C. Structural Joists and Planks (2"-4" thick, 5" and wider): Any species and grade complying with requirements for allowable unit stresses.

Fb (minimum extreme fiber stress in bending): 1,200 psi.
E (minimum modulus of elasticity): 1,200,000 psi.

D. Lumber for Miscellaneous Uses: Unless otherwise indicated, provide Standard grade lumber for support of other work, including rooftop equipment and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping and similar members.

2.2 CONSTRUCTION PANELS: For types of concealed applications indicated below, provide wood panel products complying with PS 1 where applicable, and with "APA Performance Standard and Policies for Structural Use Panels" (Form E445) for requirements indicated.

A. For following types of applications where exposure durability classification or span rating is not given, provide EXPOSURE 1 and rating required to suit support spacing indicated.

Combination Subfloor-Underlayment: APA RATED STURD-I-FLOOR, T & G if not otherwise indicated.

Roof Sheathing: APA RATED SHEATHING.

2.3 FASTENERS AND ANCHORAGES: Of size, type, material and finish suited to application shown. Provide metal hangers and framing anchors of size and type recommended for intended use by manufacturer. Hot-dip galvanize fasteners and anchorages for work exposed to weather, in ground contact and high relative humidity to comply with ASTM A 153.

2.4 SILL SEALER GASKETS: Polyethylene foam fabricated to form a gasket 1/4-inch thick and specifically designed to compress between the foundation and wood sill plate to seal gaps. Install in accordance with the manufacturer's instructions.

2.5 GLU LAM BEAMS:

A. General as manufactured by Bohemia for Wood Structures Inc., Biddeford, Maine, sized as indicated, and with exterior adhesives.

Architectural Appearance Grade.

B. Materials, Manufacture and quality control in conformance with ANSI/AITC A190.1-1983. Individually wrap beams, for shipment.

C. Keep dry during delivery, storage, handling, and erection. In addition protect units from exposure to light. Comply with manufacturer's instructions.

2.6 LOCK DECK ROOF DECK: Equal to "Lock-Deck" by Potlatch Corporation Wood Products Group, sized as indicated, decorative grade, standard Vee pattern, unfinished. Install in single unbroken pieces without end joints.

2.7 PRESERVATIVE PRESSURE TREATMENT: Treat all lumber specified for preservative treatment in accordance with LP 2-80 and dried after treatment.

A. Treat all lumber in contact with concrete or masonry.

B. Treat cants, nailers, blocking and similar items in conjunction with roofing and flashing, unless roofing materials manufacturer advises otherwise.

2.8 INSULATION: Kraft faced fiber glass building insulation with stapling flanges complying with ASTM C 665, Type II, of thickness indicated on drawings.

2.9 VAPOR BARRIER: 6-Mil carbonated polyethylene film, rated 0.1 perm or less.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install rough carpentry work to comply with "Manual of House Framing" by National Forest Products Assoc. (N.F.P.A.) and with recommendations of American Plywood Association (APA), unless otherwise indicated. For sheathing, underlayment and other products not covered in above standards, comply with recommendations of manufacturer of product involved for use intended. Set carpentry work to required levels and lines, with members plumb and true and cut to fit.

B. Securely attach carpentry work to substrates and supporting members using fasteners of size that will not penetrate members where opposite side will be exposed to view or receive finish materials. Install fasteners without splitting wood; fasten panel products to allow for expansion of joints unless otherwise indicated.

C. Provide wood framing members of size and spacing indicated; do not splice structural members between supports. Firestop concealed spaces with wood blocking not less than 2" thick, if not blocked by other framing members.

D. Fasten structural wood panel products as follows: Staples will not be permitted except for application of insulation or vapor barrier.

Subflooring: Nail or staple to framing.
Sheathing: Nail to framing.

3.2 VAPOR BARRIER:

A. Anchorage: Install with fasteners as appropriate for substrate and as recommended by vapor barrier or insulation manufacturer.

B. Provide lapped seams and lap vapor barrier onto other work at edges of coverages and at penetrations of barriers by other work.

END OF SECTION 06100

SECTION 06200 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary General Conditions and Division-1 Specification sections, apply to the work of this section.

A. Refer to Section 01030 ALTERNATES for alternate bid items.

1.2 SUMMARY: Extent of finish carpentry is indicated on the drawings and includes carpentry work which is exposed to view, is non-structural, and which is not specified in other sections.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Protect finish carpentry materials during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

B. Do not deliver finish carpentry materials until painting, wet work, grinding or similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, finish carpentry materials must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

PART 2 - PRODUCTS

2.1 WOOD PRODUCT QUALITY STANDARDS:

A. Softwood Lumber: Comply with PS 20 and applicable grading rules of respective grading and inspecting agency for species and product indicated. Manufacture to sizes and patterns using seasoned lumber. Use pieces made from solid lumber for transparent finished work, and glued-up or solid, at contractor's option for painted work.

B. Hardwood Lumber: Comply with National Hardwood Lumber Association (NHLA) rules.

C. Plywood Standard: Comply with PS 1/ANSI A199.

2.2 MATERIALS:

A. General:

1. Softwood Lumber Moisture content: Provide seasoned (KD) lumber having a moisture content from time of manufacture until time of installation not greater than values required by the applicable grading rules of the respective grading and inspection agency for the species and product indicated.

2. Hardwood Lumber Moisture Content: Provide kiln-dried (KD) lumber of moisture content from time of manufacture until time of installation within ranges required in the referenced woodworking standard.

B. Exterior Finish Materials:

1. Moldings: Standard patterns as provided by Brockway-Smith of size and shape indicated of solid ponderosa pine.

2. MDU Plywood: APA MDO EXT, panel dimensic s as indicated.

3. Solid Boards: Eastern white pine, FAS or better.

C. Interior Finish laterials:

1. Solid boards: Poplar, FAS or better.

2. Particle board for laminate covering: 45 pound density.

3. Plastic Laminate: Formica, General purpose Grade 10/HGS, finish and pattern as later selected.

4. Stair Parts:

a) Treads: Brosco clear oak stair treads sized as detailed.
b) Scotia: Brosco oak Scotia.
c) Risers: Solid boards as previously specified.
d) Metal railings specified in Division-5.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install woodwork plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install with no variations in flushness of adjoining surfaces.

B. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

C. Anchor woodwork to anchors or blocking built-in or directly attached to substrates. Secure with countersunk concealed fasteners and blind nailing as required for a complete installat Use fine finishing nails for exposed nailing, countersunk and f flush with woodwork.

D. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners.

3.2 ADJUSTMENT, CLEANING, FINISHING, AND PROTECTION:

A. Repair damaged and defective woodwork where possible to eliminate defects functionally and visually; where not possible to repair replace woodwork. Adjust joinery for uniform appearance.

B. Clean woodwork on exposed and semi-exposed surfaces.

C. Provide final protection and maintain conditions, in a manner acceptable to Fabricator and Installer, which ensures architectu woodwork being without damage or deterioration at time of substantial completion.

END OF SECTION 06200

SECTION 07530 - FLEXIBLE SHEET ROOFING SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary General Conditions and Division-1 Specification sections, apply to the work of this section.

A. Refer to Section 01 ALTERNATES for alternate bid items.

1.2 SUMMARY

A. Extent of Flexible Sheet Roofing (FSR) is indicated on drawings.
This material is identified as "SPM" on drawings.

B. Type of roofing is fully adhered single ply system.

C. Roof insulation related to flexible sheet roofing is specified in this section.

D. Mechanically fasten insulation to roof deck.

1.3 MANUFACTURER: Obtain primary flexible sheet roofing (FSR) from a single manufacturer. Provide secondary materials as recommended by manufacturer of primary materials.

1.4 INSTALLER: A firm with not less than 3 years of successful experience in installation of roofing systems similar to those required for this project and which is acceptable to or licensed by manufacturer of primary roofing materials.

1.5 SUBMITTALS: Submit specifications, installation instructions and general recommendations from manufacturer of flexible sheet roofing system materials.

1.6 WEATHER: Proceed with roofing work when existing and forecasted weather conditions permit work to be performed in accordance with manufacturer's recommendations and warranty requirements.

