Chemical	Results
Acetic Acid 5%	No Effect
Acetic Acid 10%	Ok 3 days then very slow
Acetone	Ok 3 days then slight deterioration
Ammonium Hydroxide 10%	No Effect
Blood	No Effect
Boric Acid	No Effect
Brake Fluid	Very minor swelling over 30 days
Calcium Chloride	No Effect
Carbolic Acid	Ok 2 days then slow dissolve
Acid 5%	No Effect
Detergent Solution	No Effect
Gasoline	No Effect
Hydrochloric Acid 10%	No Effect
Jet Fuel	No Effect
Lactic Acid 5%	No Effect
Methanol	Ok 3 days then Minor surface attack
Mineral Spirits	No Effect
Nitric Acid 5%	No Effect
Phenol	Ok 2 days then slow dissolve
Seawater	No Effect
Skydrol	Very minor swelling over 30 days
Sodium Hydroxide 50%	No Effect
Sodium Hypo chlorite	No Effect
Sugar Solution	No Effect
Sulfuric Acid 25%	No Effect
Toluene	Ok 3 days then very minor effect
Vegetable Oil	No Effect
Urine	No Effect
Vinegar	No Effect
Xylene	Ok 3 days then very minor effect

*****END OF SECTION*****

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SECTION 09720

FABRIC WALL PANELS

PART 1 – GENERAL

1.01 SUMMARY

Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.

1.02 DESCRIPTION

All of the requirements of the Contract Documents apply to this Section.

1.03 QUALITY ASSURANCE

Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods for proper performance of the work of this Section.

1.04 SUBSTITUTIONS

Substitutions will be considered per Article 5.3 of the General Conditions.

1.05 SUBMITTALS

A. Comply with pertinent provisions of Article 5 of the General Conditions.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Manufacturer's Specifications and other data needed to prove compliance with the specified requirements.

2. Samples of the full range of colors and patterns available from the proposed manufacturer in the specified range; if substituting product / color selected.

3. Manufacturer's recommended installation procedures which, when accepted by the Architect, will become the basis for accepting or rejecting actual installation procedures for the Work.

C. Mock-ups:

1. At an area on the site where accepted by the Architect, provide a mock-up panel of the Work of this Section.

a. Make the mock-up panel approximately 4'-0" high by 4'-0" wide and consisting of a minimum of two 2'-0" x 2'-0" panels butted together.

b. Provide one mock-up panel for each color and pattern of vinyl-coated fabric wall covering used on the Work.

c. The mock-ups may be part of the Work, and may be incorporated into the finish work when so accepted by the Architect.

d. Revise as necessary to secure Architect's acceptance.

2. The mock-up panels, when accepted by the Architect, will be used as datum points for comparison with the remainder of the work of this Section for the purpose of acceptance or rejection.

3. If the mock-up panels are not permitted to be part of the finished work, completely demolish and remove them from the job site upon completion and acceptance of the work of this Section.

D. Maintenance Instructions:

1. Furnish a copy of the vinyl-coated fabric manufacturer's maintenance instructions at project's Final Completion.

2. Include recommended cleaning materials and methods of application therefor together with precautions in cleaning materials' use if such are improperly applied.

1.06 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01640.

B. Deliver pre-finished panels in undamaged condition as packaged by the manufacturer, in sealed, labeled containers.

C. Store panels in a clean, dry storage area off the ground. Maintain storage area temperature above 45° F with normal humidity.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Temperatures:

1. Install pre-finished panels only when normal temperatures and humidity conditions approximate the same conditions that will exist when building is occupied.

2. Maintain areas to receive pre-finished panels at a minimum temperature of 65° F measured at floor level.

3. Maintain minimum temperature for 72 hours before, during, and 48 hours after applications of wall coverings.

B. Ventilation:

1. Provide adequate continuous ventilation as required for the various wall coverings, sealers and adhesives used in the spaces scheduled, but in no case, for a time less than that recommended by the manufacturer for full drying or curing.

1.08 EXTRA STOCK

Deliver to the Owner for use in future modifications or repairs, an extra stock of approximately 2% of each color and pattern of material, and proper adhesive, packaging each type of material separately, distinctly marked, and adequately protected against deterioration.

PART 2 -- PRODUCTS

2.01 PREFINISHED VINYL-COATED FABRIC WALL PANELS

A. Provide pre-finished wall panels consisting of vinyl-coated fabric factory laminated to 1/2" wood fiberboard core with a water base adhesive recommended by the manufacturer, as accepted by the Architect. Colors to be selected by the Architect.

B. Panel shall have the following minimum characteristics:

1. Fabric: Woven, treated

2. Flame Spread: 0-25

3. Smoke Developed: 200 or less

4. Substrate: Perforated non-combustible mineral fiberboard

5. Sound Absorption: NRC .65

6. Insulation: R = 2.00

7. Size: ¾" thick; 30" wide x 9'-0" maximum

C. Edges shall be wrapped. Top edge of panels shall extend to suspend ceiling wall angle.

D. Trim:

1. Provide at all exposed edges and where panels abut doors and windows.

2. Material: As indicated on Drawings.

E. Accepted Manufacturers subject to compliance with these Specifications:

1. As indicated on the Drawings.

2. Accepted substitutions under 01340.

F. Adhesive shall be a heavy-bodied water-soluble adhesive recommended by manufacturer of the accepted fabric.

G. Provide other materials not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Ascertain that substrates are straight within a maximum tolerance of 1/8 inch in 10 feet, and not greater than 1/16 inch in one foot.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 SUBSTRATE PREPARATION

Gypsum wallboard: On gypsum wallboard, apply Mechanical clips per manufacturer's recommendations securing to metal support system. Install base J-molding.

3.03 FABRICATION OF PREFINISHED PANELS

Sequence:

1. Use fabric in consecutive numerical sequence of their manufacture.

2. Place fabric panels sequentially in the exact order they are cut from the roll. Number or tag panels in same sequence for field installation.

3.04 INSTALLATION

Handle the pre-finished panels in strict accordance with the manufacturer's recommendations as accepted by the Architect.

1. Follow the manufacturer's printed instructions for securing mechanical clips to metal support system.

2. Install bottom J-molding securing at 16" o.c.

3. Install the pre-finished panels in same sequence as their manufacturer and prior to installation of plumbing fixtures, casing, bases, and cabinets.

3.05 ADJUSTMENT AND CLEANING

A. Visually inspect to verify that installed fabric is secure, smooth, clean, without wrinkles and Panels are installed with no gaps or uneven alignment at butt joints.

B. Inspect all panels, verifying that precise match has been achieved, and correcting miss-match of color and/or pattern as necessary to secure Architect's acceptance.

***** END OF SECTION *****

SECTION 09830
ELASTOMERIC COATINGS

PART 1 -- GENERAL

1.01 SUMMARY

A. Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.

B. The work to be completed under this Section shall include the furnishing of all material, labor, tools, and equipment for the complete preparation and application of a 100 percent acrylic based elastomeric wall finishing system.

C. Referenced Standards:

1. ASTM-E96-66 Water Vapor Transmission

1.02 DEFINITIONS

A. Tensile strength is the amount of force expressed in pounds per square inch required to rupture a detached film of paint at the moment of rupture. For specimen-to-specimen comparison, film thickness must be the same.

B. Elongation is the increase in length under tension of a detached film of paint expressed as a percentage of its original length. For specimen-to-specimen comparisons, film thickness must be the same.

1.03 SUBSTITUTIONS

Substitutions will be considered per Article 5.3 of the General Conditions.

1.04 SUBMITTALS

A. Product Data: Comply with pertinent provisions of Article 5 of the General Conditions, submit complete manufacturer's descriptive literature and specifications including composition reports.

B. Samples: Comply with pertinent provisions of Article 5 of the General Conditions, submit samples illustrating color, gloss and texture on an 8.5 inch by 11 inch hardboard.

C. Quality Control Submittals:

1. When and as directed by the Architect, submit certificates confirming that materials proposed for use conform to applicable air quality regulations in force at the time of application.

2. Submit manufacturer's current recommended methods of installation, including relevant limitations, safety and environmental cautions, and application rates.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with applicable codes and regulations of governmental agencies having jurisdiction over airborne emissions and industrial waste disposal.

B. Field Samples:

1. When and as directed by the Architect, apply one complete coating system for each color, gloss and texture required. When accepted, the sample panel areas may be deemed incorporated into the Work and will serve as the standard by which the subsequent Work of this Section will be evaluated for acceptance.

1.06 DELIVERY, STORAGE AND HANDLING

A. Storage and Protection:

1. Use all means necessary to protect all materials of this Section before, during and after installation.

2. Deliver materials to job site in new original and unopened containers bearing manufacturer's name and trade name.

3. Store where directed in accordance with manufacturer's instructions.

1.07 PROJECT CONDITIONS

A. Environmental Requirements:

1. Apply coating under environmental conditions no less stringent than those stipulated by the manufacturer.

2. Measure moisture content of surfaces using an electronic moisture meter. Do not apply material unless moisture contents are below:

a. Plaster: 8 percent

b. Concrete: 12 percent

c. Stucco: 22 percent

d. Wood: 15 percent

3. Do not apply when atmospheric or surface temperatures are below 50°F.

PART 2 -- PRODUCTS

2.01 MANUFACTURERS

The design is based on products from Sherwin Williams. Products listed by manufacturers number will serve as the standard by which proposed materials will be evaluated for acceptance.

2.02 MATERIALS

A. A waterborne 100 percent acrylic elastomeric wall finishing system designed for use over exterior concrete, brick, cinder block, and concrete block and properly prepared wood.

B. Provide primers produced by the same manufacturer.

2.03 COLORS

A. Colors will be selected from color chip samples provided by the manufacturer of paint system accepted for use. Match accepted samples for color, texture, gloss and coverage.

B. Where colors are specified in the Contract Documents based on a manufacturer other than the paint manufacturer accepted for use, provide colors blended to match the specified colors to the acceptance of the Architect.

2.04 SOURCE QUALITY CONTROL

A. Mechanical Tests:

1. Elongation – ASTM D2370

a. Elongation percentage 300

a. Tensile (pounds per square inch) 350

B. Dirt Pick Up Resistance:

1. Percentage reflectance retained equals 99.3 after two years exposure to the environment.

C. Water Vapor Transmission:

1. Permeability (ASTM D1653) 13.4 perms

2. Capable of withstanding approximately eight feet hydrostatic head.

D. Wind-driven rain resistance:

1. ASTM D6904-03 Passes standard test for this category.

E. Weatherability:

1. Ultraviolet light resistance durability of finish with a life expectancy of 10-15 years compared to a 100 percent acrylic paint life of 5-7 years.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Do not apply coatings to any surface unsuitable for proper finishing until surface is made satisfactory.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until satisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Surfaces must be clean, dry, and free from grease and other contaminants.

B. Remove rust and scale before priming. Prime ferrous metal immediately after preparation.

C. Remove all oil from galvanized metal before etching. Etch galvanized metal before priming. Prime the same day.

D. Repair all cracks with appropriate sealant.

3.03 APPLICATION

A. The recommended method is to airless spray two coats at 16 to 18 mils wet, per coat. Dry film thickness after two-coat application will be 15 to 16 mils at application rate of 50 square feet per gallon.

1. For airless application, use equipment capable of pumping material at two gallons per minute or more.
   a) Tip size range: .025 through .031

B. Brush and roller will require three or four coats to arrive at the same mil thickness and spread rate as a spray application

C. Low temperature additives cannot be added to this product. Thinning is not recommended.

3.04 ADJUSTING

Remove, finish, or repaint work not in compliance with Specified requirements.

3.05 PROTECTION

Provide wet paint signs, barricades, and other devices required to protect newly finished surfaces. Remove temporary protective wrapping provided for protection of the other work after completion of painting operations.

3.06 FINISH SCHEDULE

Apply the following finishes to the surfaces specified and/or as on the finish schedule on the Drawings. Apply all materials in accordance with manufacturer's instructions on properly prepared surfaces and foundation coats. All intermediate undercoats must be tinted to approximate the final color.

Architect will issue a color schedule prior to start of painting to designate the various colors and locations required for the work.

3.07 EXTERIOR SYSTEMS:

Stucco

ELASTOMERIC

Sherwin Williams

First Coat	LOXON MASONRY PRIMER A24W300
Second Coat	CONFLEX XL A5-400 Elastomeric coating
Third Coat	CONFLEX XL A5-400 Elastomeric coating
Required total	DFT of 15 mils

*****END OF SECTION*****

SECTION 09900

PAINTING

PARTS 1 -- GENERAL

1.01 SUMMARY:

A. Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.

B. Section Includes: Painting and finishing of all interior and exterior items and surfaces, unless otherwise indicated or listed under exclusions below:

1. Paint all exposed surfaces, except as otherwise indicated, whether or not colors are designated.
2. Include field painting of exposed exterior and interior structural steel, plumbing, mechanical and electrical work, except as indicated below.
3. Paint exterior plaster where indicated on Drawings.

C. Work Included:

1. The intent and requirements of this section is that all work, items and surfaces which are normally painted and finished in a building of this type and quality, shall be so included in this contract, whether or not said work, item or surface is specifically called out and included in the schedules and notes on the drawings, or is, or is not, specifically mentioned in these specifications.
2. All the requirements of Division Zero and Division One apply to this Section.

D. The following general categories of work and items that are included under other sections, shall not be a part of this section:

1. Shop prime painting of structural and miscellaneous iron or steel.
2. Shop prime painting of hollow metal work.
3. Shop finished work and items.
4. Any drywall or plaster permanently concealed from view.
5. Any factory finished equipment and other materials with a complete factory applied finish.
6. Finish hardware except where primed for paint finish.
7. Any glass, plastics, floor tiles and sheet vinyl coved or vinyl top set bases.
8. Plumbing fixtures: Toilet room accessories.
9. Lighting fixtures except as noted on drawings or specified.
10. Any acoustical surfaces; unless otherwise specified.

D. The Room Finish Schedules indicated on the drawings, indicates the location of interior room surfaces to be painted or finished. The schedule indications are general and do not necessarily define the detail requirements. Include all detailed refinements and further instructions as may be given for the required complete finishing of all spaces and rooms.

1.02 SUBSTITUTIONS

Substitutions will be considered per Article 5.3 of the General Conditions.

1.03 SUBMITTALS:

A. Product Data: Submit complete manufacturer's descriptive literature and specifications in compliance with pertinent provisions of Article 5 of the General Conditions.

1. Materials List: Submit complete lists of materials proposed for use, giving the manufacturer's name, catalog number, and catalog cut for each item when applicable. When required, provide a list of paint and coating materials proposed for use, which equates such materials with the design-basis products specified.

B. Samples: In accordance with provisions of Article 5 of the General Conditions, submit, on 8-1/2 inch by 11 inch hardboard, samples of each color, gloss, texture and material selected by the Architect from standard colors available for the coatings required.

1. For natural and stained finishes, provide sample on each type and quality of wood used on the project.

C. Manufacturer's Instructions: Submit the manufacturer's current recommended methods of installation, including relevant limitations, safety and environmental cautions, application rates, and composition analysis.

1.04 QUALITY ASSURANCE:

A. Regulatory Requirements: Comply with applicable codes and regulations of governmental agencies having jurisdiction including those having jurisdiction over airborne emissions and industrial waste disposal. Where those requirements conflict with this Specification, comply with the more stringent provisions.

Regulatory changes may affect the formulation, availability, or use of specified coatings. Confirm availability of coatings to be used prior to job going out to bid and before start of painting project.

1. Comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA).

B. Field Sample: When and as directed by the Architect, apply one complete coating system for each color, gloss and texture required. When approved, the sample panel areas will be deemed incorporated into the Work and will serve as the standards by which the subsequent Work of this Section will be judged.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Storage and Protection: Use all means necessary to protect the materials of this Section before, during, and after installation.

B. Deliver materials to job site in new, original, and unopened containers bearing manufacturer's name and trade name. Store where directed in accordance with manufacturer's instructions.

1.06 PROJECT CONDITIONS:

Do not apply exterior materials during fog, rain or mist, or when inclement weather is expected within the dry time specified by the manufacturer. No exterior or interior painting shall be done until the surfaces are thoroughly dry and cured. Do not apply paint when temperature is below 50^{o} F. Avoid painting surfaces when exposed to direct sunlight.

PART 2 -- PRODUCTS

2.01 MANUFACTURERS:

Manufacturer's catalog names and number of paint types in this Section herein are based on products of Dunn-Edwards Corporation and is the standard of quality against which the Architect will judge equivalency. The quantity of titanium dioxide, the use of clays, aluminum silicate, talc

and the purity of acrylic materials are a few of the criteria which will be used by the Architect in determining equivalency of materials.

2.02 MATERIALS:

A. Paints: Provide Ready-Mixed, except field catalyzed coatings. Pigments shall be fully ground maintaining soft paste consistency, capable of being readily and uniformly dispersed to complete homogeneous mixture. Paints shall have good flowing and brushing properties and be capable of drying or curing free of streaks and sags.

B. Accessory Materials: Linseed oil, shellac, solvents, and other materials not specified but required to achieve required finishes shall be of high quality and approved by manufacturer.

C. Colors shall be selected from color chip samples provided by manufacturer of paint system approved for use. Match approved samples for color, texture and coverage.

2.03 MIXES:

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

PART 3 -- EXECUTION

3.01 EXAMINATION:

A. Examine the areas and conditions under which work of this Section will be performed.

B. Examine surfaces to be painted before beginning painting work. Work of other trades that has been left or installed in a condition not suitable to receive paint, stain, other specified finish shall be repaired or corrected by the applicable trade before painting. Painting of defective or unsuitable surface implies acceptance of the surfaces.

C. Beware of a condition known as "critical lighting". This condition causes shadows that accentuate even the slightest surface variations. A pigmented sealer will provide tooth for succeeding decorative coating, but "does not" equalize smoothness or surface texture. Any corrective action to gypsum board/drywall must be done by the drywall contractor prior to decorating.

D. Correct conditions detrimental to timely and proper completion of the Work.

E. Do not proceed until unsatisfactory conditions are corrected.

F. Beginning of installation means acceptance of conditions.

3.02 PROTECTION:

A. Protect previously installed work and materials, which may be affected by Work of this Section.

a. Protect prefinished surfaces, lawns, shrubbery and adjacent surfaces against paint and damage.

b. Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or splatter from fouling surfaces not being painted.

c. Protect surfaces, equipment, and fixtures from damage resulting from use of fixed, movable and hanging scaffolding, planking, and staging.

B. Provide WET PAINT signs, barricades, and other devices required to protect newly finished surfaces. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

3.03 PREPARATION:

A. Perform preparation and cleaning procedures in strict accordance with coating manufacturer's instructions for each substrate condition.

B. Concrete and masonry surfaces shall be dry, clean, and free of dirt, efflorescence, encrustation, and other foreign matter. Glazed surfaces on concrete shall be roughened or etched to uniform texture.

C. Ferrous metal shall be cleaned of oil, grease, and foreign matter with solvent. Prime within 3 hours after preparation.

D. Sand and scrape metal to remove loose primer and rust.

E. Galvanized metal shall be chemically or solvent cleaned and then retreated with an etching-type solution if recommended by the finish manufacturer. Cleaned and retreated galvanized metal shall be primed the same day that cleaning has been performed.

F. Remove dust, grit and foreign matter from wood surfaces. Sand surfaces and dust clean. Spot coat knots, pitch streaks, and sappy section with pigmented stain sealer when surfaces are to be painted. Fill nail holes, cracks and other defects after priming and spot prime repairs when fully cured.

G. Remove hardware and accessories, machined surfaces, plates, lighting fixtures and similar items in place and not-to-be-finish painted, or provide surface-applied protection. Reinstall removed items upon completion of work in each area.

H. Existing surfaces to be recoated shall be thoroughly cleaned and deglossed by sanding or other means prior to painting. Patched and bare areas shall be spot primed with same primer as specified for new work.

I. Thoroughly backpaint all surfaces of exterior and interior finish lumber and millwork, including doors and window frames, trim, cabinetwork, etc., which will be concealed after installation. Backpaint items to be painted or enameled with the priming coat. Use a clear sealer for backpriming where transparent finish is required.

