shall be done in accordance with applicable National, State and local Codes, Laws and Ordinances. The following abbreviations are used for reference to standards which are to be followed:

AABC	Associated Air Balance Council
ADA	Americans With Disabilities Act
AMCA	Air Movement & Control Association
ANSI	American National Standards Institute

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ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BOCA	Building Officials and Code Administrators
NEC	National Electrical Code
NFPA	National Fire Protection Association
NEMA	National Electrical Manufacturer's Association
OSHA	Occupational Safety and Health Act
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UL	Underwriter's Laboratories

- B. The latest issue of each Code in effect at the time of bidding shall be used. Code requirements are the minimum quality and/or performance acceptable. Where the Specifications and/or Drawings indicate more stringent requirements, these requirements shall govern.

1.08 QUALITY ASSURANCE

- A. Qualification of Workpersons

Use sufficient qualified workpersons and competent supervisors in execution of this portion of the work to ensure proper and adequate installation of system throughout.

- B. Work performed shall conform with all Local and State Rules and Regulations, as well as those of the National Fire Protection Association (N.F.P.A.).
- C. Piping design shall conform to ANSI, ASME B31.9 and AWS D10.9 codes.
- D. Expansion tank shall conform to ASME Section VIII Code.
- E. Air separator and domestic storage water heaters shall conform to ASME Boiler and Pressure Vessel Code.
- F. Welding standards shall conform to ANSI Boiler Code, Section IX, B31.1

1.09 MATERIALS AND SUBSTITUTIONS

All materials and equipment shall be new and of the latest design of respective manufacturers. All materials and equipment of the same classification shall be the product of the same manufacturer, unless specified otherwise.

- A. Any proposal for substitution of Mechanical equipment, materials or vendors shall be made in writing PRIOR TO OPENING OF BIDS, see Division 1. Submit full details for consideration and obtain written approval of the Architect. The phrase "or approved equal" shall be defined to mean that the Architect, not the contractor, shall make final determination whether or not substitute materials are an equal to that

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which is specified. The contractor shall be responsible to certify within his submittals that any equipment to be considered as an "approved equal" meets or exceeds the requirements of this specification in all aspects and will physically fit within the space provided and still provide adequate space adjacent to the equipment for service. If requested by the Architect the contractor shall provide said certification in the form of scale drawings before review will be made. Architect will not be responsible to provide drawings for substituted materials unless the substitution is agreed upon prior to opening of bids. Architect's decision on acceptability of substitute materials shall be final.

- B. Approval by Architect for such substitution shall not relieve Mechanical Contractor from responsibility for a satisfactory installation and shall not affect his guarantee covering all parts of work
- C. Any material or equipment submitted for approval which are arranged differently or is/are of different physical size from that shown or specified shall be accompanied by shop drawings indicating different arrangements of size and method of making the various connections to equipment. Final results will be compatible with system as designed.
- D. Materials and equipment determined as an "approved equal" and/or substitutions must meet the same construction standards, capacities, code compliances, etc. as the equipment (i.e. Manufacturer, model, etc.) specified.
- E. Any additional cost resulting from the substitution of equipment, regardless of acceptance by the Architect or Engineer, shall be paid by this Contractor.
- F. All materials not specified otherwise shall be manufactured within the United States and supplied locally (within the State of New Hampshire) when available. It is preferable to obtain materials that are manufactured within 500 miles of the work site when practical.

1.10 PLANS AND SPECIFICATIONS

Mechanical Contractor shall provide his sub-contractors with a copy of the ENTIRE portion of Part 1 of this specification, portions of this specification and copies of drawings which pertain to the equipment to be supplied at no cost to the sub-contractor. Provide ATC Contractor with entire set of Electrical plans and specifications. Provide Testing and Balancing sub-contractor with copies of shop drawings indicating coil gpm's, fan and HRU air volumes, etc. Failure to do so may result in the Architect providing the required materials at the Contractor's expense.

1.11 ELECTRONIC DRAWINGS AND FILE SHARING

Plans and specifications may be made available in electronic format on request. Plans may be provided in either Adobe (.pdf) or CAD (.dwg or .dxf) formats and will be compressed using WinZip (.zip format). Recipient is responsible to obtain the necessary software to open the files. Note: CAD drawings will be made available to successful bidders only after

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a contract is awarded.

CAD drawings are produced with AutoCAD and may be provided in either the 2010 file formats. Upon request for CAD files a release form will be provided which must be signed and returned to the Engineer prior to transmission of electronic files. Physical mailing address, telephone numbers and e-mail address for this office are indicated on each drawing. A signed release will not be required for Adobe based files.

All contract documents are copyrighted material. No portion of materials may be reproduced or duplicated except as indicated in the release form. Where release forms are not required (Adobe based files), materials may be printed for use by the intended recipient only and may not be reproduced or copied in any other manner unless written permission is obtained.

1.12 SHOP DRAWINGS & SUBMITTALS

- A. As soon as possible after award of Contract (but not longer than 21 calendar days), before any material or equipment is purchased, Mechanical Contractor shall submit to the Architect electronic shop drawings for approval. If shop drawings are not submitted within the allotted time frame all substitutions included in the late shop drawings will be invalid and the equipment specified must be provided. Any costs resulting from delays in the project schedule due to failure to submit shop drawings related to this section in a timely manner shall be the responsibility of the Mechanical Contractor. Shop drawings shall be properly identified and shall describe in detail the material and equipment to be provided, including all dimensional data, performance data, fan curves, pump curves, computer selection print-outs, etc. Capacities indicated are minimums. Equipment submitted with capacities below specified parameters will be refused.
- B. Corrections or comments made on the shop drawings do not relieve the contractor from compliance with requirements of the drawings and specifications. Shop drawing review is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades and performing his work in a safe and satisfactory manner.
- C. Should any materials or products be purchased and/or installed without prior review and comment the contractor shall be required to remove or replace those products and/or materials if directed by the Architect at his own expense. If the materials are not removed (or replaced) or if the project is delayed as a result the Architect reserves the right to order the withholding of payment until the situation is resolved in a manner satisfactory to the Architect.
- D. Mechanical shop drawings shall be separate from Plumbing shop drawings. Submittals not separated from plumbing shop drawings will be refused for re-submittal.

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- E. Shop drawings must be original documents or good quality photocopies of original documents (photocopies of color samples are not acceptable). Faxed copies of submittal sheets will be refused unless prior arrangements are made. However, submitting shop drawings electronically in.pdf format is encouraged. Electronic files must be accessible and in an open format, meaning files must not be locked and comments may be added without altering the original content, or have interactive fields intended specifically for commenting. Locked files will not be reviewed.
- F. Review must be obtained on the following items:
1. Ductwork and Accessories
 - a. Registers and grilles
 - b. Duct access doors
 - c. Volume control dampers (manual and automatic)
 - d. Duct sealant
 - e. Turning vanes
 - f. Louvers and brick vents - provide color chips (photocopies not acceptable) – provide samples if substituting
 2. Mechanical Equipment (sound data must be provided with all interior motorized equipment).
 - a. Full warrantee information must be included with all submittals.
 - b. Fans and accessories - provide full fan curves and computer selection printouts.
 - c. Mini-Split System
 - d. Energy recovery unit
 3. Piping and Accessories
 - a. Refrigerant Piping
 - b. Condensate Pairing
 4. Insulation
 - a. Pipe
 - b. Duct
 - c. Pipe fittings
 5. Automatic Temperature Control (ATC) System

1.13 PRODUCT HANDLING

A. Protection

Use all means necessary to protect heating and ventilating materials before, during and after installation and to protect the installed work and materials of all other trades.