1.7 SPECIAL PROJECT WARRANTY: Provide written warranty, signed by Manufacturer of primary roofing materials and his authorized Installer, agreeing to replace/repair defective materials and workmanship. Repairs and replacements required because of events

beyond Contractor's/Installer's/Manufacturer's control (and which exceed performance requirements) shall be completed by Contractor/Installer and paid for by Owner.

A Warranty period is 10 years after date of substantial completion.

PART 2 - PRODUCTS

2.1 COMPATIBILITY: Provide products which are recommended by manufacturers to be fully compatible with indicated substrates, or provide separation materials as required to eliminate contact between incompatible materials.

2.2 ADHERED FSR SYSTEMS:

A. Elastomeric sheet materials, manufacturer's standard thickness but not less than 60 mils, 1400 psi minimum tensile strength (ASTM D 412) 250% min. elongation (ASTM D 412), ultraviolet and ozone resistant, low temperature brittleness of -40°F (-40°C) (ASTM D 746), standard color.

1. Products: Subject to compliance with requirements, provide the following:

   a. "Sure-Seal A": Carlisle Corporation

B. Adhesive: Type recommended by manufacturer for FSR membrane for particular substrate and project conditions, and formulated to withstand min. 60 psf uplift force.

2.3 MISCELLANEOUS MATERIALS FOR FSR:

A. Sheet Seaming System: Manufacturer's standard materials for sealing lapped joints, including edge sealer to cover exposed spliced edges as recommended by manufacturer for FSR system.

B. Flashing Accessories: Types recommended by manufacturer of FSR material, provided at locations indicated and at locations recommended by manufacturer and including adhesive tapes, flashing cements and sealants.

C. Slip Sheet: Type recommended by manufacturer for FSR material for protection of sheet from incompatible substrates.

2.4 INSULATION:

A. General: Thicknesses shown are for thermal conductivity (k-value at 70°F or 24°C) specified for each material. Provide adjusted thicknesses as directed for equivalent use of material having different thermal conductivity; provide appropriate thickness of material when thermal resistance ("R" values) are shown.

B. Polyisocyanurate Board Insulation: Rigid, polyisocyanurate foam core permanently bonded in the foaming process to 7/16-inch waferboard on one side and to a foil facer on the other. Provide thickness as indicated and apply in one layer. Aged thermal value R = 11.1 for nominal 2-inch thick material.

1. Products: Subject to compliance with the requirements provide the following:

a. NRG "Nailboard"; NRG Barriers, Inc.

C. Miscellaneous Insulation Materials:

1. Screws and "tin caps": Type recommended by insulation manufacturer and complying with fire resistance requirements.

2.5 MISCELLANEOUS ROOFING ACCESSORIES:

A. Flashing Material: Manufacturer's standard system compatible with flexible sheet membrane.

B. Metal Flashing: 16oz. lead coated copper.

PART 3 - EXECUTION

3.1 PREPARATION OF SUBSTRATE: Comply with manufacturers' instructions for preparation of substrate to receive FSR system.

3.2 INSTALLATION: Comply with manufacturers' instructions, except where more stringent requirements are indicated.

A. Extend insulation full thickness in two layers over entire surface to be insulated, cutting and fitting tightly around obstructions.

1. Do not install more insulation each day than can be covered with membrane before end of day and before start of inclement weather

2. Adhere insulation to wood roof deck with mechanical fastenings in accordance with the insulation manufacturer's recommendations.

B. FSR Membrane Installation:

1. Cut sheets to maximum size possible, in order to minimize seams and to accommodate contours of roof deck and proper drainage across shingled laps of sheet.

2. Adhesive Adhered FSR: Install membrane by unrolling over prepared substrate, lapping adjoining sheet as recommended by manufacturer. Apply adhesive to surfaces to be bonded and roll FSR into place when adhesive has properly cured. Treat seams with special cement and apply sealant to exposed sheet edges, tapering application as recommended by manufacturer. Install mechanical fasteners, flashings and counterflashings, and accessories at locations and as recommended by manfacturer.

END OF SECTION 07530

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary General Conditions and Division-1 Specification sections, apply to the work of this section.

A. Refer to Section 01030 ALTERNATES for alternate bid items.

1.2 SUMMARY: Extent of steel doors and frames is indicated on the drawings.

1.3 STANDARDS: Comply with Steel Door Institute "Recommended Specifications for Standard Steel Doors and Frames" (SDI-100), and as herein specified.

1.4 SUBMITTALS: Submit shop drawings which show how the manufacturer's products apply to and comply with the requirements of this project as set forth in contract documents.

1.5 RELATED WORK SPECIFIED ELSEWHERE: Finish Hardware in Section 08710.

PART 2 - PRODUCTS

2.1 MATERIALS: Steel doors and frames; Galvanized sheets, ASTM A 525, G 60 hot-dipped zinc coating, mill phosphatized.

2.2 ANCHORS AND ACCESSORIES: As required to accommodate wall conditions. Use galvanized items for units built into exterior walls, complying with ASTM A 153.

2.3 FABRICATION: Fabricate units to be rigid, neat in appearance, and free from defects, warp or buckle. Weld exposed joints continuously, grind, dress and make smooth, flush and invisible.

2.4 PREPARE STEEL DOORS AND FRAMES to receive mortised and concealed finish hardware, including cutouts, reinforcing, drilling and tapping, complying with ANSI 115 "Specifications for Door and Frame Preparation for Hardware".

A. Reinforce units to receive surface-applied finish hardware to be field applied.

B. Locate finish hardware as indicated or, if not indicated, as listed on SDI 100, Table V.

2.5 SHOP PAINT exposed surfaces of doors and frame units, including galvanized surfaces, using manufacturer's standard bake-on rust-inhibitive primer. Dress all welds and abrasions on galvanized frames with 95% zinc rich primer.

2.6 DOORS: Equal to Steelcraft decorat · door, 6 panel, with honeycomb insulated core and 20 ga faces. Stile edges of doors shall be beveled (1/8" in 2"). Top and bottom steel reinforcing channels shall be 14 ga.; hinge reinforcement 8 ga. Hinge backset on doors to be 1/4".

2.7 FRAMES: Comply with SDI-100, Grade II, Model 3, for materials quality, metal gages, and construction details.

A. Provide standard hollow metal frames as made by Steelcraft of set-up and welded construction with corners mitered, and reinforced.

B. Fabricate exterior frames to be from galvanized sheets.

C. Prepare frames to receive 3 silencers on strike jambs of single-swing frames.

D. Provide 26 ga. steel plaster guards or mortar boxes, welded to frame, at back of hardware cutouts where installed in concrete, masonry or plaster openings.

E. Protect inside faces of frames which are placed in plaster or masonry wall construction with high-build fibered asphalt emulsion coating applied in field by erection contractor

PART 3 - EXECUTION

3.1 INSTALLATION: Install hollow-metal units in accordance with manufacturer's instructions and final shop drawings. Fit doors to frames and floors with manufacturer's standard clearances.

END OF SECTION 08110

SECTION 08410 - ALUMINUM ENTRANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary General Conditions and Division-1 Specification sections, apply to the work of this section.

A. Refer to Section 01030 ALTERNATES for alternate bid item.

1.2 SUMMARY:

A. Extent of aluminum entrance work is indicated on drawings.

B. Types of aluminum entrance work required includes:

1. Exterior entrance door.

2. Frames for exterior entrance.

3. Storefront framing system.

1.3 SUBMITTALS:

A. Product Data: Include fabrication methods, finish hardware, accessories and installation recommendations.

B. Shop Drawings: Include elevations, details, hardware mounting heights, anchorages, expansion provisions and glazing details.

1.4 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: 5 years experience in fabrication.

B. Installer's Qualifications: 5-years experience in installation.

C. Design Criteria: Drawings are based on one manufacturer's system. Another manufacturer's system will be acceptable when differences do not detract from the design concept, as judged by Architect.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Aluminum Members: Alloy and temper recommended for strength, corrosion resistance, and application of finish; comply with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate.

B. Fasteners: Aluminum, nonmagnetic stainless steel, or other noncorrosive material. Except for application of hardware, do not use exposed fasteners. For hardware, use Phillips flat-head machine screws; match finish of member or hardware being fastened.