J. Bar and covered pipes, ducts, hangers, exposed steel and ironwork, and primed metal surfaces of equipment installed under mechanical and electrical work shall be cleaned prior to priming.

K. Preparation of other surfaces shall be performed following specific recommendations of the coatings manufacturer.

L. Bond breakers and curing agents must be removed and the surface cleaned before primers, sealers or finish paints can be applied.

M. All drywall surfaces must be completely dry and dust free before painting. Skim coated drywall must be sealed with an alkyd based sealer or a waterborne sealer recommended by the paint manufacturer for this surface. Use the appropriate light or medium tack masking tape.

3.04 APPLICATION:

A. Apply painting and finishing materials in accordance with the manufacturer's submittals, as approved. Use applicators and techniques best suited for the material and surfaces to which applied.

1. The number of coats specified is the minimum that shall be applied. Apply additional coats when undercoats, stains or other conditions show through final paint coat, until paint film is of uniform finish, color and appearance.

2. All undercoats shall be tinted slightly to approximate the color of the finish coat.

B. Apply each material at not less than the manufacturer's recommended spreading rate:

1. Provide a total dry film thickness of not less than 1.2 mils for each required coat.

C. Apply prime coat to surface, which is required to be painted or finished.

D. Finish exterior doors on tops, bottoms, and edges same as exterior faces, after fitting.

E. Sand lightly and dust clean between succeeding coats.

3.05 CLEANING, TOUCH-UP AND REFINISHING:

A. Carefully remove all spattering, spots and blemishes caused by work under this section from surfaces throughout the project.

B. Upon completion of painting work remove all rubbish, paint cans, and accumulated materials resulting from work in each space or room. All areas shall be left in a clean, orderly condition.

C. Runs, sags, misses, holidays, stains and other defects in the painted surfaces, including inadequate coverage and mil thickness shall be satisfactorily touched up, or refinished, or repainted as necessary.

3.06 FINISH SCHEDULE

A. Apply the following finishes to the surfaces specified and/or as on the finish schedule on the Drawings. Apply all materials in accordance with manufacturer's instructions on properly prepared surfaces and foundation coats. All intermediate undercoats must be tinted to approximate the final color.

1. Architect will issue a color schedule prior to start of painting to designate the various colors and locations required for the work.

B. Exterior Systems:

1. Stucco & Plaster

Flat – 100% Acrylic

First Coat	EFF-STOP, Acrylic Masonry Primer (W 709) OR SUPER-LOC Two Component Waterborne Epoxy Masonry Sealer (W 718)
Second Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701**V**)
Third Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701**V**)
OR	
Second Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704**V**)
Third Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704**V**)

2. Concrete Tilt-Up

Flat – 100% Acrylic

First Coat	EFF-STOP, Acrylic Masonry Primer/Sealer (W 709) OR SUPER-LOC Two Component Waterborne Epoxy Masonry Sealer (W 718)
Second Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701**V**)
Third Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701**V**)
OR	
Second Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704**V**)
Third Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704**V**)

3. Brick Masonry

Flat – 100% Acrylic

First Coat	EFF-STOP, Acrylic Masonry Primer/Sealer (W 709) OR SUPER-LOC, Two Component Waterborne Epoxy Masonry Sealer (W 718)
Second Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701**V**)
Third Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701**V**)
OR	
Second Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704**V**)
Third Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704**V**)

B. Exterior Systems: (Continued)

4. Concrete Block

a. Flat – 100% Acrylic

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701**V**)
Third Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701**V**)
OR	
Second Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704**V**)
Third Coat	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704**V**)

b. Semi-Gloss – 100% Acrylic

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	PERMASHEEN, 100% Acrylic Semi-Gloss Enamel (W 901V)
Third Coat	PERMASHEEN, 100% Acrylic Semi-Gloss Enamel (W 901V)

c. Gloss – 100% Acrylic

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	PERMAGLOSS, 100% Acrylic Gloss Enamel (W 960V)
Third Coat	PERMAGLOSS, 100% Acrylic Gloss Enamel (W 960V)

d. High Gloss, High Performance – Acrylic/Urethane

First Coat	**RUST-OLEUM SIERRA GRIPTEC S30 Primer**
Second Coat	**RUST-OLEUM SIERRA BEYOND Multi-Purpose Acrylic Enamel**
Third Coat	**RUST-OLEUM SIERRA BEYOND Multi-Purpose Acrylic Enamel**

5. Ferrous Metal

a. Flat – Alkyd/Acrylic

First Coat	BLOC-RUST, Red Oxide Alkyd Rust Preventative Primer (43-4)
OR	CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701**V**)
Third Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701**V**)

b. Semi-Gloss – Alkyd/Acrylic

First Coat	BLOC-RUST, Red Oxide Alkyd Rust Preventative Primer (43-4)
OR	CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat	PERMASHEEN, Int/Ext. 100% Acrylic Semi-Gloss Enamel

(W901V)

Third Coat	PERMASHEEN, Int/Ext. 100% Acrylic Semi-Gloss Enamel (W 901V)

B. Exterior Systems: (continued)

5. Ferrous Metal (continued)

c. Gloss – Alkyd/Acrylic

First Coat	BLOC-RUST, Red Oxide Alkyd Rust Preventative Primer (43-4)
OR	CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat	PERMAGLOSS, 100% Acrylic Gloss Enamel (W960V)
Third Coat	PERMAGLOSS, 100% Acrylic Gloss Enamel (W960V)

d. Gloss – Rust Preventative Alkyd

First Coat	**SYN-LUSTRO Rust-Preventative Acrylic Primer (W8)**
Second Coat	**SYN-LUSTRO Rust-Preventative Acrylic Gloss (W10)**
Third Coat	**SYN-LUSTRO Rust-Preventative Acrylic Gloss (W10)**

e. Matte, Industrial High Performance – Inorganic Zinc/Epoxy/Acrylic

First Coat	**CARBOLINE CARBOZINC 859 VOC**
Second Coat	**CARBOLINE CARBOGUARD 890 VOC**
Third Coat	**CARBOLINE CARBOCRYLIC 3359 MC**

f. Matte, Industrial High Performance – Epoxy Primer/Epoxy/Acrylic

First Coat	**CARBOLINE CARBOGUARD 890 VOC**
Second Coat	**CARBOLINE CARBOGUARD 890 VOC**
Third Coat	**CARBOLINE CARBOCRYLIC 3359 MC**

g. High Gloss, Industrial High Performance – Inorganic Zinc/Epoxy/Urethane

First Coat	**CARBOLINE CARBOZINC 859 VOC**
Second Coat	**CARBOLINE CARBOGUARD 890 VOC**
Third Coat	**CARBOLINE CARBOTHANE 134 VOC**

h. High Gloss, Industrial High Performance – Epoxy Primer/Epoxy/Urethane

First Coat	**CARBOLINE CARBOGUARD 890 VOC**
Second Coat	**CARBOLINE CARBOGUARD 890 VOC**
Third Coat	**CARBOLINE CARBOTHANE 134 VOC**

B. Exterior Systems: (continued)

6. Galvanized Metal

a. Flat – Alkyd/Acrylic

Pretreatment	GALVA-ETCH, Etching Liquid (GE 123)
First Coat	GALV-ALUM Epoxy Galvanized/Aluminum Metal Primer (43-7)
Second Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701**V**)

Third Coat	EVERSHIELD, 100% Acrylic Exterior Masonry Finish (W 701**V**)

b. Semi-Gloss – Alkyd/Acrylic

Pretreatment	GALVA-ETCH, Etching Liquid (GE 123)
First Coat	GALV-ALUM Epoxy Galvanized/Aluminum Metal Primer (43-7)
Second Coat	PERMASHEEN, 100% Acrylic Semi-Gloss Enamel (W 901V)
Third Coat	PERMASHEEN, 100% Acrylic Semi-Gloss Enamel (W 901V)

c. Gloss – Alkyd/Acrylic

Pretreatment	GALVA-ETCH, Etching Liquid (GE 123)
First Coat	GALV-ALUM Epoxy Galvanized/Aluminum Metal Primer (43-7)
Second Coat	PERMAGLOSS, 100% Acrylic Gloss Enamel (W 960V)
Third Coat	PERMAGLOSS, 100% Acrylic Gloss Enamel (W 960V)

d. Gloss – Rust Preventative Alkyd

Pretreatment	GALVA-ETCH, Etching Liquid (GE 123)
First Coat	**SYN-LUSTRO Rust-Preventative Acrylic Primer (W8)**
Second Coat	**SYN-LUSTRO Rust-Preventative Acrylic Gloss (W10**
Third Coat	**SYN-LUSTRO Rust-Preventative Acrylic Gloss (W10**

e. Matte, Industrial High Performance – Epoxy Primer/Acrylic

First Coat	**CARBOLINE CARBOGUIDE 890 VOC**
Second Coat	**CARBOLINE CARBOCRYLIC 3359 MC**
Third Coat	**CARBOLINE CARBOCRYLIC 3359 MC**

f. High Gloss, Industrial High Performance – Epoxy Primer/Urethane

First Coat	**CARBOLINE CRABOGUARD 890 VOC**
Second Coat	**CARBOLINE CARBOTHANE 134 VOC**
Third Coat	**CARBOLINE CARBOTHANE 134 VOC**

B. Exterior Systems: (continued)

1. Wood – Paint Finish

a. Semi-Gloss – Acrylic

First Coat	E-Z PRIME, Ext. 100% Acrylic Wood Primer (W 708)
Second Coat	PERMASHEEN, 100% Acrylic Semi-Gloss Enamel (W 901V)
Third Coat	PERMASHEEN, 100% Acrylic Semi-Gloss Enamel (W 901V)

b. Gloss – Acrylic

First Coat	E-Z PRIME, Ext. 100% Acrylic Wood Primer (W 708)
Second Coat	PERMAGLOSS, 100% Acrylic Gloss Enamel (W 960V)
Third Coat	PERMAGLOSS, 100% Acrylic Gloss Enamel (W 960V)

2. Wood – Stain Finish – Opaque:

Two Coats	ACRI-FLAT, Exterior 100% Acrylic Flat Finish (W 704**V**)

3. Wood – Stain Finish – Semi-Transparent:

One Coat OKON Weather Pro Tinted (WPT-3)

C. Interior Systems:

1. Gypsum Board

a. Flat - Acrylic

First Coat VINYLASTIC, Interior Pigmented Sealer (W 101)*
Second Coat DECOVEL, Interior Velvet Flat Wall Finish (W 401**V**)
Third Coat DECOVEL, Interior Velvet Flat Wall Finish (W 401**V**)

b. Low Sheen – Acrylic

First Coat VINYLASTIC, Interior Pigmented Sealer (W 101**V**)*
Second Coat SUPREMA, Latex Low Sheen Enamel (W411**V**)
Third Coat SUPREMA, Latex Low Sheen Enamel (W411**V**)

c. Eggshell – Acrylic

First Coat VINYLASTIC, Interior Pigmented Sealer (W 101**V**)*
Second Coat DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)
Third Coat DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)

C. Interior Systems: (continued)

1. Gypsum Board (continued)

d. Semi-Gloss - Acrylic

First Coat VINYLASTIC, Interior Pigmented Sealer (W 101**V**)*
Second Coat PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)
Third Coat PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)

e. Gloss – Acrylic

First Coat VINYLASTIC, Interior Pigmented Sealer (W 101**V**)*
Second Coat PERMAGLOSS, Acrylic, Int. Gloss Enamel (W901V)
Third Coat PERMAGLOSS, Acrylic, Int. Gloss Enamel (W901V)

f. Gloss– Industrial High Performance – Waterborne Epoxy

First Coat **RUST-OLEUM SIERRA S70 Industrial Epoxy Primer**
Second Coat **RUST-OLEUM SIERRA S50 Industrial Epoxy Gloss Enamel**
Third Coat **RUST-OLEUM SIERRA S50 Industrial Epoxy Gloss Enamel**

g. High Gloss – Industrial High Performance – Waterborne Epoxy/Urethane

First Coat **CARBOLINE CARBOGUARD 890 VOC**
Second Coat **CARBOLINE CARBOTHANE 134 VOC**
Third Coat **CARBOLINE CARBOTHANE 134 VOC**

2. Concrete & Plaster:

a. Flat – Acrylic Copolymer

First Coat	SUPER-LOC, Two Component Waterborne Epoxy Sealer (W718)
OR	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401**V**)
Third Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401**V**)

b. Low Sheen – Acrylic Copolymer

First Coat	SUPER-LOC, Two Component Waterborne Epoxy Sealer (W718)
OR	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	SUPREMA, Latex Low Sheen Enamel (W411**V**)
Third Coat	SUPREMA, Latex Low Gloss Enamel (W 411**V**)

C. Interior Systems: (continued)

2. Concrete & Plaster:

c. Eggshell – 100% Acrylic

First Coat	SUPER-LOC, Two Component Waterborne Epoxy Sealer (W718)
OR	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)
Third Coat	DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)

d. Semi-Gloss – 100% Acrylic

First Coat	SUPER-LOC, Two Component Waterborne Epoxy Sealer (W718)
OR	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)
Third Coat	PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)

e. Gloss – 100% Acrylic

First Coat	SUPER-LOC, Two Component Waterborne Epoxy Sealer (W718)
OR	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	PERMAGLOSS, Acrylic, Int. Gloss Enamel (W960V)
Third Coat	PERMAGLOSS, Acrylic, Int. Gloss Enamel (W960V)

f. Gloss – Industrial High Performance - Waterborne Epoxy

First Coat	**RUST-OLEUM SIERRA S70 Industrial Epoxy Primer**
Second Coat	**RUST-OLEUM SIERRA S50 Industrial Gloss Enamel**
Third Coat	**RUST-OLEUM SIERRA S50 Industrial Gloss Enamel**

g. High Gloss- Industrial High Performance - Epoxy/Urethane

First Coat	**CARBOLINE CARBOGUARD 890 VOC**
Second Coat	**CARBOLINE CARBOTHANE 134 VOC**
Third Coat	**CARBOLINE CARBOTHANE 134 VOC**

3. Brick

a. Flat – Acrylic Copolymer

First Coat	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401**V**)
Third Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401**V**)

C. Interior Systems: (continued)

3. Brick

b. Low Sheen – Acrylic Copolymer

First Coat	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	SUPREMA, Latex Low Sheen Enamel (W411**V**)
Third Coat	SUPREMA, Latex Low Sheen Enamel (W411**V**)

c. Eggshell – 100% Acrylic

First Coat	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)
Third Coat	DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)

d. Semi-Gloss – 100% Acrylic

First Coat	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)
Third Coat	PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)

e. Gloss – 100% Acrylic

First Coat	EFF-STOP, Acrylic Masonry Primer (W 709)
Second Coat	PERMAGLOSS, Acrylic, Int. Gloss Enamel (W960V)
Third Coat	PERMAGLOSS, Acrylic, Int. Gloss Enamel (W960V)

f. Gloss – Industrial High Performance - Waterborne Epoxy

First Coat	**RUST-OLEUM SIERRA S70 Industrial Epoxy Primer**
Second Coat	**RUST-OLEUM SIERRA S50 Industrial Gloss Enamel**
Third Coat	**RUST-OLEUM SIERRA S50 Industrial Gloss Enamel**

g. Gloss – Industrial High Performance - Waterborne Epoxy

First Coat	**RUST-OLEUM SIERRA S70 Industrial Epoxy Primer**
Second Coat	**RUST-OLEUM SIERRA S50 Industrial Gloss Enamel**
Third Coat	**RUST-OLEUM SIERRA S50 Industrial Gloss Enamel**

h. High Gloss- Industrial High Performance - Epoxy/Urethane

First Coat	**CARBOLINE CARBOGUARD 890 VOC**
Second Coat	**CARBOLINE CARBOTHANE 134 VOC**
Third Coat	**CARCOLINE CARBOTHANE 134 VOC**

C. Interior Systems:(continued)

4. Concrete Block

a. Flat – Acrylic Copolymer

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401**V**)
Third Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401**V**)

b. Low Sheen – Acrylic Copolymer

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	SUPREMA, Latex Low Sheen Enamel (W411**V**)
Third Coat	SUPREMA, Latex Low Sheen Enamel (W411**V**)

c. Eggshell – 100% Acrylic

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)
Third Coat	DECOSHEEN, Acrylic Eggshell Enamel ((W 440V)

d. Semi-Gloss – 100% Acrylic

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)
Third Coat	PERMASHEEN, Acrylic, Int. Semi-Gloss Enamel (W901V)

e. Gloss – 100% Acrylic

First Coat	BLOCFIL, Concrete Block Filler, Smooth (W 305)
Second Coat	PERMAGLOSS, Acrylic Int. Gloss Enamel (W960V)
Third Coat	PERMAGLOSS, Acrylic Int. Gloss Enamel (W960V)

f. Gloss – Industrial High Performance - Waterborne Epoxy

First Coat	**BLOCFIL, Concrete Block Filler, Smooth (W 305)**
Second Coat	**RUST-OLEUM SIERRA S50 Industrial Epoxy Gloss Enamel**
Third Coat	**RUST-OLEUM SIERRA S50 Industrial Epoxy Gloss Enamel**

g. High Gloss- Industrial High Performance – Acrylic/Urethane

First Coat	**CARBOLINE SANITILE 100**
Second Coat	**CARBOLINE CARBOTHANE 134 VOC**
Third Coat	**CARBOLINE CARBOTHANE 134 VOC**

C. Interior Systems:(continued)

5. Ferrous Metal

c. Flat – Acrylic Copolymer

First Coat	CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401**V**)
Third Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401**V**)

d. Low Sheen – Alkyd/Acrylic Copolymer

First Coat	CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat	SUPREMA, Int. Latex Low Sheen Enamel (W411**V**)

Third Coat SUPREMA, Int. Latex Low Sheen Enamel (W411**V**)

e. Eggshell – Alkyd/100% Acrylic

First Coat CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat DECOSHEEN, Int. Acrylic Eggshell Enamel ((W 440V)
Third Coat DECOSHEEN, Int. Acrylic Eggshell Enamel ((W 440V)

f. Semi-Gloss – Alkyd/100% Acrylic

First Coat CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat PERMASHEEN, Acrylic Semi-Gloss Enamel (W901V)
Third Coat PERMASHEEN, Acrylic Semi-Gloss Enamel (W901V)

g. Semi-Gloss –Rust Preventative Alkyd

First Coat **SYN-LUSTRO W8 Rust-Preventative Acrylic Primer**
Second Coat **SYN-LUSTRO, W9 Rust-Preventative Acrylic Semi-Gloss Enamel**
Third Coat **SYN-LUSTRO, W9 Rust-Preventative Acrylic Semi-Gloss Enamel**

h. Gloss – Alkyd/100% Acrylic

First Coat CORROBAR, White Alkyd Rust Preventative Primer (43-5)
Second Coat PERMAGLOSS, Acrylic Gloss Enamel (W960V)
Third Coat PERMAGLOSS, Acrylic Gloss Enamel (W960V)

i. Gloss –Rust Preventative Alkyd

First Coat **SYN-LUSTRO W8 Rust-Preventative Acrylic Primer**
Second Coat **SYN-LUSTRO, W10 Rust-Preventative Acrylic Gloss Enamel**
Third Coat **SYN-LUSTRO, W10 Rust-Preventative Acrylic Gloss Enamel**

C. Interior Systems: (continued)

5. Ferrous Metal

c. Gloss – Industrial High Performance - Waterborne Epoxy

First Coat **RUST-OLEUM SIERRA S70 Industrial Epoxy Primer**
Second Coat **RUST-OLEUM SIERRA S50 Industrial Epoxy Gloss Enamel**
Third Coat **RUST-OLEUM SIERRA S50 Industrial Epoxy Gloss Enamel**

d. High Gloss – Industrial High Performance - Epoxy/Urethane

First Coat **CARBOLINE CARBOGUARD 890 VOC**
Second Coat **CRABOLINE CARBOTHANE 134 VOC**
Third Coat **CRABOLINE CARBOTHANE 134 VOC**