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B. Replacements

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

1.14 AS-BUILT DRAWINGS

Keep in good condition at the job, apart from all other prints used in actual construction, one complete set of all blueprints furnished for this job. On this special set of blueprints, record *completely and accurately* all differences between the work as actually installed and the design as shown on the drawings. These record prints must be kept up to date by recording all changes within one week of the time that the changes are authorized. At the completion of the work, this set of drawings shall be delivered to the Architect for the Owner electronically in the form of CAD drawings. If a complete record of changes is not made and electronic CAD drawings not provided by the Mechanical Contractor, a record shall be made by the Engineers, and *the cost of the record shall be paid by the Mechanical Contractor*. Copies of the mechanical CAD drawings may be made available electronically to the Mechanical Contractor if desired. Drawings shall be dated accordingly and clearly identified as "AS-BUILT". Specify required CAD format when requesting the files. CAD drawings were generated using AutoCAD 2010 and utilize both paper space and model space with external references to various other drawings. Files will be compressed and will require "WinZip" (<http://www.winzip.com>) for extraction. A release form will be provided which must be signed and returned to the Engineer prior to transfer of files.

1.15 MAINTENANCE MANUAL

A. On completion of this portion of the work, and as a condition of its acceptance, submit for approval two copies of a manual describing the system. Mechanical equipment manuals shall be separate from plumbing manuals. All manuals shall be original copies, not photocopies or they will be refused for re-submittal. Prepare manuals in durable 3-ring binders approximately 8½ inches by 11 inches in size with at least the following:

1. Identification on the front cover and spine stating general nature of the manual.
2. Neatly typewritten index.
3. Complete instructions regarding operation and maintenance of all equipment involved.
4. Complete nomenclature of all replaceable parts, their part numbers, current cost, and name, address and telephone number of nearest vendor of parts.
5. Copy of all guarantees and warranties issued.
6. Where contents of manuals including manufacturer's catalog pages, clearly indicate the precise item included in this installation and delete, or otherwise

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clearly indicate, all manufacturers' data with which this installation is not concerned.

- B. In addition to above, provide two (2) separate offset style binders properly identified, each containing a copy of all reviewed shop drawings and catalog cuts. (NOTE: May be incorporated in Maintenance Manuals, if binders are of adequate size.)

1.16 OBJECTIONABLE NOISE AND VIBRATION

Mechanical equipment shall operate without objectionable noise and vibration. Should objectionable noise or vibration be transmitted to any occupied part of the building by apparatus, piping or ducts, as determined by the Architect, the necessary changes eliminating the noise or vibration shall be made by this Mechanical Contractor at no extra cost to the Owner.

1.17 GUARANTEE

This Contractor shall guarantee all materials and workmanship furnished by him or his sub-contractors to be free from all defects for a period of no less than one (1) year from date of final acceptance of completed system and shall make good, repair or replace any defective work which may develop within that time at his own expense and without expense to the Owner. Any additional costs required to extend manufacturer's guarantee and warranty for the period specified, shall be included in Contractor's base bid.

1.18 MINOR DEVIATIONS AND DISCREPANCIES

- A. The drawings are intended to indicate only diagrammatically the extent, general character and approximate locations of mechanical work. Work indicated, but having minor details obviously omitted, shall be furnished complete to perform the functions intended without additional cost to the Owner. Follow the architectural, structural, plumbing and electrical drawings so that work under this section is properly installed and coordinated with other Sections.
- B. The drawings and specifications are complimentary to each other and what is called for in one, shall be as binding as if called for by both. In the event of conflicting information on the mechanical drawings, or between drawings and specifications, or between trades, that which is better, best or most stringent shall govern.
- C. Questions to the Architect or Engineers are encouraged, but any answers or advice is non-binding. Therefore, inquires about such items should be made at least 4 days prior to when bids are due to allow time for a clarifying addendum to be issued.
- D. Any conflicts arising from duplication of equipment specified in different portions of the specifications shall be brought to the attention of the Architect prior to submitting bids. Failure to do so does not relieve the Contractor from responsibility of providing said materials and equipment and a credit will be taken for the duplicated item(s).

1.19 CHANGE ORDERS

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- A. No change shall be made in the work, equipment, or materials under this section except as directed in writing by the Architect or Engineer of record.
- B. All requests for change in contract price and scope shall be accompanied by a breakdown list of materials with unit and extended prices and labor hours with unit and extended price, plus markups that have been applied.

1.20 COORDINATION

- A. Contractor shall be responsible to coordinate his work with that of other trades to adjust to field conditions prior to commencing work. If a reasonable solution cannot be achieved without compromising the integrity of the intended design or would result in additional cost the Architect must be notified immediately prior to commencement of work. Failure to do so does not relieve the Contractor from providing and installing the systems to the satisfaction of the Architect at no additional cost.
- B. Contractor shall be responsible to review job conditions and identify conflicts and/or obstructions to ductwork and piping prior to fabrication. If conflicts and/or obstructions are noted the Architect must be notified immediately prior to commencement of work. The cost of any fabrication work performed without confirmation and notification of conflicts and/or obstructions shall be the responsibility of the contractor.

1.21 REQUESTS FOR INFORMATION

Requests for Information (RFI) or other correspondences which are submitted electronically must be in an open format, meaning files must not be locked and comments may be added without altering the original content, or have interactive fields intended specifically for commenting. Locked files will not be accepted.

1.22 WORKPLACE SAFETY

Mechanical contractor shall be responsible for the safety of his workpeople.

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PART 2 - PRODUCTS

2.01 PIPING (Alternate #1 specification)

A. General

Provide and erect in accordance with best practice of trade all hot water supply and return, drain and vent piping shown on the plans and as required to complete intended installation. Contractor shall make offsets as shown or required to place all piping in proper position to avoid other work, and to allow application of insulation and finish painting.

B. Pipe Materials:

- | | | |
|----|--------------------|-------------------------|
| 1. | Refrigerant Piping | ACR Tube |
| 2. | Condensate piping | Schedule 40 VPC Plastic |

C. Contractor shall take additional measures when soldering close to wood structures to protect the wood from igniting. Fire extinguishing equipment shall be kept within 25 feet when soldering within 12 inches of wood at all times.

2.02 PIPE HANGERS AND SUPPORTS

A. General

1. All interior hangers and supports shall be specially manufactured for that purpose and shall be the pattern, design and capacity required for the location of use.
2. Piping specified shall not be supported from piping of other trades.
3. Hangers shall be steel, adjustable clevis type; plain for steel pipe and copper plated for copper tubing. Carpenter & Paterson, Inc., Fig. 100 (Fig. 100 CT copper plated) or approved equal. Hangers on hot water and drain piping shall be sized for the piping only (not including insulation). Hangers on cold water piping, and where specifically indicated on drawings, shall be sized to include the insulation and include thermal hanger shields (insulated pipe supports).
4. Thermal hanger shields shall be Carpenter & Paterson, Inc., Fig. 265P or approved equal.
5. Exposed vertical risers $\frac{3}{4}$ inch and smaller shall be supported at the mid-point between floor and ceiling with split ring type hangers; copper plated for

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copper tubing. Carpenter & Paterson, Inc., Fig. 81 (Fig. 81 CT copper plated) or approved equal.

6. Piping suspended from walls, trench walls and partitions shall be supported by steel support bracket. Carpenter & Paterson, Inc., Fig. 69 or approved equal.
7. All steel hangers shall be factory painted.
8. Supports for PEX piping shall be designed specifically for PEX material provided and approved by the piping manufacturer.

B. Hanger Rods

1. Hanger rods shall be galvanized all thread rod. Rod size shall be as follows:

Pipe Size	Rod Size
1/2" to 2"	3/8"
2 1/2" to 3"	1/2"

2. Provide toggle bolts for fastening to concrete blocks and compound anchor shields for bolts for fastening to poured concrete.
3. Provide lag points with rod couplings or side beam connectors with drive screws for fastening to wood.
4. All nuts for hanger rod to be stainless steel.

C. Supports

Provide and install angle iron supports for pipe hangers as required. Angle iron supports shall be adequate size for span and piping or equipment load.