C. Weatherstripping: Replaceable compressible neoprene or molded PVC type gaskets or replaceable wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing as suitable for type of door operation.

D. Glass and Glazing Materials:

1. Door: 3/8" bronze tint safety glass.

2. Transom and Sidelight: 1/4" bronze tint safety glass.

E. Storefront Framing: Inside-outside matched resilient flush-glazed framing and provisions for glass replacement. Shop-fabricate and preassemble. Vista-Wall standard non-thermal break, with bronze anodic finish. Door frame for single acting door with hinges.

F. Stile-and-Rail Type Aluminum Doors: 1-3/4" thick; tubular frame members, with mechanical joints using heavy reinforcing plates and concealed tie-rods or J-bolts. Bronze anodized finish.

1. Design: Thin stile, approximately 1-3/4" width: Vista-Wall "137" thin stile "Ambassador.

G. Hardware: Provide heavy-duty units; finish to match door. Refer to hardware section for items not provided by the manufacturer.

1. Ball-Bearing Butts: 5-knuckle, 2-bearing, steel ball bearing butts sized to comply with ANSI A156.1. Provide 1-1/2 pair.

2. Overhead Concealed Closers: Comply with ANSI A 156.4. Comply with recommendations for closer size. Independently hung, single-acting with concealed arm and track.

3. Door Stop: Floor or wall mounted with integral rubber bumper; comply with ANSI A156.16.

4. Cylinders are specified in the hardware section.

5. Deadlocks: Mortised maximum security type, with minimum 1" long pivoted bolt and stainless steel strike box; comply with ANSI A 156.5. Provide for cylinders on both sides of door.

6. Thresholds: Extruded aluminum in mill finish, with anchors and clips.

2.2 FABRICATION

A. GENERAL: Sizes of units and profile requirements, are indicated on drawings.

B. Prefabrication: Before shipment, complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible. Disassemble only for shipment and installation.

1. Preglaze to greatest extent possible.

2. Do not drill and tap for surface-mounted hardware until installation.

3. Perform fabrication, including cutting, fitting, forming, drilling and grinding to prevent damage to exposed finish surfaces. For hardware, perform prior to application of finishes.

C. Welding: Comply with AWS recommendations; grind exposed welds smooth and restore mechanical finish.

D. Dissimilar Metals: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator.

E. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.

2.3 FINISHES:

A. Color Anodized Finish: NAAMM AA-M12C22A42/A44, Class I.

B. Color: Medium bronze.

PART 3 - EXECUTION

3.1 INSTALLATION: Comply with manufacturer s instructions. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Provide proper support and anchor securely in place. Separate aluminum and other corrodible metal surfaces from sources of corrosion at points of contact with other materials.

3.2 ADJUST operating hardware to function properly.

3.3 CLEAN system promptly after installation.

END OF SECTION 08410

SECTION 08520 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary General Conditions and Division-1 Specification sections apply to the work of this section.

A. Refer to Section 01030 ALTERNATES for alternate bid items.

1.2 SUMMARY:

A. Extent of Aluminum windows required is indicated on the Drawings.

B. Types of Aluminum windows required include thermally improved single hung tilt windows with insulating glass.

C. Window manufacturer shall furnish and factory glaze the sash.

1.3 RELATED WORK SPECIFIED ELSEWHERE: Greenhouse framing and glazing are specified in another Division 8 Section.

1.4 STANDARDS: Comply with applicable requirements for aluminum windows, terminology and standards of performance, and fabrication workmanship specified in ANSI/AAMA 101-85.

1.5 SUBMITTALS:

A. Submit product data, including half-size details of each typical section, showing glazing details. Submit specific information on operating parts, hardware, weatherstripping, finishes for aluminum, preglazed construction and performance.

B. Submit finish samples of 12" long extrusions of typical sections.

C. Submit shop drawings showing elevations, details and anchorages for work not detailed in product data.

PART 2 - PRODUCTS

2.1 WINDOWS:

A. Provide windows as made by Efco Corp., Monett, Mo., Series 3200 Thermal single hung, single tilt, DH-A2.5, with a siliconized polyester baked enamel coating (color as later selected) which has a 15 year warranty against cracking, peeling or loss of adhesion.

2.2 MATERIALS:

A. Aluminum Extrusions: 6063-T5 alloy and temper.

B. Fasteners: Provide aluminum, non-magnetic stainless steel, epoxy adhesive, or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors and other components of window units.

1. Where fasteners screw-anchor into aluminum less than 0.125" thick, reinforce the interior with aluminum or non-magnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.

2. Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

C. Hardware: Provide manufacturer's standard hardware of US 25D nickel bronze alloy of type (operational function) indicated, for required type and grade of window units. Each window shall have:

1. Sash lock: One heavy duty sweep latch HL86.

2. Pull handles: Two pull handles HK25.

3. Balances: Block and tackle type, quantity as required.

D. Weatherstripping: Provide the manufacturer's standard weatherstripping at each edge of each operable sash.

E. Glazing:

1. Glass: one inch thick metal framed insulating glass, exterior pane bronze tint, interior pane clear.

2. Muntins: Provide internal horizontal and vertical muntins as indicated with profile shown.

2.3 FABRICATION:

A. Sizes and Profiles: Required sizes for window units and profile requirements are indicated on the drawings. Provide moulded staff bead on exterior.

B. Thermal-Break Construction: Fabricate aluminum window units with integrally concealed low conductance thermal barrier, located between exterior materials and members exposed on the interior, in a manner that eliminates direct metal-to-metal contact.

C. Provide weepholes and internal water passages to conduct infiltrating water to the exterior.

D. Aluminum Finish: Manufacturer's standard acrylic or polyester, electrostatically applied, baked on enamel coating of color later selected by the Architect; 1.5 mil dry film thickness applied over properly prepared substrate; comply with AAMA 603.8, as applicable.

E. Preglazed Fabrication: Preglaze window units at the factory. Comply with glass and glazing requirements of the "Glass and Glazing" sections of these specifications, and AAMA 101-85.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Comply with manufacturer's specifications and recommendations for installation of window units, hardware, operators, and other components of the work.

B. Set units plumb, level and true to line, without warp or rack of frames or sash.

C. Anchor window units securely in place, with permanent separations to prevent electrolytic corrosion. Seal the entire perimeter of each unit as shown; comply with applicable requirements of the "Joint Sealant" section.

D. Adjust and lubricate operating sash and hardware for proper operation.

E. Clean aluminum surfaces promptly after installation; do not damage protective coating. Repair minor damage to the finish. Clean glass promptly after instal'.tion.

END OF SECTION 08520

SECTION 08530 - GREENHOUSE WINDOW

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work of this section.

A. Refer to Section 01030 ALTERNATES for alternate bid items.

1.2 SUMMARY:

A. Extent of greenhouse window work is indicated on drawings.

B. Type of work is prefabricated aluminum framed ndow panels glazed with insulated safety glass and with power operated window blinds furnished as a complete unit from one source, including installation.

1.3 SUBMITTALS:

A. Product Literature: Submit complete product literature including specifications, product data, recommendations and standard details.

B. Shop Drawings: Submit complete drawings including information not included in manufacturer's standard product data and the following:

Elevations
Sections
Anchors
Hardware
Accessories
Glazing Details

1.4 QUALITY ASSURANCE:

A. Single source responsibility: Provide complete greenhouse window produced by a single manufacturer capable of showing prior production of units similar to those required.

B. Installer: Provide installation by employees of the licensed sales agent specifically approved and trained by the manufacturer for such work employing skilled workmen experienced with similar installations.

C. Warranty: Provide a written 5 year warranty from the manufacturer for all materials and 1 year for labor, agreeing to repair or replace components which fail during the warranty period. Failures include, but are not limited to, failure of seal on insulated glass panels, structural failure, excessive leakage or air infiltration, faulty operation of any parts (including power operated window blinds), and deterioration of metals, metal finishes or other materials beyond normal weathering. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

1.5 PROJECT CONDITIONS: Field measurements: Work with the General Contractor to assure establishment of proper masonry dimensions as the work develops. This will require visits to the job long before windows are delivered.