6. Wood – Paint Finish

c. Flat – Acrylic Copolymer

First Coat	UNIKOTE, Int. Acrylic Enamel Undercoater (W707)
Second Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401**V**)
Third Coat	DECOVEL, Interior Velvet Flat Wall Finish (W 401**V**)

d. Low Sheen – Alkyd/Acrylic Copolymer

First Coat	UNIKOTE, Int. Acrylic Enamel Undercoater (W707)
Second Coat	SUPREMA, Int. Latex Low Sheen Enamel (W411**V**)
Third Coat	SUPREMA, Int. Latex Low Sheen Enamel (W411**V**)

e. Eggshell – Alkyd/100% Acrylic

First Coat	UNIKOTE, Int. Acrylic Enamel Undercoater (W707)
Second Coat	DECOSHEEN, Int. Acrylic Eggshell Enamel ((W 440V)
Third Coat	DECOSHEEN, Int. Acrylic Eggshell Enamel ((W 440V)

f. Semi-Gloss – 100% Acrylic

First Coat	UNIKOTE, Int. Acrylic Enamel Undercoater (W707)
Second Coat	PERMASHEEN, Acrylic Semi-Gloss Enamel (W901V)
Third Coat	PERMASHEEN, Acrylic Semi-Gloss Enamel (W901V)

g. Semi-Gloss – Alkyd – Class A Fire Retardant

First Coat	SUPER U-365, Int. Alkyd Enamel Undercoater (E22-1V)
Second Coat	ARISTOGLO, Int. Alkyd Semi-Gloss Fire Retardant Enamel (74)**
Third Coat	ARISTOGLO, Int. Alkyd Semi-Gloss Fire Retardant Enamel (74)**

C. Interior Systems: (continued)

6. Wood – Paint Finish

f. Gloss – 100% Acrylic

First Coat	UNIKOTE, Int. Acrylic Enamel Undercoater (W707)
Second Coat	PERMAGLOSS, Acrylic Gloss Enamel (W960V)
Third Coat	PERMAGLOSS, Acrylic Gloss Enamel (W960V)

7. Wood – Stain & Lacquer

a. Flat

First Coat	STAINSEAL, Interior Wiping Oil Stain **V-YBQ**
Filler	PASTE WOOD FILLER (PWF 2703)
Second Coat	550 **CONTRACTORS EDGE** High Solids Lacquer Sanding Sealer, Clear **CE550PRO-SS**
Third Coat	DECOLAC, High Solid Flat Lacquer, Clear **N/A**
Fourth Coat	DECOLAC, High Solid Flat Lacquer, Clear **N/A**

b. Semi-Gloss

First Coat	STAINSEAL, Interior Wiping Oil Stain **V-YBQ**
Filler	PASTE WOOD FILLER (PWF 2703)
Second Coat	550 **CONTRACTORS EDGE** High Solids Lacquer Sanding Sealer, Clear **CE550PRO-SS**
Third Coat	550 **CONTRACTORS EDGE**, High Solids Semi-Gloss Lacquer, Clear **CE550PRO60**
Fourth Coat	550 **CONTRACTORS EDGE**, High Solids Semi-Gloss Lacquer, Clear **CE550PRO60**

c. Gloss

First Coat OR	STAINSEAL, Interior Wiping Oil Stain **V-YQB**
Filler	PASTE WOOD FILLER (PWF 2703)
Second Coat	550 DECOLAC, High Solids Lacquer Sanding Sealer, Clear **CE550PRO-SS**
Third Coat	550 DECOLAC, High Solids Gloss Lacquer, Clear **CE550PRO90**
Fourth Coat	550 DECOLAC, High Solids Gloss Lacquer, Clear **CE550PRO90**

* Dunn-Edwards does not recommend VINYLASTIC, Interior Pigmented Sealer (W 101) on drywall where "Prep Coat", "First Coat", or other skim coat type materials have been applied. For enamel finishes, use WALLTONE, Flat Wall Finish (W 420) for the first coat. For flat finishes, use two coats of the flat finish material only.

**Yellowing of white and off-white alkyd enamels may occur because of government regulatory limits on solvent content. Substitution of latex enamels would avoid this problem, but may not provide comparable performance.

*****END OF SECTION*****

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SECTION 10400

IDENTIFYING DEVICES

PART 1 -- GENERAL

1.01 SCOPE OF WORK

A. Molded plastic signs.

B. Aluminum free-standing signs.

C. Aluminum channel letters.

1.02 RELATED WORK

A. Documents affecting this Work include: General Conditions, Special Conditions, and Sections of Division 1 of these Specifications.

B. Reinforced masonry systems: Monument signs.

C. Wood doors.

1.03 SUBSTITUTIONS

Substitutions will be considered per Article 5.3 of the General Conditions.

1.04 SUBMITTALS

A. Submit two samples illustrating full size sample sign, of type, style and color specified including method of attachment.

B. Submit manufacturer's installation instructions.

C. Include installation template and hardware.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Package signs, labeled in name groups.

B. Store adhesive tape at ambient room temperatures.

1.06 ENVIRONMENTAL REQUIREMENTS

Do not install signs when ambient temperature is below 70 degrees F. Maintain this minimum during and after installation of signs.

PART 2 -- PRODUCTS

2.01 MANUFACTURERS

A. Mohawk Sign Systems: Aluminum & Plastic Signs.

B. A.R.K. Ramos Architectural Signage Systems; Aluminum Channel Letter.

C. Substitutions: Under provisions of Section 01000.

2.02 MATERIALS -- ALUMINUM CHANNEL LETTERS

A. Aluminum letters: 8", 7" and 2", Helvetica Medium.

B. Brackets: PPM-1 bracket sleeved stud.

1. Set in adhesive in masonry.

2. Attach to support in framed wall.

2.03 MATERIALS -- MOLDED PLASTIC SIGNING SYSTEM

A. 1/8" thick ES Plastic. Color to be selected by Architect.

B. Graphics to be vinyl die-cut. 3/4" Helvetica Medium caps.

C. Adhesive mounting.

D. All signs to have 1/2" Radius corners.

E. See Schedule for types.

2.04 MATERIALS -- ALUMINUM FREE-STANDING SIGN

A. Provide 1/8" thick aluminum sign, on 1-3/4" x 1-3/4" x 1/8" x 7' post; black duranodic aluminum tubing and sign.

B. Signs are to be 22" x 17" and 9" x 18" as shown on the Drawings.

C. Letters are to be vinyl die-cut. Test shall conform to access requirements of the CBC.

D. Color to be black anodized with white lettering.

E. Signs are to be sleeve mounted in concrete footings.

F. Signs shall be located per Drawing for Handicap Parking.

2.05 DEDICATION PLAQUE

A. 20" x 24" Bronze Dedication Plaque: text to be determined at a later date.

B. Plaque to have a raised perimeter band, flat-faced classic letters, leatherette (stipple) finish and rosette bolt heads.

C. Exact layout will be prepared by architect, mount in location as directed by architect.

2.06 ACCESSORIES

A. Mounting Hardware: Chrome screws; base sleeve and studs per manufacturer's recommendations.

B. Tape Mount: Double sided tape, permanent adhesive.

C. Adhesive: Silastic adhesive as recommended by manufacturer.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify adequate support for Building Signs. Coordinate footings with other trades.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install signs after doors and surfaces are finished, in locations indicated.

1. Furnish and install all anchorage devices required to install the item and its appurtenances complete. Provide anchorage in ample time when required to be built in by other trades.

2. All wall-mounted items shall be securely fastened to solid backing or blocking.

C. Center plastic signs on doors, level.

D. Anchor all components firmly into position for long life under hard use.

E. Clean and polish.

3.03 SCHEDULES

A. Exterior building signs:

1. Handicap signs per CBC requirements and as shown on Drawings.

2. Building letters: Color as selected by Architect.

3. Monument sign: 2" and 7" letters as detailed on both sides of the sign.

B. Interior signs:

1. Handicap restrooms 12" triangle for men and 12" circle for women per Title 24 - mounted on each restroom door.

2. Office and restrooms ES Plastic: 4" x length required -- 7 doors. Text to be determined by Owner. Mount beside each door with the code required Braille designations on the sign. Copy to be in two lines as possible.

*****END OF SECTION*****

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SECTION 10520

FIRE PROTECTION SPECIALTIES

PART 1 -- GENERAL

1.01 SCOPE OF WORK

A. Provide and install all Fire extinguishers and Cabinets as shown on the documents and as required by the local Fire Marshall.

B. Accessories as required for a complete and proper project.

1.02 RELATED WORK

A. Documents affecting this Work include: Sections of Division 1 of these Specifications.

B. Gypsum Systems: Roughed-in wall openings.

C. Painting: Field paint finish.

1.03 QUALITY ASSURANCE

A. Conform to NFPA 10 requirements for extinguishers.

B. Provide fire extinguishers, cabinets, and accessories by single manufacturer.

1.04 SUBSTITUTIONS

Substitutions will be considered per Article 5.3 of the General Conditions.

1.05 SUBMITTALS

A. Include physical dimensions, operational features, color and finish, wall-mounting brackets with mounted measurements, anchorage details, rough-in measurements, location, and details.

B. Submit manufacturer's installation instructions.

C. Submit manufacturer's operation and maintenance data.

D. Include test, refill or recharge schedules, procedure, and re-certification requirements.

1.06 ENVIRONMENTAL REQUIREMENTS

Do not install extinguishers when ambient temperatures may cause freezing.

PART 2 -- PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

Larsen's Manufacturing Company.

2.02 EXTINGUISHERS

Multi-Purpose Chemical Type: Larsen's Steel tank, Model MP 5, with pressure gage, and UL Rating 2A-10B:C or approved equal.

2.03 CABINETS

Typical Extinguisher Cabinet:

1. Provide Larsen's 2409-5R Vertical Duo Panel cabinet.
2. Primer finish.

2.04 ACCESSORIES

A. Mounting Hardware: Appropriate to cabinet - see manufacturer's installation instructions.

B. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

2.05 FABRICATION

A. Form body of cabinet with tight inside corners and seams.

B. Pre-drill holes for anchorage.

C. Form perimeter trim and door stiles by welding, filling, and grinding smooth.

D. Hinge doors for 180 degree opening.

E. Glaze doors with resilient channel gasket glazing.

2.06 FINISHES

A. Extinguisher: Red enamel.

B. Cabinet Trim and Door: Primed to be painted to match adjacent surface.

C. Cabinet Interior: Enamel white.

PART 3 -- EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify that rough openings for cabinet are correctly sized and located.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 INSTALLATION

A. Install cabinets plumb and level in wall openings so that there is 54 inches from finished floor to door handle.

B. Secure rigidly in place in accordance with manufacturer's instructions.

***** END OF SECTION *****

SECTION 10800

TOILET AND BATH ACCESSORIES

PART 1 -- GENERAL

1.01 SCOPE OF WORK

All of the requirements of the Contract Documents apply to this Section.

1.02 SUBSTITUTIONS

Substitutions will be considered per Article 5.3 of the General Conditions.

1.03 SUBMITTALS

A. Provide, within 35 days of Notice to Proceed, product data on accessories describing size, finish, details of function, attachment methods.

B. Submit shop drawings, manufacturer's literature and brochures, and catalog cuts, showing complete details of all manufactured and fabricated items. Do not purchase items until the shop drawings have been approved. See Section "Samples and Shop Drawings" for number and manner of submittals.

1.04 KEYING

Supply two (2) keys for each accessory to Owner. Master Key all accessories.

1.05 REGULATORY REQUIREMENTS

Conform to Title 24 and City codes for installing work in conformance with ANSI A117.1.

1.06 SEQUENCING AND SCHEDULING

Coordinate the work of this Section with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

PART 2 -- PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

As indicated on the Drawings.

2.02 MATERIALS

A. Stainless Steel Sheet: ASTM A167, Type 304.

B. Tubing: ASTM A269, stainless steel.

C. Fasteners, Screws, and Bolts: Hot dip galvanized as recommended by manufacturer.

D. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 PRODUCTS

As indicated on the Drawings.

2.04 FACTORY FINISHING

Stainless Steel: No. 4 satin luster finish.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify that site conditions are ready to receive work and dimensions are as instructed by the manufacturer.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site at appropriate time for building-in.

B. Provide complete information, diagrams, templates, and instructions for the installation of all items, in sufficient time so that all backing, blocking, framing and formwork can be properly installed, and so that the work of other trades will not be delayed.

C. Verify exact location of accessories for installation.

3.03 INSTALLATION

A. Install the work of this Section in strict accordance with the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life under hard use.

1. Furnish and install all anchorage devices required to install the item and its appurtenances complete. Provide anchorage in ample time when required to be built in by other trades.

2. All wall-mounted items shall be securely fastened to solid backing or blocking.

B. Install fixtures, accessories and items in accordance with manufacturer's instructions.

C. Install plumb and level, securely and rigidly anchored to substrate.

***** END OF SECTION *****

SECTION 12500

WINDOW TREATMENTS

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.

1.02 SCOPE OF WORK

A. SUPPLIER: Furnish and install Manual Roller Shades (Premium Quality)

B. RELATED WORK SPECIFIED ELSEWHERE:

1. Section 06100: Rough Carpentry
2. Section 08520: Aluminum Windows

1.03 REFERENCES

A. FLAME-RESISTANT MATERIALS SHALL PASS OR EXCEED ONE OR MORE OF THE FOLLOWING TESTS:

- National Fire Protection Association (NFPA) 701 (small scale for horizontal applications)
- Department of Transportation Motor Vehicle Safety Standard 302 Flammability of Interior Materials
- California Administrative Code Title 19
- Federal Standard 191 Method 5903 (used by Port Authority of New York and New Jersey for drapery, curtain, and upholstery material)
- Boston Fire Department Teat BFD IX-1
- New York State Uniform Fire Prevention and Building Code

1.04 SUBMITTALS

A. PRODUCT DATA: Manufacturer's descriptive literature shall be submitted indicating materials, finishes, construction and installation instructions and verifying that product meets requirements specified. Manufacturers recommendations for maintenance and cleaning shall be included.

B. DRAWINGS AND DIAGRAMS: Wiring diagrams of any motorized components or units, working and assembly drawings shall be supplied as requested.

C. SAMPLE: Responsible contracting officer or agent shall supply one sample shade of each type specified in this contract for approval. Supplied units shall be furnished complete with all required components, mounting and associated hardware, instructions and warranty.

1.04 QUALITY ASSURANCE:

A. Supplier: Manufacturer, subsidiary or licensed agent shall be approved to supply the products specified, and to honor any claims against product presented in accordance with warranty.

B. INSTALLER: Installer or agent shall be qualified to install specified products by prior experience, demonstrated performance and acceptance of requirements of manufacturer, subsidiary, or licensed agent. Installer shall be responsible for an acceptable installation.

C. UNIFORMITY: Provide Manual Roller Shades of only one manufacturer for entire project.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Product shall be delivered to site in manufacturer's original packaging.

B. Product shall be handled and stored to prevent damage to materials, finishes and operating mechanisms.

1.06 JOB CONDITIONS:

A. Prior to shade installation, building shall be enclosed.

B. Interior temperature shall be maintained between 60° F. and 90° F. during and after installation; relative humidity shall not exceed 80%. Wet work shall be complete and dry.

1.07 WARRANTY:

A. Lifetime Limited Warranty. Fabrics warranted for 5 years. Specific product warranties available from manufacturer or its authorized agent.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

A. **Hunter Douglas Contract/ 12250 Parkway Centre Dr. / Poway, CA 92064/ Phone: 800-727-8953 Fax: 800-205-9819/ Website: www.hunterdouglascontract.com**, or architect approved equivalent. Product substitutions must be approved by architect minimum of 30 days prior to close of bid.

2.02 MANUAL ROLLER SHADES

A. MATERIALS:

1. FABRICS: Inherently anti-static, flame retardant, fade and stain resistant, light filtering, room darkening, & blackout fabrics providing 0% - 15% openness factors. Fabric weights to range between 6.00 oz/sq.yd. – 20.70 oz/sq.yd. containing fiberglass, PVC, polyester, acrylic, vinyl laminates, cotton, & vinyl coatings. Finish selected by architect from manufacturer's available contract colors.
2. CONTROL SYSTEM: Adjustment-free continuous qualified #10 stainless steel ball chain ((90-lb. test)) and pulley clutch operating system allows precise control and ensures a uniform look. Clutch will develop no more than ½ pound drag for ease of lifting. Glass reinforced polyester thermopolymer (PBT) plastic components conform to military specification MIL M-24519 and designed for smooth, trouble-free operation.
3. ROLLER: Circular-shaped painted extruded aluminum tubes with thicker wall & ribs provide additional strength while locking into place the clutch & end plug. 3" outside diameter extruded tube to have a .090 wall thickness. 2" outside diameter extruded tube to have a .072" wall thickness (1 ½" & 1 1/8" tubes have .055" wall thickness) providing strength & durability.
4. END PLUG: Heat stabilized fiber reinforced plastic outside sleeve and center shaft provide bearing surfaces on which the roller rides ensuring smooth, wear resistant operation.
5. BOTTOM ROD: Extruded aluminum weight in a Sealed Pocket Hem Bar (excluding thicker fabric) for tracking adjustments and provides uniform look.
6. MOUNTING HARDWARE: Manufacturer's standard .07" nickel-plated, C1008/1010 cold rolled steel universal brackets including end plug bracket with lock down retainer device.
7. ADDITIONAL AVAILABLE OPTIONS: Fascia, Top & Bottom Covers, Blockout Systems, Motorization, 3 Clutch Sizes, Fabric Wrapped Hembar, Dual Shades, Coupled Shades, Banded Shades, Extruded Pockets, Reverse Roll.

2.03 FABRICATION

A. Shade measurements shall be accurate to within ± 1/8" or as recommended in writing by manufacturer.

2.04 FABRICS

A. Fabric as indicated in drawings.

PART 3 - EXECUTION

3.01 INSPECTION:

A. SUBCONTRACTOR shall be responsible for inspection on site, approval of mounting surfaces, installation conditions and field measurement for this work.

B. OTHER INTERACTING TRADES shall receive drawings of shade systems, dimensions, assembly and installation methods from subcontractor upon request.

3.02 INSTALLATION:

A. INSTALLATION shall comply with manufacturer's specifications, standards and procedures as detailed on contract drawings.

B. ADEQUATE CLEARANCE shall be provided to permit unencumbered operation of shade and hardware.

C. CLEAN finish installation of dirt and finger marks. Leave work area clean and free of debris.

3.03 DEMONSTRATION:

A. Demonstrate operation method and instruct owner's personnel in the proper operation and maintenance of the blinds.

SECTION 13850

SECURITY SYSTEM

PART 1 -- GENERAL

1.01 Furnish and install a complete intrusion detection monitoring and control system with the performance criteria detailed in this specification; one in each building. The systems shall be inclusive of all necessary functionality, monitoring and control capability as detailed herein and on accompanying shop drawings.

1.02 The systems shall be completely programmable from any keypad with programming access determined by level of Personal Identification Number (PIN) code. There shall be no need for a removable programming module or PROM burn to accomplish user programming changes.

1.03 The system shall be listed as a Power Limited Device and be listed under the following performance standards.

UL 1610 Central Station Burglar Alarm Units.

UL 1635 Digital Burglar Alarm Communicator System Units.

UL 1023 Household Burglar Alarm System Units.

UL 365 Police Station Connected Burglar Alarm Units and Systems.

UL 609 Local Burglar Alarm Units and Systems.

UL 864 Control Units for Fire Protective Signaling Systems.

UL 985 Household Fire Warning System Units.

NFPA71 Central Station Signaling Systems.

NFPA72A Local Protective Signaling Systems.

NFPA72C Remote Station Protective Signaling Systems.

NFPA72D Proprietary Protective Signaling Systems.

NFPA74 Household Fire Warning Equipment.

CSFM California State Fire Marshal Specifications.

Each system shall be supplied with complete details on all installation criteria necessary to meet all of the above listings.