2.03 PIPE SLEEVES AND ESCUTCHEONS

A. Sleeves

1. Mechanical Contractor shall set sleeves for all piping penetrating walls and floors. Sleeves through masonry shall be steel pipe sleeves two sizes larger than the pipe. Pipe passing through walls other than masonry shall be provided with #24 gauge galvanized steel tubes with wired or hemmed edges.
2. Sleeves set in concrete floor shall finish flush with the underside, but extend a minimum of 1 inch above the finish floor. Sleeves set in partitions shall finish flush with each side.
3. Spaces between sleeves and pipes within building shall be sealed fire and

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3D i-see Sensor™ enables advance features:
Indirect or Direct Airflow for personalized comfort
Absence Detection for energy-saving mode
Double Vane features:
Separates airflow to deliver air across a large area
Simultaneously deliver air to two people in different locations
Generates more comfortable natural airflow pattern
Multiple control options available:
Hand-held Remote Controller (provided with unit) -kumo cloud® smart device app for remote access
Third-party interface options
Wireless controllers
Triple-action Filtration: Nano Platinum Filter, Deodorizing Filter, & Electrostatic AntiAllergy Enzyme Filter
Hot-Start Technology: no cold air rush at equipment startup or when restarting after Defrost Cycle

- B. Provide and install refrigerant lines as recommended by Manufacturer

2.07 ENERGY RECOVERY VENTILATOR ERV-1

A. General

Provide and install Energy Recovery Units where shown on plans.
Energy Recovery Units to be Fan Tech equal by Renewaire or Greenheck

EC motors use intelligent technology with integral electronic controls to ensure energy savings no matter what the airflow demands. Reduced energy usage results in lower operating costs. The motors develop less heat so significantly less maintenance is needed and the lifetime of the motor is increased.

B. Features

Electronically commutated motors (ECM)
TurboTouch function boosts exhaust capacity
6" (152mm) round metal duct connections with rubberized duct seals
Removable screw terminal for easy connection with external access
Top port design fits in tight spaces
Includes wall mounting speed bracket
Counterflow heat recovery core
Multiple speed operation
Internal recirculation defrost
Integrated MERV-8 Filter
55.6 lbs (25.2 kg) including core

C. Fans

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Two (2) electronically commutated motors. The EC fans operate at high efficiency levels and offer a great energy-saving potential not only at full load, but especially at part-load. When operating at part-load, the energy used is much lower than with an AC motor of equivalent output. Reduced energy usage guarantees a drop in operating costs.

- D. Heat Recovery Core
Counterflow heat recovery exchanger built from thermoformed polymer plates covered by a limited lifetime warranty. Core dimensions are 14.4"x 14.4" (366 x 366 mm) with a 14" (355 mm) depth. Our heat exchangers are designed and manufactured to withstand extreme temperature variations.
- E. Winterguard™ Defrost
The unit incorporates a unique and quiet internal recirculation defrost that does not depressurize the home during the defrost cycle. A preset defrost sequence is activated when the outdoor temperature falls below 23° F (-5° C) and automatically adjusts itself based on operating conditions. The fan speed is also adjusted automatically to provide a smooth and quiet transition between Ventilation & Defrost mode.
- G. Serviceability
Core, filters, fans and electronic panel can be accessed easily from the access panel. Core conveniently slides out with only 16" (406 mm) clearance
- H. Case
24 gauge galvanized pre-painted steel corrosion resistant
Insulation
Cabinet is fully insulated with 3/4" (20 mm) high density expanded polystyrene.
- I. Filters
Two (2) washable electrostatic panel type air filters 7.87" (200mm) x 13.77" (350mm) x 0.125" (3mm). A MERV-8 supply filter is provided with the unit. The MERV8 supply filter is intended for areas that it is required. In most cases the MERV8 supply filter is not required and it becomes optional at the home owner's discretion. MERV-8 dimensions 5.77" x 14.06" x 1.75" (146.5mm x 357mm x 44.5mm).
- J. Balancing and commissioning
Balancing must be completed using the Fantech ECO-Touch® Programmable Touch Screen Wall Control
- K. Warranty
Limited lifetime on counterflow exchanger, 7 year on motors, and 5 year on parts

2.08 SHEETMETAL

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A. General

The work under this section includes all the required sheetmetal and duct work, extensions for grilles, manual dampers, automatic counterbalanced (backdraft) dampers, deflectors, setting of control damper`s, grilles, registers, , flexible connections, fire dampers, and louvers, as shown on the drawings or required to make the installation complete in accordance with the intent of the drawings and specifications.

B. Ducts

1. The size of ducts marked on the drawings will be adhered to as closely as possible. The right is reserved to vary duct sizes to accommodate structural conditions during the progress of the work without additional cost to the Owners. The duct layout is schematic to indicate size and general arrangement only. All ducts shall be arranged to adjust to "field conditions". The Sheet Metal Contractor shall coordinate his work with Division 26 and other trades.
2. Low pressure ducts shall be constructed of galvanized steel in accordance with the following table of duct sizes OR the latest SMACNA HVAC Duct Construction Standards for Metal and Flexible Duct, whichever is stricter, unless otherwise shown on drawings.

Low pressure ducts:

Dimensions of Longest Side (inches)	Minimum Sheet Metal Gauge
Up thru 12	26
13 --> 30	24
31 --> 42	22

3. Methods of fabrication and installation shall be in strict accordance with guidelines set forth in the latest SMACNA Guide and Data Book for Low and Medium Pressure Duct Construction unless otherwise shown on drawings. Cross break all ducts with largest dimension being 18 inches and larger. Beaded ducts are not acceptable except for ductwork less than 18 inches in either direction.
4. All dampers and deflectors shall be a minimum of #22 gauge and stiffened as required. Splitter dampers shall not be acceptable.
5. All joints in ducts shall be made air tight, and all branches and turns shall be made with long radius elbows and fittings. Long radius elbows are defined as having a centerline radius of 12 times the width of the duct. If long radius elbows are not used, elbows 18 inches wide and larger shall be provided with fixed double wall airfoil turning vanes designed to reduce the resistance

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of the elbow to the equivalent of a long radius elbow with a throat radius of not less than duct width. Square elbows less than 18 inches wide shall be provided with single wall turning vanes. Square elbows with outside corners cut at 45° or rounded are not acceptable.

6. All ducts shall be installed with necessary offsets, changes in cross sections, risers, and drops which may be required. They shall be constructed with approved joints and be supported in an approved manner.
7. Round ductwork shall be constructed in accordance with the latest SMACNA HVAC Duct Construction Standards for round and oval duct construction. Ductwork larger than 8 inches in diameter shall employ spiral seams. All turns shall be made with smooth (not segmented), long radius elbows and fittings. All seams shall be type RL-5, grooved seam pipe lock or better. *Lap seams are not permissible.* Gauge thicknesses shall be as outlined in SMACNA for galvanized steel round duct gauge selections for maximum 2 inches w.g. static pressure. Ductwork shall be supported with full wrap-around band and single hanger strap as indicated in Figure 4-4 of the 1985 edition of the SMACNA HVAC Duct Construction Standards handbook.
8. Furnish and install flexible connections where indicated. Connections shall be made from Ventglas neoprene coated glass fabric as furnished by Ventfabrics, Inc., or approved equal.
9. Every precaution shall be taken to keep interior of duct system free from dirt and rubbish and to protect all ducts and equipment during construction. At completion, this Mechanical Contractor shall thoroughly clean all equipment to the satisfaction of the Architect.
10. Spaces between ducts and wall, ceiling or floor construction shall be caulked to make smoke and water tight with 3M brand fire barrier caulk CP25 or putty 303, Ciba-Geigy CS240 Firestop Sealant or approved equal.
11. Testing and Balancing... See Part 3, EXECUTION
12. Requirements set forth in applicable codes (see part one) shall supercede SMACNA standards.

C. Duct Sleeves

Provide aluminum duct sleeves through outside wall at all locations as shown on drawings.

D. Sealing of Ducts

All interior ductwork (except prefabricated grease ducts and welded duct) shall be sealed with low VOC water based duct mastic, either "MP" (Multi-Purpose), Hardcast "Iron-grip 601", Polymer Adhesive "Airseal #11", or United Duct Seal (United McGill

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Corp.) water base, latex or acrylic type sealant. All transverse joints to be continuously sealed. Note that, except as noted, oil or solvent based sealants are specifically prohibited for use on this project. Duct tape, in any form or material, is also prohibited.

For exterior applications, "Uni-Weather" (United McGill Corp.) neoprene based sealant shall be used. No other sealants may be used.