PART 2 - PRODUCTS

2.1 MANUFACTURER: This specification is based on a greenhouse window by Four Seasons Solar Products Corp. Equal products by other manufacturers may be accepted if in the Architects sole judgement differences do not materially detract from the design concept or intended performance. When substitute items are submitted for approval note in writing all instances where the proposed substitute materials vary from the requirements of this specification.

2.2 MATERIALS

A. Greenhouse Window: Four Seasons System 4.

B. Components:

1. Framing: aluminum Alloy. Structural parts 6005-T5, other parts 6063-T6, polyurethane or equal thermal-break fill material. Finish dark bronze anodized. Framing with integral drainage gutters, external weep holes and built-in shading track.

2. Glazing: Fully tempered flat and curved safety glazing with 7/8-inch thick bronze tint insulating glass factory sealed with "Heat Mirror 44" on roof and "Heat Mirror 66" on

curved and front panels. Setting blocks-90 durometer EPDM. Gasketry - 60-70 durometer EPDM (ASTM D-2240).

3. Fastenings: All stainless steel.

C. Accessories:

1. Shading System: Provide motor operated "window quilt" shades (R=7.7). Furnish shades standard with window manufacturer, pattern and color as later selected.

PART 3 - EXECUTION

3.1 INSPECTION: Inspect masonry opening before and during construction and again before beginning installation. Verify that rough opening is correct, sill is level, and masonry is dry and free of excess mortar, sand and construction debris.

3.2 INSTALLATION:

A. Comply with manufacturer's specifications and published instructions for installation of window unit, shades, operators and other components.

B. Set unit plumb, level and true to line without warp or rack of frames. Provide proper support and anchor securely in place. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with the requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101-85."

C. Set sill members and other members in a bed of compound or with joint fillers or gaskets to provide weathertight construction.

D. Cut slot in masonry and install flexible gable flashing into slot in full bed of calking. Perform work in sufficiently warm temperature to assure proper workability of flashing materials.

3.3 ADJUSTMENTS: Adjust operating items and hardware to provide a tight fit at contact points and at weatherstripping for smooth operation and a weathertight closure.

3.4 CLEANING:

A. Clean aluminum surfaces promptly after installation of window. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealing compounds, dirt and other substances. Lubricate hardware and moving parts.

B. Clean glass of preglazed units promptly after installation of windows. Comply with requirements of Glass and Glazing Section for cleaning and maintenance.

3.5 PROTECTION: Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that except for normal weathering window will be free of damage or deterioration at time of substantial completion.

END OF SECTION 08530

SECTION 08710 - FINISH HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary General Conditions and Division-1 Specification sections, apply to the work of this seciton.

A. Refer to section 01030 ALTERNATES for alternate bid items.

1.2 SUMMARY: Extent of finish hardware is specified and scheduled herein.

A. Aluminum Door hardware generally is specified to be provided with the aluminum door. Cylinders for that door are specified in this Section.

1.3 GENERAL HARDWARE REQUIREMENTS: Acceptable Manufacturers/Products: Products are listed in the schedule by specific reference to manufacturers catalog numbers. Except as otherwise indicated, products of equivalent quality, design and function by other listed manufacturers may be used, subject to approval of Architect.

1.4 SUBMISSIONS:

A. Submit five copies of final hardware schedule organized by "hardware sets", to indicate specifically and completely the product to be furnished for each item required on each door.

B. Furnish templates to each fabricator of doors and frames, as required for preparation to receive hardware.

PART 2 - PRODUCTS

2.1 PRODUCTS/MANUFACTURERS

A. Hinges: Stanley Hardware
(Acceptable substitutions: Hager, McKinley)

B. Locksets: Sargent & Company
(Acceptable substitutions: Corbin, Schlage)

C. Exit Devices: Sargent & Company
(Acceptable substitutions Von Duprin)

D. Closers: Sargent & Company

E. Thresholds: National Guard Products
(Acceptable substitutions Pemko, Reese)

F. Weatherstrip & Door Bottoms: National Guard Products
(Acceptable substitutions Pemko, Reese)

G. Stops 407 1/2B, 438B: H.B. Ives Company
(Acceptable substitutions Glynn-Johnson, Rockwood)

H. Kick plates: 1/8" thick transparent plastic laminate with beveled edges. Plates: 8" high and length be 2" less than door width.

I. Silencers: Provide silencers in metal door frames, unless not permitted for fire rating, or unless bumper-type weatherstripping is provided: 3 per single-door frame, 4 per double-door frame.

2.2 FINISHES: The finish of all exterior hinges, locksets, exit devices, pulls, push plates and stops shall be US10B. The finish of interior hinges shall be US10A. Door closers shall have a sprayed lacquer finish to simulate US10B.

2.3 FASTENERS: Provide hardware manufactured to conform to published templates, of the type intended for use with each particular item, and suitable for anchorage in the material to which each item is fastened. Do not provide hardware which has been prepared for self-tapping sheet metal screws except as specifically indicated. Finish exposed (under any condition) fastenings to match hardware finish, or, if exposed in surfaces of other work, to match finish of such other work as closely as possible.

2.4 KEYING AND KEYS: All locksets shall have six-pin cylinders keyed and masterkeyed to the Owners requirements. Provide two keys with each lock or cylinder and six of each masterkey.

2.5 CONSTRUCTION KEYS: All locksets shall be Construction Masterkeyed and permanent keys delivered directly to Owner. Provide 3 Construction Masterkeys for General Contractor use.

2.6 SCHEDULE:

A. Hardware Set No. 1.

3-0 x 7-0 Aluminum door. Aluminum Frame

LH

2 Cylinders
Remove cylinders supplied with door and replace with new ones, keyed as directed by Owner.

B. Hardware Set No. 2

3-0 x 7-0 Hollow-Metal Door. Hollow-Metal Frame

LHRB

1-1/2 pr hinges FBB191 4-1/2 x 4-1/2 US10B
1 Exit Device 6910 x 813 FLW-DT 10B
1 Closer EB 1250-P9
1 Stop Ives #445 B10B
1 Kickplate 8 x 34
1 Threshold 425 DKD x 36"
1 Set Weatherstrip PF181-17 Feet
1 Door Bottom EPDM - 36"

END OF SECTION 08710

SECTION 09250 - GYPSUM DRYWALL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary General Conditions and Division-1 Specification sections, apply to the work of this section.

A. Refer to Section 01030 ALTERNATES for alternate bid items.

1.2 SUMMARY: Extent of gypsum drywall construction required is indicated on the drawings.

1.3 REFERENCE STANDARDS:

A. Gypsum Board Standard: ASTM C 840.

B. Metal Support Standard: ASTM C 754.

PART 2 - PRODUCTS

2.1 SUPPORT MATERIALS:

A. Studs and Runners: ASTM C 645, 0.0329" (20 ga.) base metal thickness unless otherwise indicated.

1. Wood studs may be used at Contractors option (See Section 06100)

B. Furring Members: ASTM C 645, 0.0329" (20 ga.) base metal thickness, hat-shaped.

2.2 DRYWALL MATERIALS:

A. Exposed Gypsum Board: ASTM C 36.

1. Regular, unless otherwise indicated.

2. Long Edges: Standard taper plus special rounded or beveled-edge profile.

3. Thickness: 5/8", unless otherwise indicated.

2.3 TRIM ACCESSORIES: Provide mfr's. standard metal trim accessories, of the beaded type with face flanges for concealment in joint compound. Provide corner beads, L-type edge trim beads, U-type trim beads, special L-kerf-type edge trim-beads, and one piece control beads.

2.4 GYPSUM BOARD FASTENERS: Type recommended by gypsum board mfr., except as otherwise indicated.

2.5 JOINT TAPE: ASTM C 475, paper reinforcing tape.

2.6 JOINT COMPOUND: ASTM C 475, ready-mixed vinyl-type for interior work. Provide a single multi-purpose compound for 3 coats of compound application.

PART 3 - EXECUTION

3.1 SUPPORT SYSTEM:

A. Install steel studs with top runner tracks anchored to substrates.

B. Install framing, runners, furring, blocking and bracing at openings and terminations in gypsum drywall and where required for support of other work which cannot be adequately supported on gypsum board alone.