1.04 The system supplier shall be a company specializing in the manufacture and supply of security, fire and access control systems with at least (5) years of experience and shall have local employees available for support during installation and for final hook-up and acceptance testing. The local manufacturers office shall produce system specific layout and wiring shop drawings for use by the installing contractor.

1.05 WARRANTY

The contractor shall warrant the complete system wiring and equipment to be tree from inherent mechanical and electrical defects for a period of one year from the completed and certified test.

The equipment manufacturer shall make available to the owner a maintenance contract proposal to provide a minimum of two inspections and tests per year.

1.06 SUBSTITUTIONS

Substitutions will be considered per Article 5.3 of the General Conditions.

PART 2 -- PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Input/Output Capacity

The system shall be capable of monitoring a minimum of 48 individual loops or zones and controlling a minimum of (8) output relays.

B. User/Authorization Level Capacity

The system shall be capable of operation by 100 unique PIN codes with each code being assigned one of 9 User Authorization Levels.

C. Area System

The user of the system shall be capable of selectively arming and disarming any one or more of 8 areas within the system based on the user P.I.N. code used. Each of the 48 loops or zones shall be assignable to any one of the 8 available areas.

D. Keypads

The system shall support a minimum of 8 keypads with Alphanumeric Display. Each keypad shall be capable of arming and disarming any portion of the intrusion detection system based on P.I.N. authorization.

The keypads alphanumeric display shall provide complete prompt messages during all stages of operation and programming of the system and display all relevant operating and test data.

E. Loop Configuration

The system shall have a minimum of 16 Class B loops available in the Command Processor control cabinet and a minimum of 4 Class B loops available at each keypad or loop expander on the system. The system shall have the capacity for a minimum of 8 keypads or loop expanders total but at least one must be a keypad. All Class B loops shall be 2 wire, 22 AWG minimum, supervised by an End-of-Line (EOL) device and shall be able to detect open, normal or short conditions in excess of 200 milliseconds duration.

F. Keypad Communication

Communication between the Command Processor control panel and all keypads and loop expanders shall be multiplexed over a 4 conductor non-shielded cable. This cable shall also provide power to all keypads, loop expanders and other power consuming detection devices.

G. Output Relays

The Command Processor control cabinet shall have, as an integral part of the assembly, (8) output control SPDT form C relays rated 3 amps at 3φVDC or 120 VAC. Each of these relays shall be capable of activation as outlined in this specification.

H. Primary Power

The Command Processor primary power supply shall be a 16 VAC 4OVA Wire-in transformer.

I. Secondary Power

The Command Processor secondary power supply shall be a l2VDC 6AH sealed lead-acid rechargeable battery. The battery shall be protected by an automatic circuit breaker. When initially connected to battery power alone, the Command Processor control panel shall be protected by a cutoff relay until manually started or primary power is applied, The secondary power shall be float charged at 13.8 VDC at a maximum of 1.2 amps.

J. Battery Supervision

The Command Processor control panel shall supervise the secondary power source by placing a load across the battery. Once every hour while the primary source is available. If the voltage falls below 11.9 VDC a low battery fault shall be detected. If the primary power source is not available, a low battery fault shall be detected any time the voltage falls below 11.9 VDC.

The secondary power supply shall be automatically disconnected from the system when the primary power supply is not available and the secondary power supply drops to 10.0 VDC.

K. Ground Supervision

The Command Processor control panel shall supervise the earth ground connection and annunciate an open circuit condition.

L. Bell Output use during system installation and testing which will silence the bell and when silenced place the bell circuit into a trouble condition. (Requires polarized bell module)

M. Auxiliary Output

The Command Processor control panel shall be capable of supplying a minimum of 1 amp continuous at 10.5 - I5VDC to power keypads, loop expanders, smoke detectors and other power consuming detection devices such as motion detectors. This output shall also be separately fused and the panel shall provide a separate terminal for smoke detectors and disconnect power for 3 seconds during smoke detector reset.

N. Keypad Trouble

If at any time a keypad does not detect polling, the alphanumeric display shall indicate "Service Required". If at any time a keypad detects polling but not its particular address, the alphanumeric display shall indicate "Non-Polled Address".

2.02 LIGHTNING SUPPRESSION

The Command Center control panel primary power source and incoming telephone lines shall be protected from lightning, power surges, voltage spikes and transient or RF interference with a combination of zener overvoltage transient suppressors, R/C filters, ferrite beads and spark gaps. (Requires Lightning Suppressor module.)

2.03 REMOTE COMMUNICATION CAPABILITY

A. Central Station Capability

The system shall be monitored at a Central Monitoring Station using (a Digital Alarm Communicating Transmitter) (dual Digital Alarm Communicating Transmitters) (Multiplex Communication) (Multiplex Communication with Digital Alarm Communicating Transmitter backup). The Digital Alarm Communicating Receiver at the Central Monitoring Station shall be capable of receiving all data as specified in this specification.

NOTE-CONSULT SALES ENGINEERING FOR MULTIPLEX TRANSMISSION.

B. Communicator Program

Single Line Digital Alarm Communicating Transmitter

The system shall be capable of dialing 2 telephone numbers, of 15 digits each using the switched telephone network such that if 2 unsuccessful attempts are made to the first number the system shall automatically switch to the second number and make 2 attempts. If these 2 attempts are unsuccessful the system shall switch between numbers after 2 attempts each, until a successful connection is made or a maximum of 10 try's are attempted. Once 10 unsuccessful attempts are made the system shall stop dialing.

Should another event occur which requires a message to be transmitted the dialing process shall be repeated.

(Option B, Dual Line Digital Alarm Communicating Transmitter)

The system shall be capable of dialing 2 telephone numbers of 15 digits each using 2 separate switch telephone network lines such that if 2 unsuccessful attempts are made on the first line to the first number the system shall make 2 attempts on the first line to the second number. If these 2 attempts are unsuccessful the system shall repeat the sequence using the second line. If all 8 attempts are unsuccessful the system shall make 2 further attempts on the first line to the first number. After the tenth unsuccessful attempt dialing will stop. Should another event occur which requires a message to be transmitted the dialing process shall be repeated.

(Option C, Multiplex Communication)

The system shall be capable of being continuously polled by a compatible receiver system over a leased 3002 type telephone line and identifying itself with its unique account number when polled.

The Command Processor control panel shall be capable of supplying a minimum of 2 amps continuous at 10.5-15.0 VDC to power local sounding devices. This output shall be separately fused.

This output shall be supervised and the system shall detect and annunciate an open circuit, a shorted circuit or a ground on either side of the bell circuit. The system shall incorporate a silence switch for

(Option D, Multiplex Communication With Digital Alarm Communicating Transmitter Backup)

The system shall be capable of being continuously polled by a compatible multiplex receiver system over a leased 3002 type telephone line and identifying itself with its unique account number when polled. When the system has a message to Communicate and a polling request is not received for 150 seconds, or 75 seconds when the message is a fire type, the system shall switch to the Digital Alarm Communicating Transmitter backup and proceed as follows.

The Digital Alarm Communicating Transmitter backup shall be capable of dialing 2 telephone numbers using the switched telephone network such that if 2 unsuccessful attempts are made to the first number the system will automatically switch to the second number and make 2 attempts. If these 2 attempts are unsuccessful the system shall switch between numbers after 2 attempts each until a successful connection is made or 10 try's are attempted. Once 10 unsuccessful attempts are made the system shall not try again. After dialing is complete communication shall switch back to multiplex when a poll is received. Should another event occur which requires a message to be transmitted and polling has not been received, the dialing process shall be repeated.

C. (Option) Automatic Recall Time

(Single and Dual Line DACT and Multiplex with DACT Backup).

The system shall transmit an Automatic Recall Message using the Digital Alarm Communicating Transmitter to test communications, each 24 hours.

D. Communication Failure Output

(Option A, DACT Systems)

Should a Digital Alarm Communicating Transmitter fail to communicate with the Central Monitoring Station receiver on 3 successive attempts an output relay shall be activated on the Command Processor control panel. This relay output shall be reset when the system is disarmed.

(Option B, Multiplex Systems)

Should a polling signal not be received by the Command Center control panel for a period of 150 seconds an output relay shall be activated. This relay shall be reset when the system is disarmed.

E. (Option) Opening And Closing Reports

The system shall communicate to a compatible receiver each time an area is armed and disarmed and report the area number and name and the user number of the individual operating the system.

F. (Option) Reports To Operator

(Only Available When Opening & Closing Reports Are Chosen)

The system shall require that when opening and closing reports are communicated to a Central Monitoring Station the compatible receiver operator must acknowledge each communication and record same in log.

G. Close Waiting (Option)

When openings and closings are being monitored at a Central Monitoring Station, the system shall wait for an acknowledgment from the Central Monitoring Station before displaying the "System ON" message during arming of the security areas. During the waiting period the display shall read "One Moment" and the exit delay shall be extended during this period.

H. Closing Check (Option)

After temporary or permanent schedules have expired the system shall at one minute past each hour, check to see that all areas of the system are armed. If any area shall be found to be disarmed past the scheduled time, the system shall emit a steady beep and display "Closing Time" at the keypad displays designated to display System Troubles. If the system is not armed within 4 minutes, then a No Closing Report shall be transmitted to the Central Monitoring Station.

I. (Option) Abort Reports

The system shall communicate an alarm abort report to the Central Monitoring Station any time a burglar alarm has been transmitted and the system disarmed while the alarm bell is still sounding.

J. (Option) Loop Restoral Reports

The system shall communicate all loop restorals to the Central Monitoring Station. The report shall include the loop number, name and condition.

K. (Option) Bypass Reports

The system shall communicate all loop bypasses and resets to the Central Monitoring Station. The report shall include the loop number and name and the user number of the individual operating the system.

L. (Option) Schedule Change Reports

The system shall communicate all permanent and temporary schedule changes to the Central Monitoring Station. The report shall include the day, opening time, closing time and the user number making the change.

M. (Option) Code Change Reports

The system shall communicate all code additions and deletions to the Central Monitoring Station. The report shall include the user number added or deleted and the user number making the change.

N. (Option) Door Access Reports

The system shall allow the selection of a door access report from any combination of the 8 keypads in the system. A door access report shall be communicated to the Central Monitoring Station when a door is accessed from a selected keypad. The report will include the user number and the address of the keypad used to access its associated door.

Doors not selected to be reported shall remain accessible through the associated keypad by authorized users. (Must use key-pads with door strike relays.)

O. Power Failure Delay (Option)

The system shall transmit a Power Failure message to the Central Monitoring Station should primary power fail for (0 to 9) hours.

2.04 SYSTEM CAPABILITY

A. Arm Display (Option)

The system shall display the identity of all armed security areas on keypad alphanumeric displays.

B. Opening Code (Option A)

The system shall require a valid user code to disarm security areas.

Opening Code (Option B)

The system shall require a valid user code to disarm security areas outside of temporary or permanent scheduled periods. No user code shall he required to disarm security areas during scheduled period.

C. Closing Code (Option A)

The system shall require a valid user code to arm security areas.

Closing Code (Option B)

The system shall not require a user code to arm security areas.

D. Any Bypass (Option A)

The system shall permit any security loops to be bypassed without a valid user code during the arming sequence.

Any Bypass (Option B)

The system shall require a valid user code to bypass any security loops during arming.

E. Entry Delay

The system shall permit an entry delay time of (0 to 250) seconds on any loops assigned as exit type loops. When an armed exit type loop is activated, a pre-warn tone shall sound and the entry keypad shall display "Enter Code". If a valid user code is not entered prior to the expiration of the entry delay, an alarm will be transmitted.

F. Exit Delay

The system shall permit an exit delay time of (0 to 250) seconds on any loops assigned as exit type loops. This exit delay shall be displayed and counted down on the exit keypads alphanumeric display. If any loop is in an alarm condition at the expiration of the exit delay, the entry delay sequence will commence immediately.

G. Loop Retard Delay (Option)

The system shall allow a loop retard delay of (0 to 250) seconds to he applied to any loop designated as Fire, Supervisory, Auxiliary 1 or Auxiliary 2. This retard delay shall only function in the short condition.

H. Swinger Bypass (Option)

The system shall be able to automatically bypass any loop which trips more than (0 to 7) times within one hour commencing with the first trip. The system shall also transmit a report of automatic bypass to the Central Monitoring Station if Bypass Reports are included as monitored events.

I. Reset Swinger Bypass (Option)

The system shall also be able to automatically reset the swinger bypass when Swinger Bypass has been in effect for an hour without a further trip on the bypassed loop. The system shall also transmit a report of automatic swinger bypass reset to the Central Monitoring Station if bypass reports are included as monitored events.

2.05 OUTPUT CONTROL CAPABILITY

A. Bell Cutoff (Option)

The system shall automatically reset the Bell Output (0 to 99) minutes after the Bell Output has been activated.

B. Bell Test (Option)

The system shall be able to automatically activate the bell output for one second each time the security system is armed.

C. Bell Action

The system shall he able to activate the bell output in the following manner for the loop type specified.

Fire Type	(None) (Pulsed) (Steady)
Burglary Type	(None) (Pulsed) (Steady)
Supervisory Type	(None) (Pulsed) (Steady)
Panic Type	(None) (Pulsed) (Steady)
Emergency Type	(None) (Pulsed) (Steady)
Auxiliary 1 Type	(None) (Pulsed) (Steady)
Auxiliary 2 Type	(None) (Pulsed) (Steady)

D. Cutoff Output (Option)

The system shall allow a single designated output relay to be automatically reset after a period of (0 to 99) minutes. The system will allow this relay to be manually silenced from the keypad.

E. Area Outputs (Option)

The system shall activate an output relay per security area when any security area is placed in the armed condition. (Requires 16 output relay model control panel)

F. Fire Alarm Output (Option)

The system shall activate a specified output relay whenever a fire type loop is placed in the alarm condition. This relay shall be reset when the Fire Reset function is performed and no fire type loops remain in the alarm condition.

G. Fire Trouble Output (Option)

The system shall activate a specified output relay whenever a fire type loop is placed in the trouble condition or when a supervisory type loop is placed in the alarm or trouble condition. The relay shall be turned off when all fire and supervisory type loops are restored.

2.06 USER CAPABILITY

A. (Option) Arm/Disarm

The system shall allow authorized users to arm and disarm the burglary system and display such on the alphanumeric display.

B. Option) Alarm Silence

The system shall allow authorized users to silence the bell output and display such on the alphanumeric display.

C. (Option) Fire Reset

The system shall allow authorized users to reset the smoke detectors and display such on the alphanumeric display.

D. (Option) Door Access

The system shall allow authorized users to activate a door strike associated with each keypad and display such on the alphanumeric display. (Requires keypad with door strike relay.)

E. (Option) Armed Areas

The system shall allow authorized users to display a list of armed areas by number and name On the alphanumeric display.

F. (Option) Outputs On/Off

The system shall allow authorized users to individually turn output relays on and off and display the status of each output relay on the alphanumeric keypad.

G. (Option) Loop Status

The system shall allow authorized users to display the armed, bypassed or alarmed loops on the alphanumeric keypad and check the status of individual loops.

H. (Option) Bypass Loops

The system shall allow authorized users to individually bypass any of the burglary loops on the system and display same on the alphanumeric keypad. These users shall also be able to reset any bypassed loops and the system shall display same on the alphanumeric display. Any bypassed loop shall automatically be reset each time the system 15 disarmed.

I. (Option) System Test

The system shall allow authorized users to test the bell circuit, battery and communications to the central monitoring station and display the results on the alphanumeric display.

J. (Option) User Codes

The system shall allow authorized users to add and delete user codes in the system memory.

K. (Option) Schedules

The system shall allow authorized users to enter, change or delete daily on and off schedules for the output relays, and temporary and permanent opening and closing schedules.

L. (Option) Time

The system shall allow authorized users to display and reset the day of the week and the time of the day in the system memory.

2.07 DISPLAY CAPABILITY

A. (Option) Loop Monitor

The system shall be able to monitor selected burglary loops during disarmed periods and display the loop names when tripped.

B. (Option) System Monitor Trouble

The system shall annunciate and display trouble conditions from the following functions on any or all of the alphanumeric keypads in the system. The functions to be displayed shall be bell circuit, AC power, battery power, bell power fuse, panel tamper, auxiliary power fuse, and ground circuit.

C. (Option) Fire Loops

The system shall annunciate and display fire loop alarms and troubles on any or all of the alphanumeric keypads in the system.

D. (Option) Burglary Loops

The system shall annunciate and display burglary loop alarms and troubles on any or all of the alphanumeric keypads in the system.

E. (Option) Supervisory Loops

The system shall display supervisory loop alarms and troubles on any or all of the alphanumeric keypads in the system.

F. (Option) Panic Loops

The system shall display panic loop alarms and troubles on any or all of the alphanumeric keypads in the system.

G. (Option) Emergency Loops

The system shall display emergency loop alarms and troubles on any or all of the alphanumeric keypads in the system.

H. (Option) Auxiliary 1 Loops

The system shall display auxiliary 1 alarms and troubles on any or all of the alphanumeric keypads in the system.

I. (Option) Auxiliary 2 Loops

The system shall display auxiliary 2 alarms and troubles on any or all of the alphanumeric keypads in the system.

2.08 AREA IDENTIFICATION CAPABILITY

(Area Arming systems Only)

Area Name

Each of the 8 areas within the system shall be identified by a name consisting of up to ten alphanumeric characters. This name shall be used to identify an area when displayed on the alphanumeric keypad.

2.09 LOOP OR ZONE CAPABILITY

A. Loop Name

Each of the loops within the system shall be identified by a name consisting of up to ten alphanumeric characters. This name shall be used to identify a loop when displayed on the alphanumeric keypad.

B. Loop Type

The system shall be able to identity each loop as one of ten different loop types. Each loop type shall have up to eight specifiable characteristics with a default configuration based on loop type.

The system shall allow each individual loop to be configured independently for each of the characteristics related to its selected loop type.

The system shall allow each individual loop to activate one selectable output relay per loop status change and the loop changes that can activate a separate relay each are disarmed opened, disarmed shorted, armed open and armed shorted if available in the selected loop type for that loop. Further, the selected relay shall be either latched activated, pulsed on and off, momentarily activated or follow the status of the loop.

C. Loop Message

The system shall allow the selection of either an alarm, trouble or no message to be displayed on the alphanumeric keypad (and transmitted to the Central Monitoring Station) when a loop condition changes. The selection shall be made separately for disarmed open circuit, disarmed short circuit, armed open circuit and armed short circuit when available for the selected loop type. Each loop shall have a default selection based on the loop type selected.

D. Pre-warn Addresses

The system shall allow the selection of any or all keypads to sound a pre-warning when entry is made through an exit type loop. The system shall at this time also display "Enter Code" on the alphanumeric display on selected keypads.

E. (Option) Retard

The system shall allow any individual fire, supervisory or auxiliary loop to apply a retard period prior to activating an alarm message and if a retard is chosen the system shall allow the annunciation and display of retard activation on any or all alphanumeric keypad displays during the retard period.

2.010 SYSTEM OPERATION

A. User Codes

The system shall allow an authorized user to add a minimum of 100 individual PIN codes to the system and each PIN code shall be assigned to one of 9 authorization levels.

Each PIN code shall be from two to five digits in length (and allow the assigned user to activate and deactivate a predefined combination of the burglary areas within the system)

B. Output Schedules

The system shall allow an authorized user to establish and change a single on-off permanent schedule for each of the output relays for each or the seven days of the week.

C. Burglary System Schedules

The system shall allow an authorized user to establish a permanent opening and closing schedule for each day for the burglar alarm system such that certain users shall not be able to deactivate the alarm system outside of the established schedule. The system shall also allow an authorized user to establish a temporary opening and closing schedule for each day for the burglar alarm system to operate as a permanent schedule except that this schedule shall be automatically canceled after a single use.

(The system shall also use the established schedules as a reference for the Closing Check function when openings and closings are reported to a central monitoring station.)

2.011 MATERIAL

A Command Processor Control Panel

The Command Processor control panel shall be Simplex Product #

(3002-9001 with 2 output relays.)

(3002-9002 with 8 output relays.)