All seams and joints in shop and field fabricated ductwork shall be sealed by applying one layer of sealant, then immediately spanning the joint with a single layer of 3" wide open weave fiberglass tape. Sufficient additional sealant shall then be applied to completely imbed the cloth. All sealants shall be UL rated at no more than flame spread of 5 and smoke developed of 0. At contractor's option Hardcast 1602 sealant tape may be used in lap joints and flat seams.

E. Duct Access Doors

Hinged insulated access doors with seals shall be provided in ducts where indicated on drawings, or as required. Units shall be provided at each manual damper, motor operated damper, duct coil (both sides), duct mounted temperature control device and fire damper unless accessible through grilles and as shown on drawings. Units to be Ruskin Model ADH-22 for rectangular duct and Model ADR for round duct or approved equal by Elmdor.

F. Motor Operated Dampers

Motor operated control dampers mounted in ductwork shall be provided by ATC Contractor, but installed by this Contractor. Contractor shall seal dampers to ductwork to provide a completely waterproof and airtight seal between damper frames and ductwork.

G. Manual Dampers

1. See Part 3, EXECUTION for installation notes.
2. Manual dampers with smallest dimension 5 inches or less shall be shop fabricated, single 22 gauge blade, 3/8 inch rod, provided with position indicator and locking quadrant.
3. Manual dampers with smallest dimension larger than 5 inches but smaller than 11 inches shall be single blade steel, 16 gauge construction, provided with position indicator and locking quadrant. Unit shall be Ruskin Type MD35 or approved equal.
4. Manual dampers with smallest dimension larger than 11 inches shall be opposed blade steel, 16 gauge construction, linkage concealed in frame, provided with position indicator and locking quadrant. Unit shall be Ruskin Type MD35 or approved equal.

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5. Dampers to be installed in aluminum ductwork shall be fabricated of aluminum or isolated from ductwork with rubber grommets between the damper and the duct to prevent oxidation between dissimilar metals.
6. Provide hand quadrants for all manual dampers, Ventline Model 560 or approved equal.

C. Diffusers, Grilles and Registers

1. Grilles and/or registers shall be installed at all air supply, relief, return and exhaust openings as shown. All units to be steel, except as noted, and provided with baked enamel finish to match color of grille or register and countersunk screw holes. Mounting screws shall be oval head type with head painted to match finish. Unless stated otherwise, the following list is based on model numbers of Price to establish a standard of quality (if substituting, certified sound criteria shall be included with submittals indicating CFM and NC levels of each register and grille). Anemostat, Krueger, Metalaire and Tituis only will also be considered for review.
 - a. Supply Registers: Double deflection; with opposed blade damper and $\frac{3}{4}$ inch front blade spacing; front blades set horizontal.
 - b. Exhaust and Return Registers: with opposed blade damper and $\frac{3}{4}$ inch blade spacing, 35° front blade angle, front blades set horizontal.
 - c. Exhaust, Return and Transfer Grilles: without damper, $\frac{3}{4}$ inch blade spacing, 35° front blade angle, front blades set horizontal.

All lay-in registers and grilles shall be supported directly to building structure with no less than two (2) safety chains located at opposing corners.

2. Diffusers shall be installed at all air supply openings as shown. All units to be steel, except as noted, and provided with white baked enamel finish. Unless stated otherwise, the following list is based on model numbers of Price to establish a standard of quality (if substituting, certified sound criteria shall be included with submittals indicating CFM and NC levels of each diffuser). Anemostat, Krueger, Metalaire and Titus only will also be considered for review.
 - a. Square face, 2.3. or 4 way discharge with rectangular duct connection

All lay-in diffusers shall be supported to building structure with no less than two (2) safety chains located at opposing corners.

D. Louvers

1. All exterior louvers shall be extruded aluminum construction with interior bird screens and painted with Kynar finish in color to be selected by Architect. Provide not less than 2 color chip cards with submittals for review (photocopies not acceptable). Frames and blades shall have not less than

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55% minimum free area and no less than 0.081 inches thick. All louvers shall comply with Section 08400 of this specification. The following list is based on model numbers of Ruskin to establish a standard of quality; approved equal units by American Air Warming and Arrow are acceptable.

2. All louvers shall be stationary blade type . Units to be 4 inches deep with certified rating of zero water penetration at free area velocity of 900 FPM based on tests in accordance with AMCA Standard 500.
3. Frames of all louvers to be box type for mounting in masonry. Provide factory mounting flanges on head and side jambs with extended sill for units mounted in frame walls.

2.09 FILTERS

- A. All cabinet unit heaters shall be provided with a minimum of three (3) sets of filters with pleated media. One set to be used during construction (and replaced by the Mechanical Contractor during construction if required as determined by the Clerk of the Works and/or the Mechanical Engineer). Second set to be installed a minimum of one (1) day and a maximum of three (3) days prior to testing and balancing and/or final inspection. The third set shall be turned over to the Owner in their original unopened shipping boxes for their future use.
- B. Filters shall be Farr 30/30, Air Guard DP-40 or approved equal; 1 inch thick.

2.10 INSULATION AND CONDENSATE PROTECTION

- A. General
 1. Insulation shall be provided for all new metallic hot water supply and return piping, refrigerant piping, outside air intakes, relief ducts and other insulation where shown on drawings. It is not required to insulate PEX piping.
 2. Insulation systems shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less.
for cold water application shall be insulated.
- C. Duct and Equipment Insulation
 1. Insulate the following ducts with 1-1/2" inches thick fiberglass duct wrap with factory applied vapor barrier facing:
 - a. All supply ductwork from ERV-1 to diffusers.
 - b. All return ductwork from exhaust grilles to ERV-1
 2. Material to carry U. L. label. All laps to be sealed and held in place with adhesive and flare staples. All lap joints to be folded under before stapling

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so no raw insulation will be showing. On the bottom of ducts 24 inches or wider, mechanical fasteners shall be provided approximately 12 inches O.C.

E. Condensate Protection

Solder or weld bottom and sides of ducts connected to outdoors to prevent water leaks from rain and snow. Seal duct wrap and liner to minimize condensation.

F. Installation

All insulation work shall be executed by skilled insulation workmen regularly employed in the trade.

2.11 AUTOMATIC TEMPERATURE CONTROL (ATC)

A. General

1. Furnish and install a complete system of electric/electronic ATC contractor shall be ultimately responsible and liable for proper installation as outlined in Divisions 23 and 26 of this specification.

B. Room Temperature Sensors

1. General

All sensors and thermostats to be provided by mini-split manufacturer.

C. Miscellaneous Devices

1. Provide all the necessary relays, transformers, valves, positioners, switches, etc. to make a complete and operable system.

D. Description of Operation

Provide and install control wiring.
Mount Thermostats in Equipment Room
See Mechanical Specifications for manufacture supplied controls

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PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection

1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all work is complete to the point where this installation may properly commence.
2. Verify that Mechanical systems may be installed in strict accordance with all pertinent codes and regulations and the approved shop drawings.

B. Discrepancies

1. In the event of discrepancy, immediately notify Architect.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 INSTALLATION OF PIPING AND EQUIPMENT

A. General

1. All piping shall be installed within building insulation.
2. Size and general arrangements as well as methods of connecting all piping, valves, and equipment shall be as indicated, or to meet requirements for complete installation.
3. All pumps supported from overhead shall have rubber-in-shear isolators mounted in the hanging rods and shall be mounted independently of the piping system.
4. All piping shall be erected to provide for easy and noiseless passage of hot water under all working conditions. Inverted eccentric reducing fittings shall be used whenever water pipes reduce in size in the direction of flow. Tee fittings with reduction in the main direction of flow (run) are not acceptable.
5. All hot water mains shall be run level or pitch slightly upward so that no air pockets are formed in piping. Mains shall be set at elevations so runouts feeding heating equipment shall have no pockets where air can collect or automatic vents shall be provided.
6. Where preset balancing valves are used, it is critical that there not be two valves installed in series anywhere throughout the piping system.

