SPECIFICATIONS

RESTORATION - ZUNI MISSION

(NUESTRA SENORA DE GUADALUPE DE ZUNI)

ZUNI PUEBLO NEW MEXICO

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NATIONAL PARK SERVICE

DEPARTMENT OF THE INTERIOR

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SPECIAL PROVISIONS

SP-01 DESCRIPTION OF WORK

The proposed construction consists of the restoration of the Zuni Mission (Nuestra Senora De Guadalupe De Zuni) in accordance with the drawings, these specifications and as may be directed by the Board of Directors, Old Zuni Mission, Bureau of Indian Affairs and the Zuni Tribal Council.

The intent of the project is to restore the existing ruins to the period of 1870-1880 as indicated by existing photographs and within the limitations established by the Zuni Tribal Council. The structure shall, within the above stated intent, be modified as necessary to be a living church.

SP-02 DRAWINGS AND SPECIFICATIONS

a. The drawings are:

Dwg. No.	Title	Sheets	Date
931/94000	Restoration-Zuni Mission	10	December 27, 1967

b. The specifications consist of all the specifications and documents bound herein and all notations, schedules, and related data on the drawings.

SP-03 TIME

The time required for the completion of the entire project as comprehended by the contract shall be as determined by the Catholic Church or their designated representative. Completion date may be waived by the Catholic Church.

SP-04 LIQUIDATED DAMAGES

Liquidated damages for each calendar day of delay in completing the work defined in the contract beyond the completion date as determined by the Catholic Church shall be as stipulated by the Catholic Church.

Liquidated damages may be waived by the Catholic Church.

CONSTRUCTION SPECIFICATIONS

SECTION I

CLEARING AND EARTHWORK

1.01 CLEARING. Clear the site to the boundary lines as established by "Legal Description of Old Mission Church" and the accompanying map, dated May 9, 1966.

Sufficient area within the cemetery adjacent to the building shall be established to permit the necessary work to be accomplished.

1.02 EXCAVATION. Excavate to levels and dimensions shown on the plan or as necessary to accomplish the indicated work. Excavate footings to undisturbed natural bearing soil. Finish accurately bottoms and sides of excavations where unformed concrete is to be placed. Finish to 1" additional thickness of concrete each side of excavation where concrete is placed without forms. If footings are over-excavated, fill below required depth with concrete. Remove all loose or disturbed material from bottom of excavations before placing concrete. Keep excavations free of ponded water. Shore as necessary in trench, bank and deep excavations.

Where concrete footings rest on rock, level rock to a clean, even surface.

Grade excavated bottoms accurately to provide uniform bearing and support for entire length of each section. For drain pipe, round bottom of trench so at least bottom quadrant of pipe rests on undisturbed soil. Dig holes for bells and jointing operations after trench bottom has been graded.

1.03 FILL AND BACKFILL. After completion of construction below final grades, clean excavations of all debris.

A. Fill Under Concrete Slabs. Fill shall be crushed rock or screened pit run gravel well graded, No. 4 minimum to $1\frac{1}{4}$" maximum. Deposit in uniform layer, level and thoroughly compact by mechanical means.

B. Bedding Material. Cover pipe carefully with bedding material of sand, pea gravel, or loam free from debris and without rock larger than 5/8 inch in largest dimension.

After pipe installation and inspection, place bedding material to a level 6 inches above top of pipe and thoroughly hand tamp, then settle by mechanical tamping. Rodding with metal rods will not be permitted. Finally, overfill trench and compact to 4" above grade to allow for settlement.

C. Backfill Around Foundations and in Trenches (above bedding material) with excavated material or approved borrow, free from debris. Do not use material over 12" in major

dimension in backfilling against foundation walls. Overfill to allow for settlement.

Place and compact backfill in 8" layers. Grade to assure drainage away from foundations. Place and compact with care to avoid displacing pipe, concrete, or other work. Remove all excavated material not used for fill or backfill and deposit on site or as directed by the Tribal Council.