(3002-9003 with 16 output relays.)

B Security command Keypads

The Security Command keypads shall be Simplex Product #

(3002-9801 Surface Mount)

(3002-9802 Surface Mount with door strike relay)

(3002-9803 Flush Mount)

(3002-9804 Flush Mount with door strike relay)

C (Option) Lightning Suppressor

The Lightning Suppressor shall be Simplex Product #

3009-9817

D (Option) Communication Modules

The Communication Modules shall be Simplex Product #

3002-9813 Single Line DACT

3002-9814 Backup DACT

E (Option) Polarized Bell Module

The Polarized Bell Module shall be Simplex Part #3002-9820.

F (Option) Primary Power Supply

1. The Primary Power Supply shall be Simplex Product # 3009-9816 (Required to support 3 or 4 batteries)
2. The Primary Power Supply shall be Simplex Product # 3009-9815 (Required where Class II transformers are not acceptable)

G Secondary Power Supply

The Secondary Power Supply shall be Simplex Product #3002-9824 (First battery on system) and (1,2 or 3) Simplex Product # 3002-9821 (2nd, 3rd, & 4th batteries on system).

H Detection Devices

The various detection devices connected into the protection loops shall be standard Simplex products to ensure compatibility of performance and power consumption with the specified system.

I Output Devices

The various control devices connected to the system output relays shall be standard Simplex products to ensure compatibility of performance and power consumption with the specified system.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Beginning of installation means acceptance of conditions.

3.02 CODES

The contractor shall provide and install the system in accordance with the plans and specifications, all national and local codes, and the manufacturers installation instructions.

3.03 OTHER WORK

Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate subcontractor.

3.04 SUPERVISION

The manufacturer shall provide all on-site supervision of the installation, perform a complete functional test of the system and submit a written report to the contractor attesting to the proper operation of the complete system.

3.05 TESTING

The complete system shall be fully tested by the contractor in the presence of the owner's representative, the architect, the consulting engineer, the authority having jurisdiction and the manufacturer. Upon completion of a successful test, the contractor shall so certify in writing to the Owner, architect, manufacturer and general contractor.

3.06 TRAINING

The equipment manufacturer shall provide, as part of this contract, a minimum of (2) hours system programming and operation training to the building owner and consulting engineer.

*****END OF SECTION*****

SECTION 15400

PLUMBING

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.

1.02 SCOPE

Provide all Plumbing Design Service, labor, materials, and equipment required to complete the Plumbing work shown on the Drawings and specified herein.

1.03 GENERAL REQUIREMENTS

A. All core drilling, cutting, and patching for the installation of work under this section shall be performed under this section of the specifications. No holes will be allowed in any structural members without the written approval of the Architect.

B. Conformation to requirements of Uniform Plumbing Code 2007 Edition, local and/or State codes and/or Ordinances, including the Uniform City and County Building Codes, State County and City Health Department Ordinances, State of California Industrial Accident Commission Safety Orders.

C. Materials:

1. All material and equipment shall be new and in perfect condition when installed, of the best grade and of the same manufacturer throughout for each class or group of equipment. Materials not identified by name or manufacturer shall be comparable to that specified arid as approved by the Architect. Maintain adequate job protection for all materials, equipment and work of other trades. Store all pipe at least four inches (4") above grade to avoid contact with water and dirt.

2. Unless otherwise directed by the Architect in writing, or specified or indicated, all materials, fixtures and equipment shall be installed in accordance with manufacturer[t]s recommendations and instructions.

3. Plumbing equipment shall bear the manufacturer's label nameplate showing all performance characteristics. All valves, pipe fittings, etc., shall bear the manufacturer's trademark or identifying markings.

4. All materials of similar function or service shall be of one manufacturer.

5. Safety Compliance: All materials, equipment and installation shall comply with the requirements of "Occupational Safety and Health Act" (OSHA) Standards

D. Verification of Dimensions:

1. All indicated dimensions are approximate and are given for estimating purposes only. Before proceeding with the work, this contractor shall carefully check and verify all dimensions, sizes, required clearances and shall assume full responsibility for the fitting of all equipment and materials herein required to other parts of the work and to the work of other trades.

2. The drawings are essentially diagrammatic to the extent that all offsets, bends, special fittings and locations are not exactly located.

3. This contractor shall comply with all contract documents in laying out his work and equipment. He shall coordinate the work of this section with the work of other trades and all job conditions.

4. The installation of valves, thermometers, gauges, cleanouts, water hammer arrestor access doors or other indicating equipment or specialties requiring reading, adjustment, inspection, repairs, removal or replacement shall be conveniently and accessibly located with reference to the finished building.

5. Where wall and ceiling access doors are required for access to plumbing equipment, doors shall be furnished and installed under other sections. Coordinate this requirement with appropriate section of specifications.

E. Rough-In: Rough-in and final connections shall be provided for equipment furnished under other sections and by the owner in accordance with rough-in drawings furnished by others. Future equipment, as noted on the drawings, shall be provided with all required rough-in utilities.

F. Before submitting his bid for the work under this division the contractor shall carefully study all drawings and shall make a careful examination of the premises. He shall determine in advance, the methods of installing and connecting the equipment, the means to be provided for getting the equipment into place and shall make himself thoroughly familiar with all the requirements of the contract. After award of the contract, no subsequent allowances will be made to the contractor due to the failure to comply with the above requirements or any other conditions affecting the installation and completion of the work.

G. Any minor changes in work, which have not been installed, shall be made by this contractor without additional compensation except changes that increase or decrease the size of the materials specified or indicated on the drawings. This contractor shall submit an estimate of the cost, or credit for, such changes he does not consider of a minor nature and shall proceed only upon the written authorization of the Architect.

1.04 SUBSTITUTIONS

Substitutions will be considered per Article 5.3 of the General Conditions.

1.05 SUBMITTALS

A. Submit according to Article 5 of the General Conditions.

B. Requirements

1. Submittals shall be in a neat ring binder form and shall contain a complete list, in index form, of the manufacturer's names, cuts of equipment, performance data, catalog numbers and trade names; as required; to properly identify the materials and equipment to be furnished under these specifications.

2. Data submitted for each item shall be properly identified by reference to item number of paragraphs in the specifications and mechanical drawings' equipment schedule designation.

3. Any deviation from item as specified shall be clearly indicated on the submittal and noted as such.

4. These specifications and accompanying drawings specify and illustrate equipment and materials deemed most suitable for the service anticipated. This is not to preclude other products equally as good and efficient. The contractor shall prepare his bid on the basis of the particular equipment and materials specified for the purpose of determining the low bid.

5. The awarding of the contract shall constitute a contractual obligation to furnish the specified equipment and materials.

6. After the execution of the contract, should the contractor desire to substitute equipment other than that specified in the contract documents, such substitution will be considered for one reason only:

7. The equipment proposed for substitution is superior in construction and efficiency to that specified herein.
8. In the event the contractor obtains the Engineer's approval of equipment other than that herein described; he shall, at his own expense, make any changes in the structures, buildings, or piping necessary to accommodate the equipment and shall furnish record drawings to the Engineer.
9. It will be assumed that the cost to the contractor of the equipment proposed to be substituted is less than that of the equipment specified in the contract documents; and, if the substitution is approved, the contract price shall be reduced by an amount equal to the savings.

1.06 OPERATING AND MAINTENANCE DATA

Data: Submit to the Architect for approval, prior to acceptance of the installation, complete and at one time. Partial or separate data will not be accepted. Data shall consist of the following-

1. Manufacturer's Literature: Six (6) copies of manufacturer's instructions for operation and maintenance of all equipment, valves, and controls; including replacement parts lists.
2. Written Instruction: Typewritten instruction for operation and maintenance of the system composed of Operation Instructions and Maintenance Instruction. Six (6) copies submitted to the Architect for approval.
3. Operating instructions shall contain a brief description of the system. Adjustments requiring the technical knowledge of the service agency personnel shall not be included in the operating instructions.
4. Maintenance instructions shall list each item (i.e. plumbing fixtures and equipment) requiring inspection, lubrication, or service and describe the performance of such maintenance.
5. Verbal Instructions: Operating personnel shall be instructed in the operation of the systems in accordance with typewritten instructions. No other verbal instructions shall be given.
6. Binders: Four (4) complete sets of the above data in loose-leaf, ring type binders with permanent covers, with identification on inside cover.

1.07 RECORD DOCUMENTS

Record as-built drawings showing locations and size of all plumbing piping, fixtures, and equipment as installed shall be kept up-to-date and available for inspection at all times during construction. These shall be signed by the General Contractor and Plumbing Contractor to certify their accuracy and shall be submitted to the owner prior to final acceptance of the work.

1.08 PROJECT CLOSE-OUT

When the installation is complete and adjustments specified herein are made, the system shall be operated for a period of one week, during which time it shall be demonstrated to the Architect as being completed and operating in conformance with these specifications.

PART 2 -- PRODUCTS

2.01 PIPING INSTALLATION

A. Arranged as shown on the drawings and as required for a complete system.
B. Run straight and true to line and as direct as possible.
C. Risers shall be plumb. Form right angles on parallel lines with building wall.

D. Keep pipes close to walls and partitions, offset only where necessary to follow walls, or as directed.

E. Locate groups of pipes parallel to each other. Pipe spacing shall permit application of full insulation and access for servicing valves.

F. All piping shall be isolated from other piping, any part of the building, framing, conduit, etc., with one-inch (1") strips of hair, felt, or pipe isolators.

G. Risers shall not have couplings in runs from one floor outlet to next.

H. All piping shall be concealed in walls or above ceilings unless otherwise noted.

I. Street elbows, bushings, and long screw fittings will not be allowed for on-site buildings.

J. Cleanouts:

1. Floor cleanouts shall be no-hub and installed into pipe where shown on plans. Floor cleanouts shall be accessible in all cases and shall be brought to surface on "WYE" branches.

2. Wall cleanouts shall be taper thread plugs and installed into pipe where shown on plans. Wall cleanouts shall be accessible in all cases.

3. All cleanouts shall be provided with removable floor or wall plate as hereinbefore specified.

4. Cleanouts to grade shall be provided with either a traffic rated brass cap or concrete yard box.

K. Install stops on all hot and cold-water fixture supplies, unless integral stops are specified. Supply trim shall have all metal-to-metal connections.

L. Protect open pipe ends. Keep piping free from scale and dirt; protect open ends whenever work is suspended during construction to prevent foreign bodies entering and lodging there; use temporary plugs, or other approved material for protection.

M. Bending or mitering of pipe to constitute fittings shall not be permitted.

2.02 DOMESTIC HOT AND COLD WATER PIPING SYSTEM

A. Provide: Mains, risers, branches, connections.

B. Shut-off valves shall be provided in main branches, and runs to risers.

C. Piping below grade shall be dipped and wrapped with "Hunt's Process" No. HP#6-F. All field joints and fittings shall be double wrapped with "Scotch Wrap" No. 50. In lieu of wrapping, "X-Tru-Coat" steel pipe shall be considered an approved equal.

D. Joints under concrete slabs, if allowed by local codes, shall be brazed.

2.03 SOIL, WASTE, AND VENT PIPING SYSTEMS (CAST IRON PIPING)

A. Provide: Mains, risers, branches and connections.

B. Cast iron soil pipe and fittings below grade shall be service weight single-hub type.

1. Shall be no-hub service weight using the "Anaheim Foundry Company," HUSKY Series 4000, heavy duty, all stainless steel (#304) coupling:

a. One and one half (1 1/2"), two inch (2"), three inch (3"), four inch (4"), diameter coupling shall consist of a three inch (3") wide corrugated 304 stainless steel shield in conjunction with four (4) stainless steel clamps mounted in series, secured in place by means of a fixed and "floating" eyelet to allow clamp travel during tightening.

b. For five inch (5"), six inch (6"), eight inch (6"'), and ten inch (10"), shall consist of a four-inch (4") wide corrugated 304 stainless steel shield in conjunction with six (6) stainless steel clamps mounted in series, secured in place by means of a fixed and "floating" eyelet to allow clamp travel during tightening.

c. All HUSKY Series 4000 couplings, or approved equal, shall be installed using a factory preset torque wrench, set to 80 inch-pounds.

C. Above grade piping and vent line shall be service weight cast iron with no-hub joints.

D. Vent piping may be schedule 40 galvanized steel in lieu of item 2.02, C.

E. Cleanouts shall be provided as previously specified and in the following locations:

1. Near bottom of each stack and riser.
2. At every 135-degree change of direction for horizontal line.
3. Every one hundred feet (100') horizontal run.

F. Extend cleanouts to accessible surface. Do not place cleanouts in carpeted floors. In such locations, use wall-type cleanouts.

G. Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have a seal trap in connection with a complete venting system so gasses pass freely to atmosphere with no pressure for siphon condition on water seal.

H. Vent entire system to atmosphere. Discharge fourteen inches (14") above roof. Join lines together in fewest practical numbers before projecting above roof. Offset vent lines so they will not pierce roof near an edge or valley.

I. Use torque wrench to obtain proper tension in cinch bands when using hubless cast iron pipe. Butt ends of pipe against centering flange or coupling.

J. Grade all soil and waste lines at one quarter inch (1/4") fall per foot, indirection of flow.

2.04 VALVES

A. Provide shut-off valves where indicated and specified; and in the following locations:

1. Risers and main branches at points of take-off from their supply or return mains.
2. Individual equipment units at Inlet and outlet to permit unit removal for repairs without interfering with remainder of system.

B. Locate valves for easy access and operation; where concealed provide access doors.

C. Do not locate valves with stems below horizontal.

2.05 CONCEAL PIPING

A. Conceal piping in building construction. Install such piping in time so as not to delay work of other trades and to allow ample time for tests and approval; do not cover before test approval is obtained from the Architect.

B. Run up branches passing through floor or roof into partition; offset above floor close to equipment unit; expose only as much as necessary for final connection.

C. Where furred spaces are indicated, keep pipes as close to structural members as possible so as to require minimum furring. In case of furred beams, obtain approval, from Architect, of resulting headroom clearance before installing pipes.

D. Access panels: Install where shown and over all concealed valves, cleanouts, isolation unions and any concealed equipment which may require access for operation, maintenance and repair. Panel shall be sized for proper service and be not less than twelve Inches by twelve inches (12" x 12"), furnished and installed by this contractor.

2.06 PIPES PIERCING WATERPROOFING

For pipes passing through waterproofed floor or roof, provide sleeves and flashing to maintaining watertight condition. Submit details for approval.

2.07 CHECK FOR INTERFERENCES WITH OTHER TRADES

A. Before installing piping, check architectural, structural, plumbing, electrical and fire protection drawings. Make accurate layout of all piping, including installed elevations. Submit copies of final layout to other trades for coordination with their work so that grouped pipes, conduit, and ducts will not interfere with each other, or with full swing doors and will leave minimum headroom as indicated.

B. Coordination of the mechanical piping is the responsibility of this section.

C. Protect open pipe ends. Keep piping free from scale and dirt. Protect open ends whenever work is suspended during construction to prevent foreign bodies entering and lodging there; use temporary plugs, burlap, or other approved material for protection.

2.08 SUPPORTS, HANGERS, FLASHING, AND SEISMIC RESTRAINT

A. Pipe Support:

1. All piping shall be supported in such a manner that it is securely attached to the structure of the building. Attachment is to be capable of supporting the tributary weight of pipe and contents in any direction. Maximum spacing of support and braces shall be as detailed on drawings.

2. Support horizontal overhead piping with clevis hangers. Upper end of hanger rod shall be supported from a code-approved attachment. See drawings for pipe support details. Submit shop drawings of all piping supports for approval.

3. Piping shall be attached to top chord members only of prefabricated roof or floor trusses. Where plywood web trusses occur, pipe support may be secured to additional web stiffeners as shown on plans.

B. Flashing: Pipes through roof shall be flashed with "Semco" No. 1110-7 steel reinforced boot type, six (6) pound seamless lead flashing with suitable counter flashing sleeve, or as approved by the Architect. Submit shop drawings for approval.

C. Seismic Restraint: All piping and equipment shall be suitably restrained and anchored in both horizontal and vertical directions to withstand seismic forces as required by the State of California.

2.09 PIPES OVER ELECTRICAL EQUIPMENT

A. Where pipe joints or valves in cold and hot water lines occur within two feet (2'0") in horizontal direction from electrical panels, or equipment, provide a drip pan of size that will afford protection. Submit pan size and construction for approval.

B. Pans shall be 18 GA. GI sheet, edges turned up two and one half inches (2 1/2") all sides, reinforced with galvanized angles or by rolling edge over one quarter of an inch (1/4") diameter galvanized wire.

C. Provide drain with three quarters of an inch (3/4") galvanized flange and galvanized pipe drain to nearest floor sink.

D. Support with galvanized bars or angles, brace to prevent sagging or swaying, as detailed for ductwork.

2.010 PIPE AND FITTING MATERIALS

A. Service Defined: Classification and names of services as used in "Schedule of Pipe and Fitting Materials" herein, shall have the following meaning:

1. Cold Water: Connections from cold water supply outlets provided by Plumbing Contractor to equipment and for makeup.
2. Drains: Drains from expansion or storage tanks to floor drains, drains from air conditioning equipment condensate pans or piping drip pans.

B. Schedule: Unless otherwise specified, pipe and fitting materials shall conform to following schedule:

1. Interpretation of Schedule: Figure "40" and "80" following pipe material in this schedule designate pipe wall thickness, conforming to ASA B36.l0, applicable to sizes one inch (1") to ten inches (10") inclusive. Figure "40" shall mean "standard, "80" shall mean "extra strong" or "extra heavy," in the accepted trade terminology for pipe wall thickness.
    a. Fittings shall conform to pipe as to black, galvanized, or C-P finish.
    b. Schedule of Pipe and Fitting Materials

Service	Pipe Material Weight	Type of Joints	Pressure Fittings Material	Shut-Off Rating PSI SwP	Valve
Cold Water ABV. Gnd.	Copper L Tube	Soldered	Cast Bronze/ Wrought Copper	125	Ball, Check Butterfly
Cold Water Below Gnd.	Copper K Tube	Soldered	Cast Bronze/ Wrought Copper	125	Ball Butterfly
Hot Water Abv. Gnd.	Copper L Tube	Soldered	Cast Bronze/ Wrought Copper	125	Ball Butterfly
Vent	Service Weight Cast Iron	No-hub Screwed	N/A	N/A	N/A
Waste & Soil	Service Weight Cast Iron	No-hub	N/A	N/A	N/A
Drains	Copper L Tube	Soldered	Bronze	125	
Medical Gas Oxygen	Copper K Tube	Soldered	Cast Bronze/ Wrought Copper	125	Ball
Condensate	Copper L Tube	Soldered	Bronze	125	Butterfly

2.011 ASTM DESIGNATIONS FOR PIPE AND FITTING MATERIALS

A Pipe, as specified in schedule, shall conform to requirements covered by following ASTM designations:

1. Steel 40 or 80: A-53, Grade B.

2. Copper Tube "B": B-75.
3. Copper Tube "K" and "L~: B-88.
4. Cast Iron Waste: A74-80.

B Fittings, as specified in schedule for various services, shall conform to requirements covered by the following ASTM designations:

1. Malleable Iron: A-197.
2. Steel Welding Type: A-234.
3. Bronze, Solder Joint: B-88.
4. Wrought Copper, Solder Joint: ANSI B16.22, B16.18.
5. ABS: D2661-85a & D3311-82

2.012 MANUFACTURERS OF PIPE AND FITTINGS

All pipe and fittings shall be "U.S." manufactured. Pipe manufacturer shall be submitted for approval. The following manufacturers shall be acceptable for materials listed under each group:

1. Steel Pipe
   a. U.S. Steel Co.
   b. Republic Steel
   c. California Steel Industries
   d. Pioneer Pipe of Utah
   e. Kaiser Steel
   f. Bethlehem Steel Co.
2. Copper Tubing and Fittings
   a. Muller Brass
   b. Chase
   c. Revere
   d. Cerro
3. Cast Iron Pipe
   a. Alhambra
   b. Anaheim Foundry
   c. U.S. Pipe and Foundry
   d. Universal Cast Iron Manufacturing

2.013 PIPE JOINTS

A. Unless otherwise specified, join pipe as follows:

1. All steel pipe two inches (2") and smaller shall have screwed joints.
2. All steel pipe two and one half inches (2 1/2") and larger shall have welded joints.
3. All copper pipe shall have soldered joints made with 95-5 tin/antimony solder.
4. Galvanized vent pipe shall be screwed "Durham" tarred drainage fittings.
5. All joints in underground and under-floor distribution piping shall be welded, regardless of size.