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7. Provide drains with hose threads and metal caps at all low points in the water piping system.
8. In erection of hot water piping care must be taken to make allowance for expansion and contraction; piping shall be anchored as necessary to control expansion.
9. Runouts to hot water radiation shall be size indicated on plans.
10. Install brass fittings at all points of dissimilar piping connections.
11. Install a sufficient number of unions or flanges to facilitate assembly and disassembly of piping and removal of equipment.
12. Install all piping promptly, capping or plugging all open ends and making pipe generally level and plumb, free from traps, and in a manner to conserve space for other work.
12. Inspect each piece of pipe, tubing, fittings, and equipment for defects and obstructions; promptly remove all defective materials from the job site.
13. Install pipes to clear all beams and obstructions; do not cut into or reduce the size of load carrying members without the approval of the Architect.
14. All risers and offsets shall be substantially supported.
15. Make all changes in pipe size with approved reducing fittings.
16. All low points in water piping shall be provided with an accessible plug tee or drain valve.
17. All high points in water piping shall be provided with an accessible automatic vent.
18. Maximum spacing of pipe hangers (for metallic piping) shall be as follows:

Pipe Size	Spacing
½", ¾" & 1"	6'-0"
1¼" & 1½"	8'-0"
2" & 3"	10'-0"
19. Whenever possible valves shall be installed with the operating stems in the upright position, however when conditions dictate it is acceptable to position valves 90° to either side of vertical. Valves shall not be installed with the stems in the downward position.
20. Do not substitute one style of valve indicated on drawings for another unless authorized by the Architect. Example: If a gate valve is shown use ONLY a gate valve or if a ball valve is shown use ONLY a ball valve.

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21. Mount in-line air separators 2½ inches in size and larger independent of the piping system. Do not obstruct removal area of strainer with pipe hangers, equipment or other piping.

B. Joints and Connections

1. Smoothly ream all cut pipe; cut all threads straight and true; apply best quality Teflon tape to all male pipe threads but not to inside of fittings; use graphite on all plugs.
2. Make all joints in copper tube (water and drains) with 95-5 tin-antimony solder applied in strict accordance with the manufacturer's recommendations.

C. Fire Safety

Fire extinguishing equipment shall be kept within 25 feet of welding areas at all times. No flammable materials shall be placed within 25 feet of welding areas unless they are physically connected to the building structure. Contractor shall take additional measures when welding close to flammable structures to protect the wood from igniting.

D. Thermometers

1. Install thermometers where indicated on drawings and:
2. Install thermometer wells on supply and return branch piping at all duct hot water heating coils and two (2) thermometers with storage cases for the Owner's use.
3. Install thermometers on hot water piping at each port of reset water valve.

E. PEX tubing

1. Install PEX tubing where indicated on drawings.
2. Tubing shall be supported from building structure only, not from other piping or equipment.
3. Do not support other piping or equipment from PEX tubing.
4. PEX tubing may be threaded through structure with the structure acting as support so long as support is not provided in lengths greater than 32 inches on center. Use protective sleeves or bushings where tubing passes through metal studs. Tubing shall not have sags or low points that would prevent thorough drainage of the system.
5. Support devices shall be a product of the PEX manufacturer. Support

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devices shall be screwed, not nailed, into wood. Do not attach to the underside of floor decks. It is acceptable to support PEX tubing to the side of steel bar joists with "zip" strip draw bands at 32 inch centers (maximum). Leave adequate provision for pipe insulation.

3.03 PIPING TEST AND ADJUST

- A. During the installation, all hot water supply and return piping shall be tested with water to a pressure of not more than 125 psi and held for a period of not less than four (4) hours. Isolate cast iron boilers and any other piping or devices not designed for this pressure. Do not use compressed air on PEX tubing systems. Any leaks shall be repaired and another test applied to the piping. All piping shall be tested before it is insulated or otherwise concealed. Contractor shall be required to certify in writing that piping has been tested and conforms to these requirements.
- B. Before operating the water system, all of the new piping shall be flushed out to remove oil and foreign materials. This shall be accomplished by circulating a solution of heavy duty detergent by use of Mechanical Contractor supplied pump.
- C. After the installation is complete and ready for operation, the system shall be tested under normal operating conditions in the presence of the Architect and demonstrated that the system functions as designed.
- D. It shall be demonstrated that all parts of heating system have a free and noiseless circulation of water and that all parts are tight. It shall also be demonstrated that all units are functioning properly and that control system operates correctly.
- E. Should any defects in operation develop during the test periods, the Mechanical Contractor will proceed to correct defects immediately. Additional tests will be conducted after correction.

3.04 INSTALLATION OF DUCTWORK AND EQUIPMENT

- A. General
 - 1. Size and general arrangements as well as methods of connecting all registers, grilles, duct coils and equipment shall be as indicated, or to meet requirements for complete installation.
 - 2. Construction standards and sheet metal gauges shall be as outlined in the latest edition of the SMACNA HVAC Duct Construction Standards handbook for metal and flexible ducts unless specifically indicated otherwise.
 - 3. See paragraph 2.18, "Sheetmetal", sub-paragraph G., "Sealing of Ducts" for duct sealing.
 - 4. Manual Dampers
 - a. Manual dampers may be shop-fabricated on units 5 inches in height

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and less. All dampers larger than 5 inches MUST be pre-fabricated as previously outlined in this specification.

- b. All manual dampers located within 10 feet of a fan outlet shall have the blades oriented perpendicular to the fan shaft.
- c. Provide duct access door as large as possible up to 12 inches x 12 inches at EACH manual damper larger than 5 inches.

B. Protection and Cleaning

- 1. All open ends of ductwork which is to be unattended for 4 hours or more shall be temporarily protected with plastic sheeting and duct tape (or similar method) to reduce the collection of construction dust and debris.
- 2. All openings in mechanical equipment (unit ventilators, cabinet unit heaters, fans, etc.) shall be covered with cardboard and thoroughly sealed to duct and contaminants with painters tape during the construction period unless work is actually being performed on the equipment.
- 3. Prior to testing and balancing and at the end of the construction, clean the interiors of all supply and return air ductwork before changing filters in air handling equipment. Careful coordination must be maintained between the time of testing and balancing and final delivery to avoid re-accumulation of dust and debris within the duct systems which will require additional cleaning by the Mechanical Contractor.

3.05 TESTING, ADJUSTING AND BALANCING (TAB)

A. General

- 1. TAB contractor shall be a subcontractor to the Mechanical Subcontractor.
- 2. TAB contractor shall perform functional performance test of all Division 15 equipment and entire ATC system for specified operation and control sequences.
- 3. The mechanical contractor shall startup all Division 15 equipment as required by the equipment specifications. Mechanical contractor shall verify that systems are complete and operable before TAB commencing work. Ensure the following conditions:
 - a. Systems are started and operating in a safe and normal condition.
 - b. Temperature control systems are installed complete and operable.
 - c. Proper thermal overload protection is in place for electrical equipment.
 - d. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - e. Duct systems are clean of debris.
 - f. Fans are rotating correctly.
 - g. Fire and volume dampers are in place and open.

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- h. Air coil fins are cleaned and combed.
 - i. Access doors are closed and duct end caps are in place.
 - j. Air outlets are installed and connected.
 - k. Duct system leakage is minimized.
 - l. Hydronic systems are flushed, filled, and vented.
 - m. Pumps are rotating correctly.
 - n. Mechanical equipment is thoroughly clean and free of debris.
- 4. TAB Contractor shall submit field reports to General Contractor and Architect. Report defects and deficiencies noted during performance of services which prevent system testing and balance.
 - 5. TAB contractor shall submit all verification and functional performance checklists/results, signed by indicated personnel, organized by system and sub-system.
 - 6. TAB contractor shall submit other reports described below.

B. Work Included

- 1. Test, adjust and balance all air and water systems, including components to conform to air and water flow rates shown on drawings.
- 2. Test complete automatic temperature control sequences for specified operations described under AUTOMATIC TEMPERATURE CONTROLS.
- 3. Complete and submit balance report in spreadsheet format. Report shall be submitted with information noted on one side of sheet only (i.e., backside of sheet shall be blank.).
- 4. Testing of air and water systems will be done by the same agency.
- 5. Mechanical Contractor SHALL PROVIDE copies of shop drawings indicating coil gpm's, air handling unit air volumes, etc. to the Testing and Balancing contractor at no cost to the contractor.
- 6. The Balancing Contractor shall carry an allowance of \$250. which may be used, if directed by the Architect, to change motor drives and belts as job conditions require. The allowance or unused portion shall be returned to the Owner upon acceptance of the system.
- 7. Careful coordination must be maintained between the time of testing and balancing and final delivery to avoid re-accumulation of dust and debris within the duct systems which will require additional cleaning by the Mechanical Contractor.