3.2 DRYWALL INSTALLATION AND FINISHING:

A. Install gypsum boards in lengths and directions which will minimize number of end joints. Install boards with edges perpendicular to supports, with end joints staggered over supports, except where recommended in a different arrangement by mfr.

B. Form "Floating" construction for gypsum boards at internal corners in wood construction, except where special isolation or edge trim is indicated.

C. Screw gypsum board to wood supports.

D. Screw gypsum board to metal supports.

3.3 DRYWALL FINISHING: Except as otherwise indicated, apply joint tape and joint compound at joints (both directions) between gypsum boards. Apply compound at accessory flanges, penetrations, fasteners heads and surface defects.

A. Install compound in 3 coats (plus prefill of cracks where recommended by mfr.); sand after last 2 coats.

END OF SECTION 09250

SECTION 09300 - TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary General Conditions and Division-1 Specificatio sections, apply to the work of this section.

A. Refer to Section 01030 ALTERNATES for alternate bid items.

1.2 SUMMARY: Quarry tile flooring is required. The extent of the work is shown on the drawings. Sealing expansion and other joints is part of the work of this section

1.3 STANDARDS: Mortar and grout materials and installation standards of the American National Standards Institute (ANSI) and Standard Specification for Ceramic Tile ANSI A137.1 apply to the work, except as otherwise ind'cated.

1.4 SUBMITTALS: With manufacturer's product data and installation instructions for tile work, submit 1 sample of each type, color, and texture of tile.

1.5 PROJECT CONDITIONS: Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

PART - 2 PRODUCTS

2.1 MATERIALS:

A. Tile: American-Olean 'Primitive Encore' Tile #806 Blue, size and pattern as indicated.

B. Glass Mesh Mortar Units: "Wonder-Board" by Modulars Incorporated.

C. Membrane: 15 pound roofing felt or 4-mil polyethylene film.

D. Metal lath: Galvanized 2.5 or 3.4 lbs/sq.yd. expanded metal lath. Self furring (Do not use ribbed lath).

E. Portland Cement: ASTM C-150 Type 1.

F. Lime: ASTM C-206 type S or ASTM C-207 type S.

G. Sand: ASTM C-144.

H. Latex-Portland Cement Mortar: ANSI A118.4: Prepackaged dry mortar mix with re-emulsifiable powder as additive, for mixing with water only.

I. Latex-Portland Cement Grout: ANSI A118.6: Prepackaged dry grout mix with re-emulsifiable powder as additive, for mixing with water only.

J. Sealant: Multi-part pourable urethane. Type M; Grade P; Class .25, Uses "T", "M", "A" and as applicable to joint substrates indicated, "O", equal to NR-200 "Urexpan" by Pecora.

2.2 MATERIALS PREPARATION: For cement mortar installation follow requirements of TCA Method W 231-88.

PART 3 - EXECUTION

3.1 EXAMINE surfaces to receive tile work and conditions under which tile will be installed. Do not proceed until surfaces and conditions comply with requirements indicated in referenced tile standard.

3.2 INSTALLATION:

A. ANSI Tile Installation Standard: Comply with applicable parts of ANSI A-108 Series.

B. TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation".

1. Use method F144-88 for Interior Wood subfloor with glass-mesh mortar units and latex-Portland Cement.

2. Use method S151-88 for Wood Stairs.

C. Jointing Pattern: as indicated.

D. Expansion Joints: Locate expansion joints and other sealant filled joints where indicated. Do not saw cut joints. Prepare joints and apply sealants to comply with requirements of referenced standards and sealant manufacturer.

E. Install glass-mesh mortar units to comply with manufacturer's directions.

G. Grout tile with latex Portland Cement grout to comply with ANSI A108.10.

3.3 CLEANING AND PROTECTION: Clean tile in accordance with applicable ANSI standard for type of tile and method of installation used and manufacturer's instructions. Apply heavy kraft paper or other heavy protective covering to prevent surface damage.

END OF SECTION 09300

SECTION 09510 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary General Conditions and Division-1 Specification sections, apply to the work of this section.

A. Refer to Section 01030 ALTERNATES for alternate bid items.

1.2 SUMMARY:

A. Extent of acoustical ceilings is shown on drawings.

B. Type of ceilings is tile adhesively applied to substrate.

1.3 STANDARDS:

A. Acoustical materials: FA SS-S-118.

B. Surface Burning Characteristics: Flame spread: 25 or less; smoke developed: 50 or less; per ASTM E 84.

1.4 SUBMITTALS: Two samples at least 6" x 4" of each type of acoustical unit.

PART 2 - PRODUCTS

2.1 CEILING TILES: U.S. Gypsum "Acoustone" tile, "Glacier" pattern, 12" x 12" x 3/4", regular, unbacked, square edge, white.

2.2 TILE ADHESIVE: ASTM D 1779, type recommended by tile manufacturer, bearing UL-Label for Class 0-25 flame spread.

PART 3 - EXECUTION

3.1 INSTALLATION: Apply tile in accordance with tile and adhesive manufacturer's instructions and as follows:

A. Brush off loose dust from tile back surfaces.

B. Prime back of tiles with a 2-3 inch circle near each corner by buttering a very thin coat of adhesive with trowel blade at 45° angle.

C. Apply a walnut-sized dab of adhesive to each of the four circles.

D. Press tile firmly in place.

E. Insert fiber splines in kerfs at corners of tiles.

3.2 CLEANING: Clean exposed surface of tile complying with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09510

SECTION 09900 - PAINTING

PART 1 -GENERAL

1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary General Conditions and Division-1 Specification sections, apply to the work of this section.

A. Refer to Section 01030 ALTERNATES for alternate bid items.

1.2 SUMMARY: Extent of painting work is indicated on drawings and schedules, and as herein specified.

1.3 DESCRIPTION OF WORK: Painting and finishing of interior and exterior items and surfaces, unless otherwise indicated.

A. Includes field painting of bare and covered pipes and ducts, hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work.

B. Paint exposed surfaces, except as otherwise indicated. Colors will be selected by Architect from standard colors available for the coatings required.

1.4 WORK NOT INCLUDED: Unless otherwise indicated, shop priming of ferrous metal items and fabricated components are included under their respective trades. Pre-finished items, such as metal toilet partitions, acoustic material and the like, are not included. Unless otherwise indicated, painting is not required on surfaces of concealed areas. Finished metals such as anodized aluminum, stainless steel, bronze and similar metals will not be painted. Do not paint any moving parts of operating units, or over any equipment identification, performance rating, name or nomenclature plates or code-required labels.

1.5 DELIVERY AND STORAGE: Deliver materials to job site in new, original, and unopened containers bearing manufacturer's name, trade name, and label analysis. Store where indicated in accordance with manufacturer's instructions.

1.6 JOB CONDITIONS: Do not apply paint in snow, rain, fog or mist or when relative humidity exceeds 85%. Do not apply paint to damp or wet surfaces.

1.7 PROTECTION: Protect work of other trades. Correct any painting

related damages by cleaning, repairing or replacing, and refinishing, as directed by Architect.

1.8 COORDINATION: Provide finish coats which are compatible with prime paints used. Provide barrier coats over incompatible primers where required. Notify Architect in writing of anticipated problems using specified coatings with substrates primed or previously finish painted by others.

1.9 SUBMISSIONS:

A. Colors: Prior to starting work, submit manufacturer's chips of available standard colors for paints to be used so that a timely selection can be made.

PART 2 - PRODUCTS

2.1 MATERIAL QUALITY:

A. Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.

1. Proprietary names used to designate colors or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers. The following named materials are by Pratt & Lambert unless specified otherwise.

2. Manufacturer's products which comply with coating qualitative requirements of applicable Federal Specifications, yet differ in quantitative requirements, may be considered for use when acceptable to Architect. Furnish material data and manufacturer's certificate of performance to Architect for any proposed substitutions.