B. Welding Exceptions: In locations such as risers in shafts or mains in crowded corridors, where welding may be difficult; permission may be given by job inspector or Mechanical Engineer to use screwed joints up to four inch (4") size.

C. Welding Process, Procedure:

1. Where welding is required by work of this section, such work shall only be performed by welders qualified and certified by a recognized, approved agency. Such certification shall bear a date not more than six (6) months prior to date of starting work under this section and shall be submitted and approved by the job inspector and Mechanical Engineer prior to starting work.

2. Pipe welding shall comply with the latest revision of applicable code, ASA Code for Pressure Piping and State requirements. Before welding is performed, contractor shall submit to the Mechanical Engineer evidence of compliance of welding and operator's qualification according to provisions of governing codes. Standard Procedure Specifications and operators qualified by National Certified Pipe Welding Bureau shall be considered as conforming to requirements of these specifications.

3. Use only welding type fittings and welding neck flanges. The following exceptions may be used, only as approved by the Architect:

   a. Join "small" branches into mains with intersection weld, instead of using welding type tee. "Small" shall mean that the branch is one size less than half the size of the main which it intersects as: 1 1/4" branch into 3" main; 1 1/2" branch Into 4" main; 2" branch into 6" main; 4" branch into 10" main.

   b. Use only "Weldolet" of "Threadolet" type of welding fittings for intersection welding of branches to mains.

4. Do not make direct welded connections to valves, expansion joints, strainers, apparatus, and other equipment, which are intended to be removable.

5. Brass piping shall have screwed joints for sizes two inches (2"), flanged for two and one half inches (2 1/2") and larger.

D. Brazing Option: Brazing of threadless brass pipe to bronze fittings with preinserted rings, will be acceptable in place of screwed joints.

1. For brazing joints on threadless brass pipe and copper "B" tube, copper tube type "K" and "L," use brazing alloy, 80% copper, 15% silver, 5% phosphorous, which will flow freely at 1300 °F; Handy and Harmon "Sil-Fos," or approved equal; use flux and brazing method recommended by manufacturer of brazing alloy.

2. Copper tube type "K" and "L" shall have soldered or sweated joints with solder-joint type or copper fittings. Flared joints with flare type bronze fittings may be used where approved for specific service. Solder shall be 95-5 or equal.

3. Do not make brazed or soldered connections to valves, expansion joints, strainers, apparatus, other units, which are intended to be removable.

E. Screwed Joints:

1. For screwed joints use red or white lead and oil, or approved pipe-joint compound; apply only on male threads.

2. Brass pipe shall have screwed joints, for sizes two inches (2") and under; flanged two and one half (2 1/2") and over.

3. Cut pipe, nipples evenly, cut threads clean, remove burrs, ream ends to full inside bore. Cut brass pipe with hacksaw rather than with pipe cutter.

4. Do not use Stulson Wrench for making brass pipe joints tight; such pipe, bearing wrench marks, will not be acceptable and shall be replaced at Contractor's own expense.

F. Joints of Dissimilar Metals: Provide with "EPCO" dielectric valves isolation couplings of same size as pipe.

G. Pipe Preparation:

1. Pipe shall be carefully cleaned before installation. The ends of threaded pipe shall be reamed out full-size with a long taper reamer so as to be partially bell-mouthed and perfectly smooth.

2. All threads on black steel pipe shall be cut with new clean dies, full thickness of the die and so that no more than two (2) threads are left exposed on the pipe when the joint is made up in the fitting or valve.

3. Copper, brass pipe and chromed, polished or painted. Connections from fixtures shall show no tool marks. Install with approved wrenches.

4. Thread lubricant shall be used for all threaded joint make-up and shall be applied to the make thread only. Lubrication shall include threaded cleanout plugs.

2.014 PIPE SLEEVES, ESCUTCHEONS, COVERS

A. Furnish and set sleeves to accommodate pipes passing through foundations, walls, floors, partitions, and roof; provide escutcheons at exposed finished surfaces pierced by pipes.

B. Any pipe passing through a wall of a vertical shaft or through a wall of an occupancy separating or floor shall pass through a 16 GA G.I. sleeve. After pipe has been installed through sleeve, remaining space shall be packed tightly with an inert packing and secured on each side of wall with a 16 GA escutcheon around pipe. Submit shop drawings for approval.

2.015 VALVE TYPES

A. General: For valve location and installation, refer to "Valves" under "Piping Installation herein and the drawings.

B. Valve Requirements: Unless otherwise indicated or specified for particular system or individual equipment, following requirements shall apply:

1. Valves, General: Designed for packing under pressure with valve open or closed.

2. Valves used for throttling of controlling flow: Globe type as indicated. For shut off use butterfly or ball type as indicated.

3. Ball valves on all cold water and hot water piping unless otherwise noted.

4. Valves shall have rating of not less than 125-PSI SWP or as indicated in service schedule.

5. Valve Material: Bronze for sizes two inches (2") and smaller.

6. Valve ends: Screwed for all sizes two inches (2.') and smaller, except copper tube.

7. Valve ends for copper tubes, Type K and L: Solder joint type.

8. Flange valves shal1 have flange drilling to suit joining pipe flanges.

9. Gate valves shall have solid tapered wedge, except whore otherwise specified.

10. Globe type valves shall have renewable composition discs recommended by manufacturer for intended service, or renewable bevel seat and metal disc where so specified.

11. Check valves shall be horizontal swing type with bronze seat and composition or bronze disc as approved; body of same material, pressure rating, screwed or flanged,

finish as adjoining globe or gate valve. Check valves in pump discharge lines shall be of the spring-loaded non-slam type as manufactured by "Mission" Duo Check Series 150-S-M-F.

C. Submit complete shop drawings and catalog cuts of all valve types to be used, for review and approval by Architect, prior to installation. No Exceptions.

2.016 VALVE CATALOG NUMBER DESIGNATIONS

A. Valve design, material of components, workmanship, and other features: Equal to "Stockham Valve Company" catalog numbers (unless otherwise noted) for various types of valves listed.

B. Gate Valves:

1. Screwed, bronze, union bonnet, rising stem, 150-PSI SWP; NO. B-120.
2. Screwed, ibbm, non-rising stem, 125-PSI SWP; NO. G 608.
3. Flanged, ibbm, non-rising stem, 125-PSI SWP; NO. G 461.
4. Flanged, ibbm, OS & Y, 125-PSI SWP; NO. G-623.

C. Ball Valves:

1. Screwed two inches (2") and smaller, cast bronze body, 40 PSI WOG, "Apollo 3" Series 82.
2. Valves shall include reinforced Teflon packing ring, thrust seal, body seals and seats.
3. Balls shall be chromium-plated bronze, with full size ports.
4. Quarter turn on-off, adjustable packing gland and internally inserted stem.
5. 2 1/2" and larger: "Powell" 150 PSI, flanged ball valve Fig. 4226T with 316 stainless steel (SS) body and 316 55 ball and stem with Teflon seat.

D. Globe and Angle Valves:

1. Screwed, bronze, composition, 150-PSI SWP; B-22 globe, No. 17 angle.
2. Screwed, bronze, bevel seat and metal disc$_1$ 200P51 SWP, B-37 globe, No. 701 angle.

E. Check Valve, Horizontal Swing Type (not for pump discharge):

1. Screwed, bronze body, bronze disc, 125-PSI SWP; B-319.
2. Flanged, cast iron, bronze disc, 125-PSI SWP; G-931.

F. Cocks

1. One inch (1") and larger, 175 lb. brass, square head, "Powell" Fig. 2201 lubricated type.

2.017 MANUFACTURER OF VALVES

A. Valves: "Stockham," "Crane," "Nibco" or "Potter-Roemer."

B. All valves shall be the product of manufacturer.

C. All valves shall bear name or trademark of manufacturer, working pressure, and direction of flow cast or stamped on valve body.

2.018 PIPE ISOLATION

A. Hangers shall be separated from pipe by means of steel encased hair felt padded isolation.

B. Isolator shall be as manufactured by "Lemco-Trisolators" or "Potter Roemer RP Isolators." Submit shop drawings for approval.

2.019 PIPING IDENTIFICATION

A. Each individual pipeline concealed or exposed shall be labeled for quick and easy identification as to direction of flow and content of materials carried in the pipes by method of stenciling.

B. Labels shall be installed at each valve, special fittings and at all branch take-offs and twenty feet (20'-0") apart on long runs.

C. Samples of all stenciling for flow and content shall be submitted for approval prior to installation.

	LETTERS
1. Domestic Hot Water Supply:	DHW
2. Domestic Cold Water Supply:	DCW
3. Soil:	S
4. Waste:	W
5. Gravity Condensate:	GC

D. Prior to stenciling, all fuel gas piping shall be provided with one coat of primer paint and one coat of yellow paint. Primer arid paint types as selected by the Architect.

2.020 PLUMBING FIXTURES

A. All plumbing fixtures indicated on drawings and/or specifications shall be furnished and installed in accordance with manufacturer's specifications by this contractor.

B. Plumbing fixtures shall be type indicated on the Plumbing Fixture Schedule on the Drawings as follows, with connection sizes as indicated in fixture schedule except for the following:

1. Floor Drain FD-1: J.R. Smith #2005-A-P-PB, 5" square top, 2" outlet, trap primer connection, duco cast iron body with polished bronze grate.

2. Floor Sink FS-I: J.R. Smith #3410-12, 8" square top -medium receptor, no hub, 2" pipe size connection, cast iron flanged receptor, acid resistant coated interior and acid resistant coated grate.

3. Trap Primer TP-I: Precision Plumbing Products, Inc. model "Prime-rite" 1/2" inlet and 1/2" outlet with distribution unit may be located as indicated on drawings or as required by code. UPC listed.

4. Water Hammer Arrestor WHA-I: Precision Plumbing Products, Inc. model "SC-Series" (size as required), installed on all quick closing valves and all valves which close with the flow of fluid, or on headers serving more than one fixture. Provide a 12"x 12" access panel.

C. Interior exposed pipe, valves, and fixture trim shall be chrome plated.

D. The complete installation of each fixture shall include trap and accessories with accessible stop or control valve in each hot and cold-water branch supply line. Fixture floor connections shall be made with approved brand of cast Iron floor flange, soldered or caulked securely to waste pipe. Make joint between fixture and floor flange tight with approved fixture setting compound or gaskets.

E. Polish chrome finish at completion of project.

F. Install fixtures and fittings as per local codes and manufacturer's instructions.

G. Do not use flexible water piping.

H. Caulking: Fixtures shall be bedded and caulked along joint at walls, counter tops and other intersecting surfaces with "Polysenseal" distributed by "Gladding-McBean" or approved equal.

I. Backing for all fixtures indicated on wall shall be one quarter inch by six inches (1/4" x 6") steel) plate; recessed flush with stud face and extending to next stud beyond fixture on each side. Secure plate top and bottom at each stud and weld three-eighths inch (3/8") steel stud bolts to each stud. See fixture schedule for type of support required. For wood stud installation, secure backing plate to each stud with three-eighths inch by two-inch (3/8" x 2") long lag bolts. Minimum two (2) per stud.

2.021 WATER HAMMER ARRESTORS

A. Piston operated, type K copper barrel, with brass threaded adaptor:

1. The piston shall provide a permanent mechanical barrier between fluid and pre-load air change.

2. The piston shall be equipped with two (2) O-rings, "Parker Specifications" N741-75, temperature rated 40 ^{0}F to 450 ^{0}F. Seal lubricant shall be "Dow Corning" Silicone Compound #111 *FDA* listed as safe for use in potable water systems.

B. Shall be designed to operate under domestic and commercial line pressures. Shall be equal to the pipe diameter at the point of installation.

C. The installation shall be made in the vertical or horizontal positions from the source of lock. Shall be installed in the following locations:

1. All quick closing valves.

2. All valves that close with the flow of fluid.

D. Normal arrestor operating pressure shall be 35 to 250 Psig, with a maximum surge or spike pressure not to exceed 1500 Psig.

E. Arrestor shall be fully guaranteed in writing by manufacturer for the entire life of the system.

F. Shall be as manufactured by "Precision Plumbing Products, Inc.," SC Series. Submit shop drawings for approval by the Mechanical Engineer.

2.022 CLEANOUTS

A. Floor: "J.R.Smith" #4023 or #4043 or "Zurn" #1400-2 or #1440-3, with polished nickel bronze non-skid adjustable round or square top. Use carpet clamping type top with carpet marker in carpeted areas.

B. Dry Wall: "J.R.Smith" #4670 or approved equal by "Zurn" or "Josam;" prime coated steel, face or wall type.

C. All other walls: "J.R.Smith" tl4470 or approved equal by "Zurn" 1470 series with chrome plated cover and screws. Provide "J.R. Smith" #4715 or approved equal where wall thickness is inadequate to conceal cleanout.

D. Submit shop drawings and/or catalog cuts for each type for Mechanical Engineer's approval, prior to installation.

2.023 PIPE INSULATION

A. Furnish and install thermal insulation on clean dry surfaces; after testing, inspection, and approval in strict accordance with these specifications, contract documents and manufacturer' 5 recommendations.

B. All insulation and accessory material shall meet the requirements of flame spread not to exceed 25 and smoke developed not to exceed 50, as tested by "Procedure ANSI/ASTM-E-84, NFPA 225 or UL 723.

C. Insulation shall be as manufacture by "Manville" or as approved by the Mechanical Engineer, prior to installation.

D. Installation: By skilled appliers directly in the employ of firms with a minimum of five (5) years successful installation experience, specializing in this type of work.

E. Pipe Hangers shall be installed outside the insulation. This contractor shall insert a section of cellular glass insulation at the support of a length not less than twice pipe diameter.

2.024 EQUIPMENT IDENTIFICATION - VALVES

A. Numbered brass disc attached to each valve for identification.

B. Valve tag shall be stamped to identify type of service and sequence number (i.e.: HW-I). Submit sample valve tag for approval prior to installation.

C. Valve directory to be provided with operations and maintenance submittals.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Beginning of installation means acceptance of conditions.

3.02 SPECIAL REQUIREMENTS

A. All new equipment shall be anchored as required and/or as detailed on drawings.

B. Written Certifications, in a form approved by the Architect, shall be provided by the equipment manufacturer or his authorized representative:

1. That the equipment and its installation was inspected on the job by the manufacturer and that the equipment is in first-class condition throughout, was installed in accordance with manufacturer's requirements and recommendations, and that the installation is approved by the manufacturer.

2. That the equipment is operating in a safe and satisfactory manner and is delivering capacities and performance hereinbefore specified and/or indicated on the drawings.

C. Damage by Leaks: The contractor shall be responsible for all damage to equipment and premises caused by leaks or breaks in piping or equipment for a period of one (1) year after date of final acceptance.

D. Unless otherwise directed, and/or specified, and/or indicated, all materials and equipment shall be installed in accordance with the manufacturer's recommendations and instructions.

E. Plumbing equipment shall bear the manufacturer's label or nameplate showing performance characteristics. Identifying size or model number shall be given only when not practicable or customary to show otherwise. All valves, pipe, fixtures and fittings shall bear the manufacturer's trademark or identifying markings.

F. Plumbing piping layouts as shown on the drawings are subject to modifications, by contractor, without extra cost as required to clear other items of construction. This contractor shall coordinate the work of this section with that of other sections as to avoid interferences by other crafts involved.

G. Contractor shall visit site prior to bidding and fully acquaint himself with all conditions affecting installation of the proposed system. Failure to do so shall not relieve contractor of responsibility of providing complete, operational, and acceptable system.

***** END OF SECTION *****

SECTION 15600

HEATING. VENTILATING AND AIR CONDITIONING

PART 1 -- GENERAL

1.01 SCOPE

Work of this section includes everything necessary and incidental to completing heating, ventilating, and air conditioning work; except as herein specifically excluded.

1.02 GENERAL REQUIREMENTS

A. All core drilling, cutting, and patching for the installation of work under this section shall be performed under this section of the specifications. No holes will be allowed in any structural members without the written approval of the Architect.

B. Guarantee: Furnish a written guarantee form as stipulated in section "General Conditions," for a period of one (1) year from date of acceptance of work by the owner.

C. Materials:

1. All materials and equipment shall be new and in perfect condition when installed, of the best grade and of the same manufacturer throughout for each class or group of equipment. Materials not identified by name or manufacturer shall be comparable to that specified and as approved by the Architect. Maintain adequate job protection for all materials, equipment and work of other trades. Store all pipe at least four inches (4") above grade to avoid contact with water and dirt.

2. Unless otherwise directed by the Mechanical Engineer in writing, or specified or indicated, all materials, and equipment shall be installed in accordance with manufacturer's recommendations and instructions.

3. Mechanical equipment shall bear the manufacturer's label nameplate showing all performance characteristics. All valves, pipe fittings, etc., shall bear the manufacturer's trademark or identifying markings.

4. All materials of similar function or service shall be of one manufacturer.

D. Approval of Materials:

1. Within thirty (30) days after award of the contract, submit to the Architect, six (6) copies of a complete list of material and equipment proposed for the job including rating and capacity data, sizes, grade, electrical data, part or catalog number, manufacturer's name, pictures, catalog cuts, etc.

2. Submit with the above list, six (6) copies of complete shop drawings for all fabricated equipment and six (6) copies of complete control diagrams with descriptions and details.

3. Safety Compliance: All materials, equipment and installation shall comply with the requirements of "Occupational Safety and Health Act" (OSHA) Standards.

E. Verification of Dimensions:

1. All indicated dimensions are approximate and are given for estimating purposes only. Before proceeding with the work, this contractor shall carefully check and verify all dimensions, sizes, required clearances and shall assume full responsibility for the fitting of all equipment and materials herein required to other parts of the work and to the work of other trades.

2. The drawings are essentially diagrammatic to the extent that all offsets, bends, special fittings and locations are not exactly located.

F. This contractor shall comply with all contract documents in laying out his work and equipment. He shall coordinate the work of this section with the work of other trades and all job conditions.

1. The installation of valves, thermometers, gauges, dampers, duct access doors or other indicating equipment or specialties requiring reading, adjustment, inspection, repairs, removal or replacement shall be conveniently and accessibly located with reference to the finished building.

2. Where wall and ceiling access doors are required for access to mechanical equipment, doors shall be furnished arid installed under other sections. Coordinate this requirement with appropriate section of specifications.

G. Rough-in: Rough-in and final connections shall be provided for equipment furnished under other sections and by the owner in accordance with rough-in drawings furnished by others. Future equipment, as noted on the drawings, shall be provided with all required rough-in utilities.

H. Machinery Guards: All moving parts of machinery, such as shaft couplings, belt drives, etc., shall be adequately covered with removable metal guards to protect personnel from possible injury. Guards shall be furnished by the equipment manufacturer and shall comply with applicable requirements of applicable state agencies and OSHA.

1.03 SUBSTITUTIONS

Substitutions will be considered per Article 5.3 of the General Conditions.

1.04 SUBMITTALS AND TESTS

A. Requirements and Submittals:

1. Conformation to requirements of Uniform Mechanical Code-1995 Edition, local and/or State codes and/or Ordinances, including the Uniform City and County Building Codes, State County and City Health Department Ordinances, State of California Industrial Accident Commission Safety Orders.

2. Apply and pay for all permits, fees, inspections, examinations and tests required by any legally constituted authorities.