C. Quality of Compliance

- 1. Qualification: TAB Contractor must be independent test and balancing

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agency.

2. AABC Compliance: Comply with AABC Manual MN-1 "AABC National Standards" as applicable to mechanical and hydronic distribution systems and/or Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).
3. Industry Standards: Comply with ASHRAE recommendations for measurements, instruments and testing and balancing.
4. Coordination: Work together with Automatic Temperature Control Contractor to adjust set points of various devices to balance system(s) and test ATC sequences of operation. Temperature Control Contractor shall be responsible for balancing return air, exhaust (relief) air and outdoor air dampers on Air Handling Units in order to achieve proper mixed air temperatures.
5. ASHRAE Guideline 1-1996, "The HVAC Commissioning Process".

D. Execution of TAB Work

1. TAB Contractor shall visit job site and determine that control devices, test devices and valves are correctly installed and ready for balancing.
2. Examine each air and hydronic distribution system to see that it is free from obstructions. Determine that all dampers, registers and valves are in a set or full open position; that moving equipment is lubricated, and that required filters are clean and functioning. Request that Installing Contractor perform any adjustments necessary for proper functioning of the system.
3. TAB Contractor shall use test instruments that have been calibrated within a time period recommended by the manufacturer, and have been checked for accuracy prior to start of testing, adjusting and balancing activity.
4. Verify that all equipment performs as specified. Adjust variable type drives, volume dampers, control dampers, balancing valves and control valves as required by TAB work.
5. Test pressure profile of systems by traverse as required.
6. Adjust each register and damper to handle and properly distribute design airflow within 5% of specified quantities. Mark all setpoints.
7. Adjust front and rear discharge louvers on each supply register to distribute air in an even pattern or as indicated on plans.
8. Set all adjustable balancing valves so that each is furnished with design fluid flow within 5% of the specified quantities. Mark all set points.

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9. Take readings at pre-set balancing valves and record flow readings.
10. Adjust air discharge patterns of all supply air diffusers, registers and grilles for optimal air diffusion.
11. Document results of all testing on approved TAB report formats and submit 3 copies for approval and record within 15 days of completion of TAB work. Include a warranty period of 90 days, during which time the Architect/Engineer may request a re-check or re-adjustment of any part of the work. Reports shall be compiled on a spreadsheet such as Excel, Quattro-Pro, Lotus, etc. and shall clearly indicate the following *minimum* information:
 - a. Air (Rated and Actual)
 - 1) System/unit name
 - 2) HP, BHP, voltage, amperage and fan rpm
 - 3) Static pressures; suction, discharge and total
 - 4) Total system flow rate
 - 5) Individual terminal flow rates (Terminal readings must show location, make, model and size of register, grille or diffuser).
 - 6) Filter status report
 - b. Water
 - 1) Pump full flow and no-flow suction and discharge pressures.
 - 2) Rated and actual amperage, voltage and total discharge head (TDH).
 - 3) Calibrated balancing device readings will indicate location, size, setting, differential pressure and rated and actual gpm.

Reports to have a minimum of color or must be compatible with monochrome printers. Reports must be submitted to the Architect electronically in addition to hard copies.

E. Drawings

Drawings in CAD format may be made available to the TAB Contractor after the contract for this work is awarded.

3.06 CLOSING IN UNINSPECTED WORK

A. General

Do not cover up or enclose work until it has been properly and completely inspected and approved.

B. Noncompliance

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Should any work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required. After it has been inspected completely and approved, make all repairs and replacements with materials necessary for approval by the Architect and at no additional cost to the Owner.

If it is not practical to uncover the uninspected work it may, at the Architect's discretion, be considered inadequate and credit given to the Owner for the work as if it were not done in satisfactory accordance with the terms of the contract documents.

3.07 TEMPORARY HEATING

- A. Mechanical Contractor shall install the new heating system and related equipment as soon as those portions of the building are ready and the work can be performed.
- B. Mechanical Contractor will be required to permanently connect as many units as possible for temporary heat.
- C. At the conclusion of the temporary heating period, the complete system shall be thoroughly cleaned.
- D. General Contractor will be required to assume full responsibility for the care and operation of the new equipment during its temporary use and to return the equipment to the Mechanical Contractor in perfect order, normal wear and tear excepted.
- E. Water, fuel and electric power required to operate the heating system for temporary heat shall be provided by the General Contractor.

3.08 CLEANING

Prior to acceptance of the buildings, thoroughly clean all exposed portions of the Heating, Ventilating and Air Conditioning installation, including the removal all labels and all traces of foreign substance. Prior to testing and balancing vacuum and clean inside of all convectors, finned radiators (spackle droppings), unit ventilators, heat recovery units, fans and cabinet unit heaters. Clean the interiors of ductwork (where accessible) as outlined in 3.03, "INSTALLATION OF DUCTWORK AND EQUIPMENT"; paragraph "B", "Protection and Cleaning".

3.09 INSTRUCTIONS

On completion of the job, the Mechanical Contractor shall provide a competent technician to thoroughly instruct the Owner's Representative in the care and operation of the system. The total period of instruction shall not exceed four (4) hours. (Temperature control system instruction shall be in addition to this instruction period). The time of instruction shall be arranged with the Owner.

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3.10 RECYCLING

Discarded materials, both new and removed, shall be recycled whenever practical through metal salvage dealers (ductwork, piping, etc.), paper salvage (cardboard shipping containers, etc.), wood & plastic products, etc. The Mechanical Contractor shall retain the salvage value of discarded materials and may use this value to offset his project bid price if so desired. Toxic materials such as adhesives, coolants, refrigerants, etc. SHALL be disposed of in a manner acceptable to the State of Vermont Department of Environmental Protection.

3.11 HAZARDOUS MATERIALS

Mercury, or any other material deemed hazardous by the Federal Environmental Protection Agency or the State of New Hampshire Department of Environmental Protection, shall not be used in any components of the mechanical systems.

END OF SECTION 23000

SECTION 260000

GENERAL REQUIREMENTS FOR ELECTRICAL WORK

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. Scope: It is the intent of these Drawings is to define the equipment and materials for the new toilet facility in T1R9 WELS, Maine.
- B. Provisions: As used in this section, "provide" means "furnish and install", "furnish" means "to purchase and deliver to the project site complete with every necessary appurtenance and support and to store in a secure area in accordance with manufacturer's instructions", and "install" means "to unload at the delivery point at the site or retrieve from storage, move to point of installation and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project".
- C. Existing Site Conditions – Responsibilities Prior to Bid: Before submitting a bid, the Electrical Subcontractor shall visit and carefully examine site to identify existing conditions and difficulties that may affect the work of this Section. No extra payment will be allowed for additional work caused by unfamiliarity with site conditions.
- D. Existing Site Conditions – Responsibilities Prior to Starting Work: Before starting work in a particular area of the project, the Electrical Subcontractor shall examine the conditions under which work must be performed including preparatory work performed under other Sections of the Contract, or by the Owner and report conditions which might adversely affect the work in writing to the Engineer. Do not proceed with work until defects have been corrected and conditions are satisfactory. Commencement of work shall be construed as complete acceptance of existing conditions and preparatory work.
- E. Coordination of Work: The General Contractor shall coordinate the work of all trades including that of the electrical contractor, with all other subcontractors to determine whether there will be any interference with the electrical work. If the Electrical Subcontractor fails to check with the General Contractor and the electrical work is later found to interfere with the work of other subcontractors, then he shall make necessary changes, without additional cost to the Owner, to eliminate such interference.
- F. Intent of Design: This performance specification is not intended to indicate and specify each component required, but does require that the components and materials be provided for a complete and operational installation.
- G. Discrepancies in Documents: Each bidder shall be responsible for examining the specifications carefully before submitting his bid, with particular attention to errors,

omissions, conflicts with provisions of laws and codes imposed by authorities having jurisdiction, conflicts between portions of specifications, and ambiguous definition of the extent of coverage in the contract. Any such discrepancy discovered shall be brought to the immediate attention of the Engineer for correction. Should any of the aforementioned errors, omissions, conflicts or ambiguities exist in the specification, the Electrical Subcontractor shall have the same explained and adjusted in writing before signing the contract or proceeding with work. Failure to notify the Engineer in writing of such irregularities prior to signing the Contract will cause the Engineer's interpretation of the Contract Documents to be final. No additional compensation will be approved because of discrepancies thus resolved.