B. Provide undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

2.2 PAINT SYSTEMS: Provide following paint systems for various substrates, as indicated.

A. EXTERIOR:

1. Metal:

1 coat P & L EFFECTO "Rust Inhibiting Primer"
2 coats P & L EFFECTO "Enamel"

2. Wood Trim:

1 coat P & L Permalize "Exterior Primer"
2 coats P & L EFFECTO "Enamel

3. Brick: (Building walls only)

1 Coat HYDROZO "Clear Double 7"
Apply in strict accordance with manufacturer's published instructions.

B. INTERIOR:

1. Gypsum Wallboard

1 coat Merrifield "Primer Sealer"
2 coats P & L "Pro-Hide Latex Satin Enamel"

2. Wood Trim, Painted

1 coat P & L "Interior Trim Primer"
1 coat P & L "Vitralite Undercoating"
1 coat P & L "Vitralite Enamel Eggshell"

3. Wood Beams, Transparent Finish
Fill all voids.

1 coat P & L "Tonetic Wood Stain"
1 coat P & L "38 Clear Finish" Satin.

4. Metal, Painted

1 coat P & L "Interior Trim Primer."
1 coat P & L "Vitralite Undercoating"
1 Coat P & L "Vitralite Enamel Eggshell"

PART 3 - EXECUTION

3.1 SURFACE PREPARATION: Perform preparation and cleaning procedures in strict accordance with coating manufacturer's instructions for each substrate condition.

A. Remove hardware and accessories, machined surfaces, plates, lighting fixtures and similar items in place and not to be finished-painted or provide surface-applied protection. Re-install removed items and remove protective coverings at completion of work

3.2 MATERIAL PREPARATION: Mix, prepare, and store painting and finishing materials in accordance with manufacturer's directions.

3 3 APPLICATIONS: Apply painting and finishing materials in accordance with manufacturer's directions. Use applicators, and techniques best suited for materials and surfaces to which applied.

A. Apply additional coats when undercoats, stains, or other conditions show through final paint coat, until paint film is of uniform finish, color and appearance.

B. Finish exterior doors on tops, bottoms and edges same as exterior faces, unless otherwise indicated.

C. Sand lightly between succeeding enamel or varnish coats.

D. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise specified.

E. Apply prime coat to material which is required to be painted or finished, and which has not been prime coated by others.

F. Apply each material at not less than the manufacturer's recommended spreading rate, to provide a total dry film to thickness of not less than 4.0 mils for entire coating system of prime and finish coats for 3-coat work.

3.4 COMPLETE WORK: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.5 CLEAN-UP AND PROTECTION:

A. Clean-Up:

1. During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day.

2. Upon completion of painting work, clean window glass, finish hardware and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

B. Protection:

1. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

2. Provide 'Wet Paint' signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

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

END OF SECTION - 09900

SECTION 15100

MECHANICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Work Included

1. Furnish all labor, materials, equipment, transportation and perform all operations required to install a complete heating and ventilating system for the Sunroom Addition, in accordance with these specifications and applicable drawings. Perform demolition and removal as required.

2. Work to be performed shall include, but is not limited to the following:

a. Provide and install gas fired combination heating and cooling, rooftop unit and duct system indicated on drawings

b. Gas pipe, valves and fittings

c. Sheetmetal and duct liner

d. Temperature control

e. Tests and balance

3. Specifications and accompanying drawings do not indicate every detail of 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.

4. Before submitting proposal, Contractor shall familiar with all conditions. Failure to do so shall not relieve Contractor of responsibility regarding satisfactory installation of the system.

B. Related Work Described Elsewhere (See also Para. 16 of Supplementary Conditions)

1. Cutting and patching

2. Electrical conduit and wiring, except as noted below

3. Roofing, curb openings and framing of openings

4. Setting of sleeves in masonry work (sleeves provided by HVAC Contractor). See Section 01005: "Summary of Work"

5. All finish painting

C. HVAC Electrical Work

1. Provide and erect all motors, temperature controls, limit switches as specified. All other switches, fused switches, outlets, motor starters required and all necessary wiring and fuses to properly connect and operate all electrical equipment specified shall be furnished and installed under Electrical Section 16000.

2. All electric wiring for temperature control system shall be furnished and installed by HVAC Control Contractor and installed in accordance with Electrical Section 16000.

3. Rooftop HVAC Unit

a. Power wiring and disconnect switch for HVAC unit on roof shall be furnished and installed by Electrical Contractor.

b. All other wiring at HVAC Unit including economizer, oversize motor, anti-short cycling timer, remote potentiometer, and remote sensor shall be furnished and installed by HVAC Contractor, in accordance with Electrical Section 16000.

PERMITS

This Contractor shall apply for, obtain, and pay for all permits and inspections required by law and notify proper authorities in ample time for such inspections to be made.

1.4 QUALITY ASSURANCE

A. Qualification of Personnel

Use sufficient qualified personnel, 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.

1.5 MATERIALS

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 same manufacturer, unless specified otherwise.

A. Any proposal for substitution of HVAC equipment shall be made in writing. Submit full details for consideration and obtain written approval of the Architect. Architect's decision on acceptability of substitute materials shall be final.

B. Approval by Architect for such substitution shall not relieve Contractor from responsibility for a satisfactory installation and shall not affect guarantee covering all parts of work.

C. Any material or equipment submitted for approval which are arranged differently or 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. Any additional cost resulting from the substitution of equipment shall be paid by this Contractor.

1.6 SHOP DRAWINGS

A. As soon as possible after award of Contract, before any material or equipment is purchased, Contractor shall submit to the Architect eight (8) copies of shop drawings for approval. Shop drawings shall be properly identified and described in detail the material, equipment or fixtures.

B. Submittal review must be obtained on the following items:

1. Gas, pipe, valves, and fittings including hangers
2. Rooftop HVAC unit and all accessories
3. Ductwork and duct liner
4. Grilles, registers & diffusers
5. Temperature controls including control schematic diagram with sequence of operation; a complete wiring diagram showing all components integrated into one drawing
6. Duct flexible connections

1.7 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.

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.

1.8 AS-BUILT DRAWINGS

Keep in good condition at the job, apart from all other prints used in actual construction, one complete set of all blue 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. If a complete record of changes is not made by the Contractor, a record shall be made by the Engineers, and the cost of the record shall be paid for by this Contractor.

1.9 MAINTENANCE MANUAL

A. Upon 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. Prepare manuals in durable plastic binders approximatley 8-1/2" by 11" inches in size with at least the following:

1. Identification on, or readable through, the front cover starting general nature of the manual.

2. Neatly typewritten index near the front of the manual, furnishing immediate information as to location in the manual of all emergency data regarding the installation.

3. Complete instructions regarding operation and maintenance of all equipment involved.

4. Control schematic and wiring diagram.

5. Complete nomenclature of all replaceable parts, their part numbers, current cost, and name and address of nearest vendor of parts.

6. Copy of all guarantees and warrantees issued.

7. Where contents of manuals including manufacturer's catalog pages, clearly indicate the precise item included in this installation and delete, or otherwise clearly indicate, all manufacturers' data with which this installation is not concerned.

B. In addition to above, provide two (2) binders, properly identified, each containing a copy of all approved shop drawings and catalog cuts.

1.10 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 Contractor at no extra cost to the Owner.

1.11 INSURANCE

This Contractor shall purchase and maintain all Workmen's Compensation Insurance, Public Liability and Property Damage

Insurance during the progress of the work and until completion and acceptance of the entire project by the Owner in the amounts as specified in the Supplementary General Conditions.

1.12 GUARANTEE

This Contractor shall guarantee all materials and workmanship furnished, including sub-contractors, to be free from all defects for a period of 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.

PART 2 - EXECUTION

2.1 SURFACE CONDITIONS

A. Inspection

1. Prior to all work of this Section, carefully inspect 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 HVAC 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, notify Architect immediately.

2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

C. Caution: Do not install gas piping sleeves in existing or new walls or partitions without first coordinating with General Contractor. HVAC Contractor must comply with requirements of Section 01005: "Summary of Work".

2.2 INSTALLATION OF PIPING AND EQUIPMENT

A. General

1. Install gas piping per Section 15488: "Natural Gas Piping Systems".

2. Inspect each piece of pipe, tubing, fittings, and equipment for defects and obstructions; promptly remove all defective materials from the job site.

3. 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.

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

2.3 CLOSING IN UNINSPECTED WORK

A. General

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

B. Noncompliance

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 and approved, make all repairs and replacements with materials necessary for approval by the Architect and at no additional cost to the Owner.