3. Submission of six (6) brochures containing certified manufacturer's drawings and cuts of all equipment and specialties within thirty (30) days after Contract is signed. Partial or incomplete submittals will be rejected and will be returned to Contractor for re-submittal.

a. Submittals shall be in a neat ring binder form and shall contain a complete list, in index form, of the manufacturer's names, cuts of equipment, performance data, catalog numbers and trade names; as required; to properly identify the materials and equipment to be furnished under these specifications.

b. Data submitted for each item shall be properly identified by reference to item number of paragraphs in the specifications and mechanical drawings' equipment schedule designation.

c. Any deviation from item as specified shall be clearly indicated on the submittal and noted as such.

d. These specifications and accompanying drawings specify and illustrate equipment and materials deemed most suitable for the service anticipated. This is not to preclude other products equally as good and efficient. The contractor shall prepare his bid on the basis of the

particular equipment and materials specified for the purpose of determining the low bid. The awarding of the contract shall constitute a contractual obligation to furnish the specified equipment and materials.

e. After the execution of the contract, should the contractor desire to substitute equipment other than that specified in the contract documents, such substitution will be considered for one reason only: The equipment proposed for substitution is superior in construction and efficiency to that specified herein.

f. In the event the contractor obtains the Engineer's approval of equipment other than that herein described; he shall, at his own expense, make any changes in the structures, buildings, or piping necessary to accommodate the equipment and shall furnish record drawings to the Engineer.

g. It will be assumed that the cost to the contractor of the equipment proposed to be substituted is less than that of the equipment specified in the contract documents; and, if the substitution is approved, the contract price shall be reduced by an amount equal to the savings.

B. AIR SYSTEMS TEST AND BALANCE

1. Work under this section shall include complete and total balancing of all equipment air systems.

2. This contractor shall procure the services of an independent Air Balance and Testing Agency, approved by the Engineer, which specializes in the balancing and testing of heating, ventilating, and air conditioning systems. All work of this agency shall be done under the supervision of a qualified Heating and Ventilating Engineer employed by them. All instruments used by this agency shall be accurately calibrated and maintained in good working order. Should the Contractor refuse of neglect to make tests necessary to satisfy Architects that requirements of Specifications and Drawing are met, such tests may be made by an independent testing company with the Contractor charged for all expenses.

3. Air balance and testing shall not begin until system has been completed and is in full working order. The contractor shall put all heating, ventilating, and air conditioning systems and equipment into full operation and shall continue the operation of same during each working day of testing and balancing.

4. Testing and Balancing: The air balance agency shall perform the following tests and balance systems in accordance with the following requirements:

   a. Test and adjust belt drive blower RPM's to design requirements.

   b. Test and record each motor full load ampere reading.

   c. Make pilot traverse of main supply, return and exhaust ducts and obtain design CFM at fans.

   d. Test and record system static pressures, suction and discharge.

   e. Adjust main exhaust and return air ducts to proper design CFM.

   f. Adjust all zones to proper design CFM, supply and return.

   g. Test and adjust each diffuser, grille and register to within +/-5% of design requirements.

5. After balancing, the contractor shall demonstrate to the Mechanical Engineer, that the system is in balance and shall spot-check diffusers and registers at random to ascertain proper air delivery.

6. In preparing balance reports, contractor shall record information as required on ABC test sheets, No's 82020, 82030, 82033, 82035, 82040, 82100, 82101 and others as required.

7. In cooperation with the controls manufacturer's representative, set adjustments of automatically operated dampers to operate as specified, indicated, and/or noted.

8. All diffusers, grilles, and registers shall be adjusted to minimize drafts in all areas. As a part of the work of this contract, the air conditioning contractor shall make any changes in the pulleys, belts and dampers required for correct balance as recommended by the air balance agency.

PART 2 -- PRODUCTS

2.01 SHEET METAL

A. Layout: Drawings are in part diagrammatic and are intended to convey the scope of work and indicate the general arrangement of equipment, ducts and piping. Mechanical trades shall follow these drawings in laying out their work, consult general construction drawings to familiarize themselves with all conditions affecting their work and shall verify spaces in which their work will be installed. Where job conditions require changes in indicated locations and arrangement, make such changes at no additional cost to owner.

B. Description: Includes sheet metal plenums, ductwork, manually operated dampers and equipment connections.

C. Material: All sheet metal shall be fabricated of galvanized steel.

D. Low Pressure Duct Construction: Gauges, transverse joints, spacing of joints and intermediate bracing shall be as tabulated below, in which transverse joints are shown SS for S-stop, DS for drive slip, PS for pocket slip, and BS for bar slip. PS and BS lapped and riveted at corners. Intermediate bracing where shown may be omitted if duct sections of four feet (4'0") or less are used. Maximum spacing of bracing--four feet (4'0")

1. Schedule:

Shape	Size (in.)	Gauge	Transverse Joint	Bracing
Rect.	Up to 12	26	DS, SS	None
Rect.	13 to 18	24	DS, SS	None
Rect.	19 to 30	24	DS, SS	None
Rect.	31 to 42	22	1" PS, or BS	I x I x I-I/8
Rect.	43 to 54	22	1 1/2" standing seam	1.5 x 1.5
Round	Up to 9	24	2" slip	None
Round	9 to 14	24	4" slip	None
Round	14 to 23	22	4" slip	None

2. Alternate Transverse Joint: For rectangular duct sizes nineteen inches (19") and above, in lieu of the joint construction specified in Schedule 1 above, an alternate joint construction in "Ductmate" shall be acceptable. Submit shop drawings for approval.

3. Stiffening: Panels twenty inches (20") and larger shall be cross-broken unless standing seams are used and are spaced closer than thirty-six inches (36").

4. Changes in Direction and Size: Elbows with throat radius 75~ of the dimension of the adjacent duct as otherwise detailed. Ducturns used where indicated. In ducts twenty inches (20") wide or less, use Barber-Coleman ducturns or as approved. Transitions with lengths not shorter than those shown; minimum length of three feet (3'0") where not indicated. Round elbows shall be of 4-piece construction. Same gauge as adjacent duct. Round "Wye" fittings to have 45-degree side take-off tapped into reducing transition. Seal all joints as specified below.

5. Joints: Airtight for the purpose intended. Seal all joints with high pressure, flexible duct sealant with pressure tests to 10" of water column. Sealant shall be as manufactured by "Glenkote" or approved equal. Alternately, ductwork may be sealed with 6 oz canvas strips and Arabol. Pittsburgh lock or double seams excepted. Arabol shall be used full strength with no dilution. Duct tape shall not be used.

6. Supports: Ducts secured against displacement and vibration. Anchor to structural parts of building at intervals not greater than ten feet (10'0") and suspend with hanger straps. All supports shall be per SMACNA Standards. Submit shop drawings for approval.

7. Manual Dampers: Install where shown: manually operated, opposed blade dampers with interlocking edges, fabricated of 18-gauge steel and equipped with locking quadrants and end bearings. Duro Dyne SRH-228 damper regulators shall be installed on dampers in lined duct; SRST-I on wrapped duct, with proper offset for duct insulation. Each damper regulator rod, Duro Dyne model "SB." Submit shop drawings for approval.

8. All round "Wye" fittings shall include a manual volume damper with locking quadrant. Dampers shall be "Duro Dyne" JDS series or equal. Submit shop drawings for approval.

9. Turning vanes shall be double wall type. No exceptions.

10. Turning vanes in ducts twenty inches (20") wide and larger shall be double wall with perforate inner face and packed with fiberglass. Use "Sonoturn" or equal. Submit shop drawings for approval.

11. Register Boxes: Sheer metal register boxes shall be provided for all ceiling diffusers and registers with round duct connections. Register boxes shall be lined with one inch (1") duct liner and be complete with round starter collar, size as indicated on drawings. Submit shop drawing for approval.

12. Flexible ductwork shall be "GlassFlex" AVC-180 or equal, UL-181 Class I air duct, material tested and labeled with a flame and smoke raring of 25/50 or lower. The duct shall have R-4.5 fiberglass insulation and a 0.17 perm vapor barrier. Maximum length shall not exceed five feet (5'0"). Submit shop drawings for approval

13. The contractor shall verify all clearances on job prior to fabricating ductwork. Provide transitions and offsets as required to install the work and coordinate all clearances with other trades.

14. Provide "Duro Dyne" model TH-1 instrument port in each supply and return trunk for each specified system. Submit shop drawings for approval.

2.02 DUCT INSULATION

A. Line all ductwork where specified below with one inch (1") 1.5 PCF density moisture-resistant, fire-resistant, glass, sound absorbing duct liner. Liner shall be cemented to duct with "3M" #EC-104 adhesive. Where widths of ducts or casings exceed twenty inches (20"), both mechanical fasteners eighteen inches (18") on centers and adhesive

shall be used. Exposed edges securely cemented to prevent fraying. Dimensions of ducts are net inside liners. Manufacturer shall be "Manville" Linacoustic R or approved equal. Flame spread not over 25. Smoke developed not over 50. Liner shall meet all of the requirements of NFPA 90A & 90B. Submit shop drawings for approval on method of fastening and material.

1. All supply, return, and exhaust plenums.
2. Line all ductwork from inlet of exhaust fans upstream for a developed length of twenty feet (20'0") from the fan.
3. Line all register boxes with one-inch (1") duct liner.
4. In additional locations where shown on drawings.

B. Wrap all unlined ductwork in uninsulated or unconditioned areas with 1 ½", .75 pcf fire-resistant moisture resistant fiberglass insulation duct wrap. Insulation package shall have a flame spread rating of 25, and a smoke developed factor of 50 and shall meet all of the requirements of NFPA 90A & 90B. Duct wrap insulation shall consist of a blanket of glass fibers factory laminated to a reinforced foil vapor retarder facing with a 2" min. stapling and taping flange on one edge.

1. Duct wrap shall not exceed 25% compression during installation and shall carry an R-value of 4.2 installed.
2. Duct wrap sections shall be tightly butted to adjacent sections with the 2" flap overlapping the adjacent section. All joints to be stapled and taped with pressure sensitive tape matching the insulation facing, FRK backing stock or glass fabric and mastic. Seal all tears, punctures and other penetrations of the duct wrap facing with tape or mastic to provide a vapor-tight system.
3. Insulation shall be as manufactured by "Owens-Corning, or equal in "Manville" or "Armstrong".
4. Duct wrap shall be secured with #16 soft galvanized wire, spaced at twelve-inch centers. . No raw edges exposed will be acceptable.

2.03 CEILING DIFFUSERS AND REGISTERS

A. Performance:

1. Devices shall provide the required air throw and spread with no apparent drafts or excessive air movement within the ventilated or air conditioned area.
2. All air distribution accessories required to effect these conditions shall be provided and installed by this contractor.
3. Diffusers, grilles and registers causing excessive air movement, drafts or objectionable noise shall be replaced at no cost to the owner.

B. Ceiling Diffusers:

1. Diffusers shall be modular, removable core type, with adjustable volume control dampers.
2. Furnish diffusers in a factory applied, baked enamel finish. Color as selected by the Architect.
3. Diffusers shall be as manufactured by "Metalaire" Series 9000 MOD-FLO modular adjustable air diffusers, aluminum construction, or equal in "Anemostat."
4. Verify frame types prior to ordering. Submit Shop Drawings, including color samples, for approval.

5. Provide in the neck at each diffuser at duct takeoff from main duct, an adjustable type air extractor and volume controller. Submit shop drawings for approval.

6. Where air distribution devices are installed in lay-in ceilings, twenty four by twenty four (24" x 24") filler panel shall be provided. For ceiling diffusers larger than 24" x 24" (i.e. 30" x 22"), provide properly sized filler panel.

C. Sidewall Diffusers:

1. Diffusers shall be extruded aluminum linear bar grilles with sizes as shown on plans.

2. Deflection bars shall be 15° in a permanently fixed position.

3. Borders shall be 1" wide.

4. Grille and register sections shall be furnished in one piece up to 6 feet in length.

5. Bar Grille borders shall be mechanically fastened to provide a neat hairline corners.

6. Furnish all grilles with opposed blade dampers.

7. Grilles shall have a natural anodized finish, and shall be as manufactured by Metal*Aire or approved equal in "Anemostat" or "Titus".

D. Return/Exhaust Registers:

1. Registers shall be aluminum construction with key operated, opposed blade, volume Dampers.

2. Furnish all registers with a factory applied, baked enamel finish. Color as selected by the Architect.

3. Registers shall be as manufactured by "MetalAire" Model RH, or equal in "Anemostat."

4. Verify frame types prior to ordering. Submit shop drawings, including color samples, for approval.

5. Where registers are installed in lay-in ceilings, twenty four by twenty four (24" x 24") filler panel shall be provided. For return/exhaust registers larger than 24" x 24" (i.e. 30" x 22"), provide properly sized filler panel.

2.04 PACKAGED ROOF MOUNTED AIR CONDITIONING UNIT (GAS HEAT)

A. General:

1. Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing a scroll or reciprocating compressor for cooling duty and gas combustion for heating duty. Unit shall discharge supply air downward as shown on contract drawings. Units shall be manufactured by Carrier or approved equal. Substitute manufacturers shall meet all ratings on drawings, including SEER, cooling BTUH, and heating AFUE. Any substitute product not meeting any of the stated performance and efficiency ratings on the drawings shall be rejected.

B. Design Standards:

1. Unit shall be rated in accordance with ARI Standards 270 and 360. Designed in accordance with UL Standard 1995.

2. Unit shall be designed to conform to ANSI/ASHRAE 15.

3. Unit shall be UL tested and certified in accordance with ANSI Z21.47 Standards and CSA or CGA certified as a total package.

4. Unit casing shall be capable of withstanding Federal Test Method Standard 141 (Method 6061) 500-hour salt spray test.

C. Setup and Handling:

1. Unit shall be stored and handled per manufacturer's recommendations.

D. Cabinet:

1. Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a pre-painted baked enamel finish.

2. Indoor blower compartment interior cabinet surfaces shall be insulated with a minimum 1/2 in. thick, flexible glass fiber insulation, coated on the air side. Aluminum foil faced glass fiber insulation shall be used in the furnace compartment.

3. Cabinet panels shall be easily removable for servicing.

4. Filters will be accessible through a hinged access panel.

5. Holes shall be provided in the base rails for rigging shackles to facilitate overhead rigging.

6. Unit shall have a factory-installed internal condensate drain trap providing a minimum 3/4-in. connection. Drain shall allow for no standing water accumulation per AHSRAE 62. Substitute manufacturers shall provide proof of compliance with ASHRAE 62.

E. Fans:

1. Indoor Blower (Evaporator Fan):

a. All fans shall be belt driven and include an adjustable- pitch motor pulley.

2. Condenser Fans shall be of the direct driven propeller type with corrosion-resistant blades riveted to corrosion-resistant steel supports. They shall be dynamically balanced and discharge air upwards.

F. Compressor:

1. Hermetic type shall be factory rubber shock mounted and internally spring mounted for vibration isolation.

2. Factory-installed crankcase heater to prevent refrigerant dilution of oil.

G. Coils:

1. Evaporator and condenser coils shall have aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed.

H. Heating Section:

1. Induced draft combustion type with energy saving direct spark ignition system and redundant main gas valve.

2. The heat exchanger shall be of the tubular section type constructed of minimum of 20-gauge steel coated with a nominal 1.2-mil aluminum-silicone alloy for corrosion resistance.

I. Refrigerant Components:

1. Fixed expansion device with filter driers.

J. Filter Section:

1. FARR 30% disposable 2 inch filter or equal installed separately in RA duct and economizer outside air intake.

K. Controls and Safeties:

1. Unit Controls: Unit shall be complete with self-contained low-voltage control circuit protected by a manually resetable circuit breaker on the 24V side.
   a. Economizer Control
   b. Capacity control
2. Safeties:
   a. Unit shall incorporate a solid-state compressor protector which provides reset capability at the space thermostat, should any of the following safety devices trip and shut off compressor:
      1. Compressor over temperature, over current.
      2. Low-pressure switch.
      3. Freezestat, evaporator coil.
      4. High-pressure switch.
   b. Heating section shall be provided with the following minimum protections:
      1. High temperature limit switch.
      2. Induced draft motor centrifugal switch.
      3. Flame rollout switch (manual reset).
      4. Flame proving controls.
      5. Redundant Gas valve.
3. Operating Characteristics:
   a. Unit shall be capable of starting and running at 115 degrees F ambient outdoor temperature per maximum load criteria of ARI Standard 360.
   b. Compressor with standard controls shall be capable of cooling operation down to 25 degrees F outdoor ambient temperature.
   c. Unit provided with fan time delay to prevent cold air delivery before heat exchanger warms up.
4. Electrical Requirements:
   a. All unit power wiring shall enter unit cabinet at a single location.

L. Special Features:

1. Roof Curb: Formed 18 gauge galvanized steel shipped completely assembled with wood nailer strip, welded corners, and integral 2-in. spring isolation. Minimum curb height shall be 14 inches, including the spring isolation.

M. Integrated Economizer:

1. Integrated, fully modulating type field-installed capable of simultaneous economizer and compressor operation, to provide cooling with outside air.
2. Economizer shall be installed within the unit cabinet and equipped with centrifugal fan powered exhaust fan.
3. Provide FARR 30% disposable filter for OSA filtration.
4. Provide solid-state dual enthalpy control.

2.05 EXHAUST FANS (CEILING MOUNTED)

A. General

1. Fan shall be direct driven, ceiling mounted, with centrifugal blower.

2. See equipment schedule for capacities and duty of each exhaust fan to be provided and plans for layout details.

3. Fans shall be U.L. Listed and all electrical components shall carry the listing and comply with the State of California Electrical Code.

4. Fans shall be as manufactured by "Cook," or approved equal in "Greenheck" or "Penn."

B. Quality Assurance

1. Exhaust fans shall be design certified by AMCA.

2. All fans shall be statically and dynamically balanced.

C. Construction

1. The drive frame, bearing, and motor plates shall be constructed of mild gauge steel.

D. Motors

1. Motors shall be heavy duty, 1750 RPM, open drip-proof, horsepower and voltage as indicated on equipment schedule.

2. Motors shall be equipped with permanently lubricated, sealed ball bearings.

2.06 AUTOMATIC TEMPERATURE CONTROLS

A. Description: A complete system of automatic controls installed to control the equipment, consisting of a system of electronic and/or electric controls to provide the heating, ventilating and air conditioning results specified, as intended, and as shown on the drawings. All controls provided shall be the responsibility of a single manufacturer. The contractor shall furnish and install such additional material, equipment and appurtenances as required to make satisfactory operating Systems.

B. Work Included: The Mechanical Contractor shall be responsible for furnishing all the automatic temperature control devices as shown on the plans. He shall secure the services of the temperature control manufacturer to install all temperature control devices, except those specified as being furnished with other equipment. The temperature control manufacturer shall also-

1. Submit shop drawings of proposed temperature control system showing electrical interlocks with all mechanical equipment, list of materials being furnished, and a detailed description of the control sequence. These shop drawings shall completely show, in detail, all wiring, both control and power, for all heating and air conditioning equipment and systems. Failure to provide complete submittal will result in rejection of the product.

2. Instruct the electrician, sheet metal worker, and pipe fitter on the particular requirements of control devices for which each is responsible.

3. Calibrate all devices and make all final settings and test out control system under actual operating conditions for satisfactory operation.

4. Deliver and hang a copy of the control diagram, material list and control sequence, inclusive, on a permanent type of print, framed behind glass and mounted as directed by the Architect in the field. All control devices on the diagram shall be clearly labeled as to location and function.

5. Contact operating personnel, instruct them on the operation and maintenance of the control system and provide as hereinafter specified.

6. All low voltage wiring shall be furnished and installed by the Mechanical Contractor. Conduit for low voltage wire shall be furnished and installed under the Electrical Section of the specifications.

C. Work Not Included: All line voltage wiring, including conduit shall be under the Electrical Section of the specifications.

2.07 EQUIPMENT IDENTIFICATION

Equipment

1. Stenciled identification for each piece of equipment installed.

2. Equipment identification tags to match plan numbers.

3. Submit equipment stenciling for approval by Mechanical Engineer, prior to installation.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Beginning of installation means acceptance of conditions.