1.02 APPLICABLE CODES AND STANDARDS

- A. Work: All work shall be in accordance with the laws, rules, codes, and regulations set forth by Local, State, and Federal authorities having jurisdiction. All products and materials shall be manufactured, installed and tested as specified, but not limited to the latest accepted edition of the following codes, standards and regulations:

NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Act
NEC	National Electrical Code (NFPA 70)
UL	Underwriters Laboratory
NESC	National Electrical Safety Code
FM	Factory Mutual Association
MUBEC	Maine Unified Building and Energy Code
Local AHJ	Local and State building, electrical, fire and health department and public safety codes agencies.

- B. Code Conflicts: When requirements cited in this Paragraph conflict with each other or with Contract Documents, the most stringent requirements shall govern conduct of work. The Engineer may relax this requirement when such relaxation does not violate the ruling of authorities that have jurisdiction. Approval for such relaxation shall be obtained in writing. Should the Electrical Subcontractor perform any work that does not comply with the requirements of the applicable building codes, state laws, and industry standards, he shall bear all costs arising in correcting these deficiencies.

PART 2 SCOPE OF WORK

2.1 GENERAL REQUIREMENTS

- A. General Scope: The work to be accomplished under this section includes providing all labor, materials, equipment, consumable items, supervision, administrative tasks, tests and documentation required to install complete and fully operational electrical systems as described.
- B. Administrative Responsibilities: The Electrical Subcontractor shall file plans, obtain permits and licenses, pay fees and obtain necessary inspections and approvals from authorities that have jurisdiction, as required to perform work in accordance with all legal requirements.

2.2 WORK TO BE PROVIDED UNDER THIS DIVISION

- A. Existing Conditions and Scope:
 1. **Electric Service**: Furnish a new 120/240V overhead electrical service from the pole behind the building. Contractor shall furnish service mast, conductors, utility metering equipment, and service rated disconnect.
 2. **Grounding System**: Furnish a complete new grounding electrode system for this building and bond all equipment and auxiliary devices to this system as required by the National Electrical Code. Furnish all electrodes and wiring in accordance with the NEC and outlined on the drawings.
 3. **Power Distribution Systems**: Intent is to furnish a new 100A, 120/240-Volt, single-phase main power panel as shown on the plans and all overcurrent devices, raceway, cable and wire.
 4. **Feeder and Branch Circuit Wiring**: Furnish feeder and branch circuits and devices for power to equipment and convenience receptacles as shown on the plans.
 5. **Motor Circuit Wiring**: Provide all motor wiring, safety disconnects, and motor starters unless integral with equipment.
 6. **Interior Lighting Systems**: Provide complete interior lighting system including normal and emergency fixtures, exit signs, lamps, controls, trim and accessories.
 7. **Telephone and Data Systems**: Provide telephone service conduit into the building for future service if required at a later time by the Owner. Owner does not intend to have telephone at this time.
 8. **Supports and Fittings**: Provide all support material and hardware for raceway and electrical equipment.
 9. **Terminations**: Provide terminations of all cable and wire unless otherwise noted.

10. Penetrations: Provide all building wall, floor and roof penetrations for raceway and cable tray where not provided by the General Contractor.

2.3 GENERAL EQUIPMENT AND MATERIALS REQUIREMENTS

- A. General Requirements: All equipment and materials shall be new and of the quality specified. All materials shall be free from defects at the time of installation. Materials or equipment damaged in shipment or otherwise damaged during construction shall not be repaired at the jobsite, but shall be replaced with new materials.
- B. Representation of Equipment: All equipment installed on this project shall have local representation, local factory authorized service and a local stock of repair parts.
- C. Warranties: No equipment or material shall be installed in such a manner as to void a manufacturer's warranty. The Electrical Subcontractor shall notify the Engineer of any discrepancies between the Contract Documents and manufacturer's recommendations prior to execution of the work. Refer to Division 1, General Requirements for Warranty Requirements.

2.4 SHOP DRAWINGS

- A. General Requirements: After the Contract is awarded, but prior to proceeding with the Work, the Electrical Subcontractor shall obtain complete shop drawings, product data and samples from manufacturers, suppliers, vendors, and Subcontractors for all materials and equipment specified herein, and submit data and details of such materials and equipment for review by the Engineer. Submission of such items shall follow the guidelines set in the General Section of the Specification Document. Prior to submission of the shop drawings, product data and samples to the Engineer, the Electrical Subcontractor shall review and certify that the shop drawings, product data and samples are in compliance with the Contract Documents. Further, the Electrical Subcontractor shall check all materials and equipment after their arrival on the jobsite and verify their compliance with the Contract Documents. A minimum period of ten working days, exclusive of transmittal time will be required in the Engineer's office each time shop drawings, product data and/or samples are submitted or resubmitted for review. This time period shall be considered by the Electrical Subcontractor when scheduling his Work.
- B. Information to be included in Submittal: The shop drawing submittal shall include all data necessary for interpretation as well as manufacturer's name and catalog number. Sizes, capacities, colors, etc., specified on the drawings shall be specifically noted or marked on the shop drawings.

- C. Responsibility of Submitted Equipment: The Engineer's review of such drawings shall not relieve the Subcontractor of responsibility for deviations from the Contract Specifications, unless he has in writing called to the attention of the Engineer such deviations at the time of the submission. The Engineer's review shall not relieve the Electrical Subcontractor from responsibility for errors or omissions in such drawings.
- D. Proposal of Other Equipment: If the Electrical Subcontractor proposes an item of equipment other than that specified which requires any redesign of the wiring or any other part of the mechanical, electrical or architectural layout, the required changes shall be made at the expense of the trade furnishing the changed equipment at no cost to the Owner.
- E. Substitution of Equipment of Equal Quality: Manufacturer's names are listed herein and on the drawings to establish a standard for quality and design. Where one manufacturer's name is mentioned, products of other manufacturers will be acceptable if, in the opinion of the Engineer the substitute material is of quality equal to or better than that of the material specified. Where two or more manufacturer's names are specified, material shall be by one of the named manufacturers only.

2.5 RECORD DRAWINGS

- A. General Requirements: As work progresses, and for duration of the Contract, the Electrical Subcontractor shall maintain a complete and separate set of prints of Contract Drawings at job site at all times and record work completed and all changes from original Contract. Drawings shall clearly and accurately include work installed as a modification or added to the original design. At completion of work and prior to final request for payment, the Electrical Subcontractor shall submit a complete set of reproducible record drawings showing all systems as actually installed.

2.6 EQUIPMENT SPECIFICATIONS

- A. Panelboards: Panelboards shall be of the sizes, rating and arrangement shown on the attached sketch. Panelboards shall be provided complete with all overcurrent devices, accessories and trim. All panelboards shall be provided with safety barriers for dead front construction. The required short circuit ratings of assembled panelboards are shown on the Drawings. The short circuit rating of every overcurrent device in the panel shall meet or exceed the panel rating. Unless otherwise noted on the Drawings, series rated combinations will not be permitted.