2.4 TEMPORARY HEATING

See Section 01500: "Temporary Work"

2.5 CLEANING

Prior to acceptance of the buildings, thoroughly clean all exposed casings of the Heating and Ventilating installation, removing all labels and all traces of foreign substance. Vacuum and clean inside of all unit ventilators and cabinet unit heaters.

2.6 INSTRUCTIONS

On completion of the job, the Contractor shall provide a competent technician to throughly 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.

2.7 EQUIPMENT IDENTIFICATION

A. Identify new gas piping with Seton mark pipe markers by Seton Name Plate Corporation. Marker shall snap completely around pipe and be visible from all directions. Marker shall include both identification and direction of flow.

B. Tag all new gas valves (if not tagged by valve manufacturer) with 1-1/2" round brass tags and #6 bead chains.

C. Identify damper open position of remote potentiometer as follows:

Position of Damper	Identification
Closed	No Ventilation
10% Open	Normal Ventilation
Half Open	High Ventilation
Full Open	Maximum Ventilation

END OF SECTION 15100

SECTION 15488

NATURAL GAS PIPING SYSTEMS

PART I - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with NFPA 54 where applicable. Base pressure rating on natural gas system maximum design pressures. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in natural gas systems. Where more than one type of materials or products are indicated, selection is Installer's option.

1.3 QUALITY COMPLIANCE

ANSI Compliance: Comply with applicable provisions of ANSI B31.2.

NFPA Compliance: Comply with applicable provisions of NFPA 54.

Utility Compliance: Comply with requirements of Northern Utilities, Inc.

Submittals: Submit manufacturer's technical product data, assembly-type shop drawings and maintenance data.

PART 2 - PRODUCTS

2.1 GAS SERVICE PIPING

A. All Pipe Sizes: Black steel pipe; Schedule 40; wrought-steel buttwelding fittings.

2.2 BUILDING DISTRIBUTION PIPINGS

A. Pipe Size 2" and Smaller: Black steel pipe; Schedule 40; malleable-iron threaded fittings.

2.3 PIPING SPECIALTIES

A. Escutcheon Plates: Install on each pipe penetration exposed to view in occupied spaces.

B. Sheet-Metal Pipe Sleeves: Install on each pipe penetration through interior partitions and ceilings.

C. Cast-Iron Pipe Sleeves: Install on each pipe penetration through exterior walls or footings, both above and below grade.

D. Steel Pipe Sleeves: Install on each pipe penetration except as otherwise indicated.

E. Sleeve Seals: Install in sleeves in foundation walls below grade and in exterior walls; either calked lead and oakum or modular mechanical rubber link seals.

2.4 SUPPORTS AND ANCHORS

A. General: Provide factory-fabricated supports and anchors complying with MSS SP-69. Install, complying with MSS SP-89.

B. Gas Cocks:

C. Gas Cocks 2" and Smaller: 150 psi non-shock WOG, bronze straightway cock, flat or square head, threaded ends.

D. Manufacturers: DeZurik; Jenkins; Lunkenheimer; NIBCO; Powell; Rockwell; Stockham or Walworth.

E. Install at connection to gas train for each gas-fired equipment item; on branches and risers as indicated.

PART 3 - EXECUTION

3.1 GENERAL

A. No person other than an authorized employee of Northern Utilities, Inc., shall repair, alter, or make connections to a gas pipe upstream of the meter or restore gas service to the pemises.

B. The Installer is responsible for his own work, including proper sizing, proper materials, supports and testing.

C. Piping Certificate, Form 1-79 PAL, available from Northern Utilities, Inc., must be submitted to Northern Utilities, inc., before gas service will be activated to any location where:

(a) a new piping system is installed

(b) addition or repairs to an existing piping system are made

(c) a piping system has been exposed to fire

(d) new appliance is installed

3.2 GAS SERVICE

A. General: Consult with Northern Utilities, Inc., as to extent of it's work, costs, fees and permits involved. Pay such costs and fees; obtain permits.

3.3 EQUIPMENT CONNECTIONS

A. General: Connect gas piping to each gas-fired equipment item with drip leg and shutoff gas cock. Comply with equipment manufacturer's instructions.

3.4 PIPING TESTS

A. Test natural gas piping in accordance with NFPA 54 and Northern Utilities, Inc., requirements.

3.5 PIPING INSTALLATION

1. Install natural gas piping in accordance with applicable codes and Northern Utilities, Inc., requirements.

2. Use sealants on metal gas piping threads which are chemically resistant to natural gas. Use sealants sparingly, and apply to only male threads of metal joints. Pipe joint compound shall be used on all threaded joints.

3. Remove cutting and threading burrs before assembling piping.

4. Do not install defective piping or fittings. Do not use pipe with threads which are chipped, stripped or damaged.

5. Plug each gas outlet, including valves with threaded plug or cap immediately after installation and retain until continuing piping or equipment connections are completed.

6. Ground gas piping electrically and continuously within project, and bond tightly to grounding connection.

7. Install drip-legs in gas piping at each riser at point where it is joined to horizontal run of pipe and where required by code or regulation.

8. Install "Tee" fitting with bottom outlet plugged or capped at bottom of pipe risers.

9. Use dielectric unions where dissimilar metals are joined together.

10. Install piping with 1/64" per foot (1/8%) downward slope in direction of flow.

11. Install piping parallel to other piping, but maintain minimum of 12" clearance between gas piping and steam or hot water piping above 180oF; between any gas piping and any other hot surface such as breeching.

12. No supply run to be smaller than 3/4" ID.

13. All material to be new and unused when piping is to be concealed.

14. Metallic pipe and fitting threads shall be taper threads and shall comply with the standard for pipe threads. General purpose (inch) ANSI/ASME B 1.20.1.

15. When installing gas piping which is to be concealed, the following shall not be used: Unions, tubing, fittings, threads, right and left couplings, bushings and swing joints made by combinations of fittings. Only elbows, tees and screw couplings are approved for use in concealed piping.

16. Piping passing through concrete, brick, concrete block, walls or floor is to be sleeved or protected from corrosion.

17. Piping in floors is to be protected from corrosion.

18. Piping underground, beneath buildings is prohibited.

19. Piping is not to be embedded in concrete floor.

20. Drop pieces are to be run full size to the appliance. Any reduction in the pipe size is to be done as close to the appliance as possible.

21. Prohibited Locations: Gas piping inside a building shall not be run in or through a circulating air

duct, clothes chute, chimney or gas vent, ventilating duct, dumb waiter, elevator shafts or underneath buildings.

22. When any other fuel gas is to be interconnected with the natural gas system, Northern Utilities, Inc., should be contacted to advise the proper method.

23. Prohibited Concealed Piping

(a) Concealed gas piping shall not be located in solid partitions (concrete or cinder block). Tubing shall not be run in hollow walls or partitions unless protected against physical damage.

(b) Concealed gas piping shall not be run horizontally through hollow walls or partitions.

(c) Valves, cocks or any shutoff devices shall not be installed in concealed gas piping.

3.6 APPLIANCE INSTALLATION

A. All appliances will be installed in accordance with manufacturer's recommendations. The recommendations will appear on the name plate or on separate instructions which accompany the appliance. This information will list the minimum clearance to combustible material and other information required for proper installation.

B. A separate shutoff will be installed in an accessible location at each appliance.

3.7 TESTING

A. Every new or enlarged system of gas piping must be tested and the proper completed form submitted to Northern Utilities, Inc., (Piping Certificate 1-79 PAL) before the gas will be turned on.

B. Testing for Tightness: OXYGEN SHALL NOT BE USED AS A TESTING MEDIUM. Note: A proper test cannot be made with appliances connected. This could also result in expensive damage to the controls on the appliance. The gas meter must also be isolated from the section being tested, as pressure back against the meter will cause extensive internal damage.

C. Test Presssure: The minimum test pressure for low pressure delivery in concealed gas piping systems (below 1/4 psi) shall be no less than 25 psig for a time period

of one hour. The minimum test pressure for high [illegible] delivery systems (above 1/4 psi) shall be no le[illegible] 65 psig for one hour for piping under 2". 100 ps[illegible] piping above 2" or where pipe is welded. During [illegible] pressure test, all joints shall be tested with a soap water solution. Any leaks found will be repaired [illegible] system again tested.