3.02 EQUIPMENT

A. Regulation, Operation and Instruction

1. Lubricate all bearings in accordance with manufacturer's recommendations and instructions.

2. Check operation of all pumps, fans, motors, etc.

3. The services of a qualified technician shall be made available for a continuos period of not less than seventy two (72) hours during business hours, at a time convenient to the owner to place the entire system into operation, supervise its operation, make all tests and adjustments, correct any and all defects and deficiencies and thoroughly instruct the owner's operators in the proper operation and maintenance of the entire system. Furnish complete test reports including all motor currents, static pressures, temperatures, fan speeds, and CFM to the Architect for review by the Mechanical Engineer.

4. Furnish any additional operation, labor, and material that may be required during guarantee period.

5. The contractor shall, during the guarantee period, and as directed by the owner, make any additional tests, adjustments, etc., that may be required and correct any deficiencies arising from the operation of the system.

3.03 OPERATING AND MAINTENANCE DATA

Data: Submit to the Architect for approval, prior to acceptance of the installation, complete and at one time. Partial or separate data will not be accepted. Data shall consist of the following--

1. Manufacturer's Literature: Six (6) copies of manufacturer's instructions for operation and maintenance of all equipment, valves, and controls; including replacement parts lists.

2. Written Instruction: Typewritten instruction for operation and maintenance of the system composed of Operation Instructions and Maintenance Instruction. Six (6) copies submitted to the Architect for approval.

   a. Operating instructions shall contain a brief description of the system. Adjustments requiring the technical knowledge of the service agency personnel shall not be included in the operating instructions.

   b. Maintenance instructions shall list each item (i.e. controls and mechanical equipment) requiring inspection, lubrication, or service and describe the performance of such maintenance.

3. Verbal Instructions: Operating personnel shall be instructed in the operation of the systems in accordance with typewritten instructions. No other verbal instructions shall be given.

4. Binders: Four (4) complete sets of the above data in looseleaf, ring type binders with permanent covers, with identification on inside cover.

3.04 SPECIAL REQUIREMENTS

A. The manufacturer and/or supplier of all equipment shall certify in writing to the owner that this equipment complies with these specifications.

B. All new equipment shall be anchored as required and/or as detailed on drawings.

C. Written Certifications, in a form approved by the Mechanical Engineer shall be provided by the equipment manufacturer or his authorized representative:

   1. That the equipment and its installation was inspected on the job by the manufacturer and that the equipment is in first-class condition throughout, was installed in accordance with manufacturer's requirements and recommendations, and that the installation is approved by the manufacturer.

   2. That the equipment is operating in a safe and satisfactory manner and is delivering capacities and performance hereinbefore specified and/or indicated on the drawings.

D. The following shall be certified as described above: Air-conditioning systems, evaporative coolers, suspended gas heaters, and exhaust fans.

E. Damage by Leaks: The contractor shall be responsible for all damage to equipment and premises caused by leaks or breaks in piping or equipment for a period of one (1) year after date of final acceptance.

F. Unless otherwise directed, and/or specified, and/or indicated, all materials and equipment shall be installed in accordance with the manufacturer's recommendations and instructions.

G. Mechanical equipment shall bear the manufacturer's label or nameplate showing performance characteristics. Identifying size or model number shall be given only when not practicable or customary to show otherwise. All valves, pipe, and fittings shall bear the manufacturer's trademark or identifying markings.

H. All materials of similar class or service shall be of one manufacturer.

I. Duct layout as shown on the drawings is subject to modifications, by contractor, without extra cost as required to clear other items of construction. This contractor shall coordinate the work of this section with that of other sections as to avoid interferences by other crafts involved.

J. Contractor shall visit site prior to bidding and fully acquaint himself with all conditions affecting installation of the proposed system. Failure to do so shall not relieve contractor of responsibility of providing complete, operational, and acceptable system.

3.05 COMPLETION

A. When the installation is complete and adjustments specified herein are made, the system shall be operated for a period of one week, during which time it shall be demonstrated to the Mechanical Engineer as being completed and operating in conformance with these specifications.

B. Record as-built drawings showing locations and size of all pipe and ducts as installed shall be kept up-to-date and available for inspection at all times during construction. These shall be signed by the General Contractor and Heating, Ventilating, and Air Conditioning Contractor to certify their accuracy and shall be submitted to the owner prior to final acceptance of the work.

***** END OF SECTION *****

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SECTION 16000

ELECTRICAL

PART 1-- GENERAL

1.01 SCOPE

A. Provide all Electrical Design Service, labor, materials, and equipment required to complete the electrical work shown on the Drawings and specified herein.

B. A brief outline of these requirements includes, but is not limited to the following:

1. Underground conduits, pull-boxes, pads, vaults, etc. for power
2. Electrical distribution equipment including switchgear
3. Complete interior and exterior lighting, power, telephone, and cable television systems including branch circuit distribution as indicated.

1.02 LISTINGS AND CODES.

A. All electrical materials and equipment shall be new and shall be listed by Underwriters Laboratories (UL) and bear their label, or listed and certified by a nationally recognized testing authority where UL does not have a listing. In addition, the materials, equipment, and installation shall comply with the requirements, where applicable, of the latest edition of the following:

1. National Electrical Manufacturers Association (NEMA)
2. American Standard Association (ASA)
3. National Fire Protection Agency (NFPA)
4. American National Standard Institute (ANSI)
5. California Code of Regulation, Title 24 (CCR)
6. National electrical code (NEC)
7. All local and state codes having jurisdiction

B. In cases where the codes have different levels of requirements, the most stringent rule shall apply.

1.03 SHOP DRAWINGS.

A. Contractor shall submit to the Architect for approval six (6) sets of a complete list and catalog cuts of all materials proposed to provide for the electrical systems covered by these drawings. Each electrical item shall be identified by the manufacturer and trade name of the item as well as the description given on the electrical engineers plans. Unless otherwise specifically authorized by the Architect, make all submittals in groups containing all associated items. The Architect may reject partial submittals as not complying with the provisions of this section. No materials shall be delivered to the job until the list has been approved by the engineer. Acceptance or rejection of substitute materials shall be at the discretion of the Architect.

B. Make all submittals in accordance with the general contractor's schedule of shop drawings and far enough in advance of scheduled dates of installation to provide required time for reviews, securing necessary approvals, possible revision and re-submittal, including placing orders and securing delivery.

1.04 LOCATIONS AND ACCESSIBILITY.

Work specified and not clearly defined by the Drawings shall be brought to the attention of the

Architect prior to installation so that it may be installed and arranged in a satisfactory manner.

1.05 TESTING AND ADJUSTMENT.

A. Upon completion of electrical work, adjust and test circuits, lights and other electrical items to insure proper operation of all electrical equipment.

B. Check service voltages under maximum obtainable loads. Equipment, fixtures, and parts found to be in need of correction during such testing shall be immediately repaired or replaced with new equipment and that part of the system shall be retested. Such replacement or repair shall be done at no additional cost to the owner.

C. All failures shall be corrected in a manner satisfactory to the Architect. The contractor shall furnish all necessary costs of retesting equipment and correcting failures.

D. All electrical tests shall be witnessed by an inspector that shall have experience in electrical work, equal to that of an electrician having at least five (5) years experience as an I.B.E.W. journeyman.

1.06 LAYOUT AND INSTALLATION.

Layout and installation of electrical work shall be coordinated with the overall construction schedule and work schedule of various trades, to prevent delay in the completion of the project. Complete Drawings for the entire project shall be available at the job site. It shall be obligatory to thoroughly check these documents before organizing the electrical work schedule or installing material and equipment.

1. The electrical Drawings are diagrammatic in nature and indicate the preferred locations of outlets and equipment, and are to be followed as closely as possible. It is not within the scope of the Drawings to show all bends, offsets, pullboxes, and obstructions and it shall be the responsibility of the contractor to include such in the bid. The Drawings are not intended to be scaled, and the contractor shall refer to the architectural Drawings for dimensions and limitations of the building structure, and to the mechanical Drawings for the location of equipment requiring electrical service and connections.

2. In the event that changes in the indicated locations or arrangements are necessary due to field conditions, such changes shall be made by the contractor without extra costs, providing the change has been approved by the Architect before the work has been commenced and no additional materials are required. Contractor shall advise the architect of any required additional costs and have approval of same before proceeding.

1.07 RECORD DRAWINGS.

Provide and maintain in good order a complete set of electrical contract prints. All changes shall be clearly recorded on this set of prints. At the end of the project, the contractor shall transfer all changes to one set of transparencies for submission to the architect. Accurate complete electrical contract prints shall be provided by the contractor to the architect when requested and at cost of printing. Upon completion of the work, deliver to the architect one complete set of final prints of the transparencies and the transparencies themselves, with complete installation and changes in the work indicated thereon. All sheets shall be dated and initialed by the contractor as being a correct and accurate record of the installation.

1.08 WARRANTY.

The manufacturer□s standard warranty shall in no event be for a period of less than two (2) years from date of initial start-up of the system and shall include repair parts, labor, reasonable travel expense necessary for repairs at the job site, and expendables filters, and other service items made unusable by the defect) used during the course of repair. Running hours shall not be a limiting factor for the system warranty by either the manufacturer or servicing distributor. Submittals received without written warranties as specified will be rejected in their entirety.

1.09 SUBSTITUTIONS

Substitutions will be considered per Article 5.3 of the General Conditions.

PART 2 -- PRODUCTS

2.01. DISTRIBUTION SERVICE EQUIPMENT AND PANELBOARDS.

A. Design, provide and install Panelboards in the location as shown on plans and shall conform to the requirements of the U.L., NEMA standard for panelboards. Fronts shall be finished to resist corrosion with not less than one priming coat and one finishing coat. Exposed parts of trim and doors shall be painted by others after installation. All branch circuit panel board locks shall be "like keyed" with three keys furnished to owner. Adjacent poles of single pole devices shall be of a different phase with split phase bussing. Circuits shall be numbered from top to bottom with odd numbers on the left and even numbers on the right. The front shall include flush hinged door with lock, covering all breakers.

B. Identification nameplates shall be provided of micarta 1/8" thick, of approved size, with beveled edges and engraved white letters 1/4" high minimum on black background.

2.02. CONDUITS AND RACEWAYS.

A. All conduits and raceways shall conform to U.L. standards as applicable.

B. Electrical metallic tubing (EMT). No less than 1/2" trade size, 2" maximum trade size. E.M.T. may be used in dry locations only. Shall conform to U.L. standards as applicable.

C. Rigid galvanized steel conduit (RGS). Shall be steel, galvanized or zinc coated full weight, no less than 1/2" trade size. Shall conform to U.L. standards as applicable.

D. Liquid-tight flexible conduit. No less than 1/2" trade size, flexible, galvanized steel core completely encased in a polyvinyl chloride jacket. Shall conform to U.L. standards as applicable.

E. Non-metallic polyvinyl chloride (PVC). No less than 3/4" trade size, schedule #40 unless noted otherwise. Sunlight resistant and rated for 90° c. Conductors. Shall conform to U.L. standards as applicable.

F. Flexible metallic conduit. No less than 1/2" trade size, steel, formed from continuous strip and zinc coated. Shall conform to U.L. standards as applicable.

2.03. FITTINGS. Fittings and outlets for conduit systems shall conform to the following:

A. Fittings for electrical metallic tubing (EMT) for sizes 1/2" through 2" shall be wrench tightened compression type which shall provide pull-on force resistance and electrical continuity as required by U.L. No indenting fittings or adjustable set screw type fittings shall be used.

B. Fittings for rigid galvanized steel conduit (RGS) shall be steel, threaded fittings only. Split and "set screw" type fittings are not acceptable.

C. Fittings for liquid-tight flexible conduit shall be of the compression type with threaded ferrule, sealing ring and suitable for wet locations.

D. Fittings for PVC shall be non-metallic, sunlight resistant, and of the same compound as the conduits which they are being utilized with.

E. Fittings for flexible metallic conduit shall be of the "squeeze" type with either one (1) or two (2) screws, cast or malleable steel, cadmium or zinc coated.

2.04. CONDUCTORS.

A. Conductor sizes are specified by American Wire Gauge (AWG). Conductors shall be copper. Wire sizes #10 and larger shall be stranded conductor. However, control and signal systems

may be wired with #14 stranded. Insulation for wiring shall be 600 volt type "THWN", 75° c. Rated for dry or wet locations or type "THHN", 90° c. Rated for dry locations.

B. Conductor sizes shall be sized as required by code. All wiring shall be color coded for phase identification as follows:

120/208V. 3Phase, 4W.	277/480V. 3Phase, 4W.
Phase A = Black	Phase A = Brown
Phase B = Red	Phase B = Orange
Phase C = Blue	Phase C = Yellow
Neutral = White	Neutral = Grey
Ground = Green	Ground = Green

C. Make splices for conductors #8 and smaller with steel or copper spring insulated wire nuts. Splices for conductors #6 or larger shall be with split bolts or "Kearney's" which when used shall be thoroughly insulated.

D. The green ground wire shown on conduit runs shall run continuous from panel to last outlet. This wire shall be pigtailed in each outlet for connection to box and device so that if the device is removed, the ground will not be interrupted.

2.05. OUTLET BOXES.

Outlet boxes shall be sized for the number and size of conductors and conduits entering the box and equipped with plaster/extension rings where required. All boxes shall be labeled to indicate panel and circuit number of conductors contained within. In no case shall any box be less than 4" round or square. Unless specifically noted otherwise, outlet boxes for concealed work shall be galvanized or sherardized, one piece, pressed steel, with knockouts as required. Provide dedicated power connections to all ancillary office equipment such as printers, faxes, plotters, and shredders.

2.06. PULL BOXES.

Sizes as indicated on the Drawings and per utility company requirements, but in no case of less size or material thickness than required by the governing code in-ground. Pull boxes located in or around vehicular traffic areas shall be provided with traffic rated covers and shall be placed to avoid surface water flow areas. All covers shall be permanently identified as to the type of service contained therein (IE: power, communications, etc.) Above-ground boxes located in damp or wet areas shall be rated NEMA 3R.

2.07. DISCONNECTS.

A. Manual motor starter switches shall be toggle type on/off, as required for control of single and three phase motors and resistance heater loads. Switches shall be side wired and be complete with oversize silver contacts. Shall be U.L. listed as applicable

B. Safety switches shall be heavy-duty industrial type. Switches shall be fused or non-fused as indicated on the Drawings. Enclosures shall be rated either NEMA 1 or NEMA 3R as required by installation. Units shall be quick make, quick break with operating handle which can be padlocked in the "off" position. Finish shall be standard light gray enamel. Switches shall have affixed to covers, a nameplate indicating what item is controlled by switch.

1. Fuses shall be of correct rating for each installation, and shall be either current limiting or multi-element time delay as required by equipment manufacturer's recommendation. Shall be U.L. listed.

A. Sealing of devices in hazardous areas are to be treated per NEC Article 500

2.08. PULL WIRES.

Install an unspliced pull line in all empty conduits. Pull line shall be a 3/16" braided polypropylene

line.

2.09. GROUND RODS.

Provide steel centered copper clad ground rods as required per NEC 250. Minimum length shall be 3/4" x 8', driven nearly full length into the earth with no more than 2" left above grade for proper connection to the grounding conductor(s). The resistance of a made electrode must comply with NEC 250-36.

2.010. LIGHTING FIXTURES

Provide a complete lighting system consisting of exit and emergency lighting and area lighting consisting. See Lighting Fixture Schedule as provided in the Drawings for type of fixtures and control systems.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Beginning of installation means acceptance of conditions.

3.02 GENERAL.

Any cutting, patching or finish repair of the work or work of other trades necessary for the installation of the electrical work shall be provided under this section.

3.03 MISCELLANEOUS.

A. Provide trenching, concrete encasement when required, backfilling and compaction for all underground conduits and/or structures. Compaction must meet General Contractor requirements.

B. Provide footings for all post and/or pole-mounted lighting fixtures: concrete shall conform to the applicable sections of this specification and local codes having jurisdiction.

C. Structural and miscellaneous steel used in connection with electrical work and located out-of-doors or in damp locations, shall be galvanized unless noted otherwise. Included are underground pullbox covers, unistrut bracing and similar electrical items.

D. Flashings shall be provided at all points where conduit or other electrical components penetrate the roof. Flashings shall extend a minimum of 5" above the surrounding roof surface with weatherproof mastic applied, to prevent moisture or dust from entering the opening. Flashings shall be delivered to the roofing contractor for installation. The correct location of all such penetrations shall be verified by the contractor.

E. Provide sleeves under walls, concrete footings and foundations. Sleeves shall have an inside diameter of not less than 1" larger than the outside diameter of conduit contained therein.

3.04 CONDUIT.

A. Conduit for line voltage wiring shall be concealed within finished walls, ceilings and under/in floors. Exposed conduits above ceilings and surface mounted in mechanical and service areas shall be installed parallel or perpendicular to the building walls. Right angle turns shall consist of conduit bodies or symmetrical bends. All conduits shall be properly secured with components specifically manufactured for this use. All conduits shall be sized in accordance with fill capacities set forth in NEC Article 348.

B. Electrical metallic tubing (EMT), Do not embed EMT in concrete or below grade. EMT may be used where concealed or where not subject to damage.

C. Rigid galvanized steel conduit (RGS) shall be used in mechanical rooms, where conduit passes through concrete slabs on grade and where subject to physical damage.

D. Flexible metallic conduit shall be used for final connections to all vibrating and mechanical equipment. A code gauge green insulated equipment grounding conductor shall be installed in such conduits. Flexible metallic conduit may be used in length's of less than 6' for connecting fixtures, provided that a code gauge insulated grounding conductor is provided. Liquid-tight flexible conduit shall be used for all damp or wet locations.

E. Polyvinyl chloride conduit (PVC) shall only be used underground at depth per code, unless otherwise noted, below finished grade when not installed under a concrete slab or footing. Provide a code gauge green ground wire in all PVC runs. All underground conduit runs shall terminate with pre-manufactured bell ends at all manholes and pull boxes.

F. Conduit ends shall be cut square and shall be carefully reamed out to full size with a tapered burring reamer and shouldered to the fittings.

G. Bends in conduit shall be made so that the conduit will not be damaged, and that the internal diameter of the conduit will not be effectively reduced. The radius of the curve of the inner edge shall not be less than shown in table 346-10 of the NEC.

H. Conduit supports shall be provided for all above ground systems. Conduit shall be securely supported and fastened per the NEC and local jurisdiction

I. Conduit shall not run closer than 6" to any hot water pipe, steam pipe, heater flue, or vent.

J. Condulets shall be used where conduit runs must go around outside corners of walls, beams, equipment, etc. All condulet covers shall be accessible.

K. All conduits entering or leaving the building shall be sealed per NEC requirements.

L. All conduits entering the building from a hazardous area must be sealed per NEC Article 500.

3.05 CONDUCTORS AND TERMINATIONS.

A. Wire and cable shall be continuous from outlet to outlet, with the splices only in junction boxes, gutters, equipment or other approved locations.

B. Make splices, joints, taps and connections to equipment with approved solderless lugs sized for the wire or conductor involved.

C. Identify power and lighting feeders with permanent tags at panels, pull boxes and points where conduit run is broken.

D. Installation. Thoroughly clean conduit and wireways to insure all parts are perfectly dry before pulling wires. Use approved wire pulling compound for sizes #2 or larger, and on long runs.

E. Wire or cable bends in junction and/or pullboxes shall be made with a long radius. Bends for cable shall have a radius of not less than 8 times the diameter of the cable. Per N.E.C. Section 300-34.

F. #12 Conductors and smaller shall be provided with eye or forked type compression set connectors when conductors are terminated on a set screw type terminal.

3.06 DEVICE AND JUNCTION BOXES.

A. Concealed outlet boxes shall be accurately placed, flush with the finished surface of wall or ceiling, unless otherwise indicated. They shall be plumb and rigidly fastened to the structure, independent of the conduit, by a bar hanger or strap approved for that particular use.

B. Outlet boxes in furred ceiling shall be rigidly fastened to the supporting structure by an approved bar type hanger or blocking.