1. Enclosures: Boxes shall be code gauge galvanized sheet steel. Trim shall be code gauge steel, ANSI-61 gray finish with stainless steel flush type lock/latch handle. All locks shall be keyed alike. Trim for surface mounted panels shall be of hinged door construction such that the gutter space may be exposed by a hinged door. Directory frames shall be metal frame with plastic covers.
 2. Bus Work: All bus work shall be 1000 amp/sq. in. copper or 750 amp/sq. in. aluminum. Unless otherwise noted on the drawings, neutral busses shall be 100% rated with adequate connections for all outgoing neutral conductors. Panelboards shall be provided with copper or aluminum ground busses.
 3. Circuit Breakers: Overcurrent devices shall be trip-free molded case, bolt-on, thermal magnetic circuit breakers. Main circuit breakers shall be individually mounted and bolted to bus assembly. Back-fed branch mounted circuit breakers are prohibited. Front faces of all circuit breakers shall be flush. Trip indication shall be clearly shown by the handle position between the ON and OFF positions. All connections shall be rated for 75°C copper conductors.
- B. Grounding System: The Contractor shall provide all equipment pertaining to the grounding system including but not limited to: grounding electrodes, bonding jumpers, equipment grounding conductors, connections and other materials as may be required for a complete installation. The completed system provided shall meet the requirements of the National Electrical Code and the interpretation of the Local Authority Having Jurisdiction.
1. Ground rods shall be ¾-inch copper clad steel construction furnished in 10 foot lengths.
 2. Bare grounding conductors shall be soft drawn stranded copper, sized in accordance with NEC Article 250 unless otherwise noted on the Drawings.
 3. Insulated grounding conductors shall be stranded copper with Type TW, THW or THHN/THWN insulation. Grounding conductor shall be provided with green insulation for identification purposes.
 4. Equipment Grounding System: A separate, insulated copper conductor, with green colored insulation, shall be provided in all raceways and with every feeder, branch and control circuit, in addition to the grounded metallic conduit system. The equipment grounding conductor shall be grounded at both ends. Care shall be taken not to create a parallel path to the neutral conductor by any other means of grounding.
 5. Grounding of Raceways: All metallic raceways shall be electrically continuous and bonded to the grounding system. All junction boxes, pull

boxes, switch boxes, outlet boxes, etc., shall be bonded to the equipment grounding conductor by means of a green bonding jumper and screw. All devices (switches/receptacles etc.) having a grounding terminal shall have a bonding jumper installed tied directly to the equipment grounding conductor. (No exceptions).

6. Other Systems: Interior metal water, gas and sprinkler piping, roof mounted fans, pipes, ducts, railings, and other metallic equipment shall be bonded as required by Article 250 of the NEC. The points of attachment of these bonding conductors shall be located in readily accessible locations.
- C. Feeder and Branch Circuit Wiring and Conduits: Provide feeder and branch circuits and devices for power to equipment and convenience receptacles. This includes branch wiring to system control panels furnished under other sections.
1. All circuits feeding panels, circuit feeders and circuit wiring shall be copper, minimum size #12 AWG. Conductors shall be 600V rated with THHN/THWN insulation.
 2. All feeder wiring in non-corrosive areas shall be in EMT conduit where surface mounted and in MC cable where recessed behind drywall. Wiring installed in corrosive areas shall be installed in Schedule 80 PVC conduit, properly supported to avoid sagging.
 3. EMT and PVC conduits shall be properly supported with hangers or clips at a spacing not to exceed 10 feet. Minimum conduit size is $\frac{3}{4}$ ".
 4. Flexible liquid-tight conduit shall be used for connections to vibrating equipment.
 5. All conduits or penetrations in fire rated walls shall be furnished with fire stopping material to maintain the integrity of the rating.
- D. Lighting Systems:
1. Light fixtures shall be provided with housings, trims, drivers, lamps, reflectors, wiring and other components required, as a factory-assembled unit for a complete installation. Provide electrical wiring within light fixtures suitable for connecting to branch circuit wiring in accordance with N.E.C. Article 410, Paragraph 25. Provide LED lighting fixtures of the wattages, initial lumen outputs and color temperatures specified in the fixture schedule. LED fixtures shall be furnished with 0-10V dimmable driver.
 2. Occupancy sensors shall be furnished of the type and model specified on the drawings, installed and wired into the local lighting circuit in the area that the sensors are installed. The engineer will consider equipment of another equal manufacturer, where suitable coverage can be documented. Power packs shall be provided as required for each room provided with occupancy sensors

as needed. Provide all miscellaneous equipment and wiring for a complete installation.

3. Emergency lights and exit signs shall be wired to the local area lighting circuit as required by National Electrical Code.

E. Safety Switches

1. Safety switches shall be 240 VAC, NEMA heavy duty, horsepower rated visible blade type. Switches shall be non-fused or fused as indicated on the drawings. Lugs shall be front removable and UL listed for copper conductors. All current carrying parts shall be plated to resist corrosion.
2. The switch operating mechanism shall be spring activated quick make - quick break, such that during the normal operation of the switch, the operation of the contacts shall not be capable of being restrained by the operating handle after the closing or opening operation of the contacts has been started.
3. The external operating handle shall be an integral part of the box and not the cover. The operating handle shall also indicate the switch position, ON in the up position, OFF in the down position and be capable of being padlocked in the OFF position. An interlock shall be provided to prevent opening the cover when the switch is ON and prevent closing the switch contacts when the cover is opened. This interlock mechanism shall be provided with an externally operated override.
4. Single speed motors shall be provided with three pole switches. Two speed motors shall be provided with six pole switches.
5. Switches shall be provided with a factory supplied ground kit.
6. Fused switches shall be provided with class H or K fuses.
7. The UL Listed short circuit current rating of the switches shall be 10KAIC when used with Class H or K fuses.
8. Safety switches installed indoors shall be provided with NEMA 1 enclosures. Safety switches installed outdoors or in wet areas shall be provided with NEMA 3R enclosures. Safety switches in corrosive areas (pool equipment room) shall be NEMA 4X rated.

F. Manual Toggle Type Motor Switches

1. Single phase fractional HP manual motor starters shall be toggle operated, enclosed, one or two pole switches as required by the installation. The enclosure shall be NEMA 1 for indoor locations and NEMA 3R for outdoor, wet and damp locations. A handle guard shall be provided to allow the toggle

operator to be padlocked in the OFF position. Starters shall be provided with trip free melting alloy or solid state thermal overloads.

PART 3 EXECUTION

3.1 REQUIREMENTS

Unless otherwise noted all wiring shall be installed in raceway as follows:

- A. **Power Distribution Outdoors:** All conduits installed outdoors and conduit exposed to physical damage shall be rigid steel, rigid aluminum or intermediate metal conduit.
- B. **Power Distribution Indoors:** Unless otherwise noted, all other power distribution wiring including feeders and branch circuits shall be installed in electrical metallic tubing (EMT) when installed exposed. Where exposed to potential physical damage, conduits shall be rigid steel, rigid aluminum or intermediate metal conduit. Wiring installed in corrosive areas shall be installed in Schedule 80 PVC conduit, properly supported to avoid sagging.

3.2 EQUIPMENT ARRANGEMENT AND ACCESS

- A. **Location of Equipment:** Locate all equipment which must be serviced, operated or maintained in fully accessible positions. Minor deviations from the drawings may be made to allow for better accessibility at no additional cost to the Owner, but changes shall not be made without review by the Engineer. Minimum clearances in front of or around equipment shall conform to the latest applicable code requirements.
- B. **Arrangement of Equipment:** The size of equipment shown on the drawings is based on the dimensions of a particular manufacturer. Where other manufacturers are acceptable, it is the responsibility of the Electrical Subcontractor to determine if the equipment he proposed to furnish will fit the space available. Layout drawings shall be prepared by the Subcontractor when required by the Engineer or Owner to indicate a suitable arrangement.

3.3 EQUIPMENT LABELING

- A. **Panelboards:** All panelboards, cabinets and other specified equipment shall be labeled with engraved laminated plastic plates, minimum 3/4" high with 3/8" engraved letters. Punch tapes with mastic backings are not acceptable.
- B. **Empty Conduits:** All empty conduits shall have labels tied to the pull string at each end of each empty conduit, marked as to identification of each end. Junction boxes with circuits provided for future use shall be labeled with appropriate circuit designation.

- C. Panelboard Directories: Cardholders for panelboards shall be filled out with typewritten identification of each circuit, except that the word "spare" shall be written in soft pencil to identify all circuit breakers installed that are not used.

END OF SECTION 260000