D. After a successful pressure test, the piping can connected to the meter and the appli[illegible]e connected the piping system.

E. All outlets including those with a shutoff valve, sh[illegible] be securely closed gas-tight with a plug or [illegible] threaded. Any pipe left temporarily shal' be plug[illegible] or capped gas-tight. If flanged, a blind flange and [illegible] gasket must be installed.

END OF SECTION 15488

SECTION 15500 - WET AUTOMATIC FIRE SPRINKLER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary General Conditions and Division-1 Specification sections, apply to the work of this section.

A. Refer to Section 01030 ALTERNATES for alternate bid items.

1.2 SUMMARY: The extent of the automatic sprinkler work is to design and install revisions to the existing wet system and extend it into the new work in conformance with the requirements of NFPA 13 and the Insurance Underwriters.

1.3 EXISTING CONDITIONS:

A. Visit the site and become thoroughly familiar with the existing system prior to preparation of Shop Drawings.

B. The existing system is understood to have been installed by Automatic Sprinkler Corp. of America, 78 Pleasant Ave., South Portland, (767-2166).

1.4 CODES AND STANDARDS:

A. Install automatic sprinklers in strict accordance with the requirements of NFPA 13, "Installation of Sprinkler Systems", current edition.

B. Submit plans to and have them approved by The Regional Fire Insurance Rating Office. All record copies of the drawings for this work shall bear this stamp of approval.

1.5 SUBMITTALS: Submit shop drawings showing layout of sprinkler system indicating all components required for a complete system and bearing required approvals.

1.6 CHANGES IN WORK: Should changes occur in the scope of the work determine the extent of the changes required in cooperation with the Architect and the Contractor. Do not perform changes in work until authorized to do so by a properly signed Change Order.

1.7 LAYOUT: Plan work so that sprinkler heads will be located to be attractive in relation to other work by avoiding conflict with other work and using symmetrical placement and even spacing. If

exposed piping cannot be avoided run it as inconspicuously as possible.

1.8 QUALITY ASSURANCE:

A. Installers Qualifications: A firm with not less than three years successful experience in the design and installation of wet automatic sprinkler systems.

PART 2 - PRODUCTS

2.1 MATERIALS: Provide all new materials of the best quality meeting the requirements of the above referenced standards.

A. Sprinkler heads: In exposed locations use flush concealed sprinkler heads with white finish.

B. Areas subject to freezing: In the crawl space, vestibule, and other areas subject to temperatures below 32 degrees F install an anti-freeze solution in the sprinkler piping.

PART 3 - EXECUTION

3.1 INSTALLATION: Change existing piping as necessary to accomodate new work. Conceal piping in new work wherever possible. Install in accordance with requirements of NFPA 13.

3.2 COOPERATION: Cooperate with electrical and other mechanical trades in layout and installation of piping and sprinkler heads.

3.3 CLEAN-UP: Remove from the site all pipe and fittings which have been discontinued or are not necessary in the work. At the completion of the work remove from the site all surplus material, scrap, packing, tools and waste.

END OF SECTION 15500

SECTION 15771

ROOFTOP HEATING AND COOLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SCOPE

Provide factory-assembled and tested rooftop unit as indicated, designed for roof and consisting of compressor, condenser, evaporator coil, condenser and evaporator fans, refrigeration and temperature controls, filters, and dampers. Provide capacities and electrical characteristics as scheduled.

1.3 QUALITY COMPLIANCE

A. ARI Compliance: Test and rate rooftop unit in accordance with ARI 210 and 360; sound test and rate unit in accordance with ARI 270 and provide Certified Ratings Seal.

B. ASHRAE Compliance: Construct refrigerating system in accordance with ASHRAE 15. Provide EER not less than prescribed by ASHRAE 90A.

C. UL Compliance: Provide rooftop unit which is designed, manufactured, and tested in accordance with UL requirements. Unit shall have UL label.

D. AGA Compliance: Construct gas-fired furnace section in accordance with AGA safety standards and provide AGA label on unit.

E. Submittals: Submit manufacturer's technical product data, assembly-type shop drawings, wiring diagrams, and maintenance data.

F. Special Project Warranty: Extend warranty to 5-years for compressor(s) and heat exchanger.

G. Space Availability: Unit must fit within space made available for it as shown on drawings. Space available as shown are maximum, including accessory economizer and casings. Supply and return orientation must be as shown and not reversed.

H. Manufacturers: One of the following:

The Trane Company
Carrier Corporation
McQuay Group

PART 2 - PRODUCTS

2.1 ROOFTOP UNIT

A. Casing: Provide manufacturer's standard casing construction arranged for dedicated downflow, corrosion protection coating, and exterior finish. Provide removable panels and/or access doors for inspection and access to internal parts. Insulate casing with 1" thick minimum thermal insulation. Provide knockouts for electrical and piping connections. Provide condensate drain connection.

B. Evaporator Fan: Provide forward-curved, centrifugal, belt-driven fan with adjustable sheave or direct-driven fans; and permanently lubricated motor bearings.

C. Condenser Fan: Provide propeller-type, direct-driven fan with permanently lubricated bearings.

D. Coils: For evaporator and condenser, provide non-ferrous construction with aluminum plate fins mechanically bonded to seamless copper tubes; with brazed tubing joints.

E. Compressors: Provide serviceable, semi-hermetic, or fully hermetic compressors, in accordance with manufacturer's published technical data. Provide vibration isolators and crankcase heaters.

F. Safety Controls: Provide the following controls:

1. Evaporator defrost control
2. High pressure cutout
3. Low pressure cutout
4. Compressor motor overload protection

G. Heat Exchangers: Provide natural gas fired drum and tube heat exchanger with aluminized steel and stainless steel components.

1. Ignition: A forced combustion blower shall supply premixed fuel to burner ignited by a pilotless hot surface ignition system. A negative pressure gas valve shall require blower operation to initiate gas flow.

2. Control: On initial call for heat, combustion blower shall purge heat exchanger for 45 seconds before ignition. After three agnition attempts, and burner is not lit, entire heating system shall be locked out until reset manually at thermostat.

H. Accessories: Provide the following accessories as indicated and/or scheduled:

1. Curb: Provide insulated roof curb under unit, constructed in accordance with NRCA Standards. Provide seal strip between curb and unit, and wood nailer for flashing.

2. Low Ambient Control: Provide head pressure control designed to operate at temperatures down to 0°F. (-18°C.).

3. Thermostat: Programmable Electronic Night Setback type with cooling setup and heating setback from an internal 7-day, 5-1-1 programming capability. Thermostat shall have digital display of time, day, temperature, program status and active stage. Unit shall have continuous or timed override feature and with up to four temperature adjustments per day; as sell as choice of automatic or manual changeover, minimum on-off times, 7-day battery back up, low battery warning and 6-minute equipment lockout for power outages over 1/2 second. Provide with remote sensor.

4. Economizer and Control: Provide economizer and control factor installed consisting of return and outside air dampers, motor operator and outside air filter. Fully modulating electric control system with enthalpy control, and adjustable mixed-air thermostat. Design system for 100% outside air capability and minimum position setting, preset linkage and wiring harness with plug. Provide

automatic changeover through adjustable enthalpy control device. Provide barometric relief.

5. Remote Potentiometer for minimum outside air adjustment.

6. Anti-Short Cycling Timer: Timed off to provide minimum of five minutes off between compressor cycles.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install rooftop heating and cooling unit in accordance with manufacturer's installation instructions. Install unit plumb and level, firmly anchored in location indicated, and maintain manufacturer's recommended clearances.

B. Support: Install unit on roof curb, in accordance with National Roofing Contractor's Association (NRCA) installation recommendations.

C. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.

1. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-16 sections. Do not proceed with equipment start-up until wiring installation is acceptable to Equipment Installer.

D. Ductwork: Refer to Division-15 Section 15841: "Low Pressure Ductwork and Accessories". Connect supply and return ducts to unit with flexible duct connections. Provide transitions to exactly match unit duct connection sizes.

E. Gas Piping: Refer to Division-15 Section 15488: "Natural Gas Piping Systems". Connect gas piping to unit gas train with shutoff cock and drip leg.

F. Start-up rooftop heating and cooling unit in accordance with manufacturer's start-up instructions. Test controls