D. Settlement. After backfill has settled, fill and compact all low areas to bring to grade before final acceptance.

1.04 GRADING AND CLEANUP. Fine grade area as shown on the drawings and to a uniform slope 2" in 5 feet away from structure. If directed by Catholic Church some areas may be graded 4" below grades indicated on the plans to allow for topsoil.

SECTION II

CONCRETE WORK

2.01 GENERAL. The source of all concrete aggregate is the responsibility of the Contractor. If local natural aggregate is used, it shall be selected, screened and washed as required to conform to A.C.I. 318-63 Building Code requirements for reinforced concrete and A.C.I. 315-57 Manual of Standard Practice for Detailing Reinforced Concrete Structures.

2.02 MATERIAL. The materials used in the work shall conform to the following specifications:

A. Portland Cement: Type I, II or III, Federal Spec. SS-C-192d or A.S.T.M. C150. Use only one brand of cement. Furnish cement for on-the-job mixing in standard one-cubic-foot bags, or bulk cement weighed on an approved weighing device.

B. Course Aggregate: Federal Spec. SS-A-281b(1) or A.S.T.M. C 33-49 and shall be clean, hard, durable, uncoated gravel or crushed stone. Concrete aggregate size range (by weight):

Passing a 2-inch sieve	-	100%
" " 1½-inch "	-	95-100%
" " 3/4-inch "	-	35-70%
" " 3/8-inch "	-	10-30%
" " No. 4 Screen	-	0-5%

C. Fine Aggregate (sand): Clean, hard, durable, uncoated

grains. Size range (by weight):

Passing a No. 4 sieve	-	95-100%
" " No. 16 "	-	45-80%
" " No. 50 "	-	10-30%
" " No. 100 "	-	2-10%

Volume removed by sedimentation - Not more than 3% fine aggregate shall pass A.S.T.M. C 40 sodium hydroxide test for silt and humus and shall not contain strong alkali or organic matter.

Deleterious Substances: Maximum in fine and coarse aggregates (by weight):

	Clay Lumps	Coal & Liginite	Material Passing NO. 200 Sieve	Soft Fragments
Fine Aggregate	1	½	3	0
Coarse Aggregate	¼	½	1	3

D. Water: Clean and potable.

E. Reinforcing Steel: A.S.T.M. A-499-64 or Federal Spec. QQ-S-632, Type B (deformed) Grade 2 (Intermediate), free from oil, dirt, loose scale, concrete spatter, etc.

F. Welded Wire Fabric: A.S.T.M. A-185-37 and A-497-GA spot welded.

G. Expansion Joint: A.S.T.M. D-544, ½" asphalt impregnated fiberboard of width of concrete or members jointed.

H. Metal Accessories: Include all spacers, chairs, ties, sleeves and other devices necessary for proper placing,

spacing and fastening of reinforcing. Form Ties: approved bolts, straps or rods of proper lengths and design that when forms are removed, no metal shall be within 3/8" of finished (exposed) surfaces.

I. Ready Mix or Transit Mix Concrete: Shall meet requirements of this section.

J. Bonding Agent: MIL-B-19235 Larsen Products Corp., "Weld-Crets," or approved equal applied in strict accordance with manufacturer's directions to repair honeycomb, or similar applications where bonding of concrete to existing or set concrete is required, or to existing stonework.

K. Curing Materials: Double-sheeted kraft paper; polyethylene plastic sheets; an approved type nonstaining sprayed on painted coating or surface flooding (slabs) with water.

2.03 CONSTRUCTION

A. Concrete Compressive Strength: Minimum 3000 lbs. per square inch at 28 days. Slump 5" maximum, Cement content: minimum of 6 sacks per cubic yard of concrete. Water maximum of 6 gals. per sack of cement.

B. Reinforcing: Bar lap: minimum 24 bar diameters. Install reinforcing continuous around corners or use splice bars with minimum lap and same bar size. Unless otherwise shown, reinforce all slabs with 6" x 6" 6/6 welded wire mesh.

Welded wire (Fabric) reinforcing in slabs shall be lapped minimum 6" at edges, tied securely together; stretch flat and center in slab; tighten and adjust as concrete is placed.

C. Mixing and Placing: Minimum mix time: 1½ minutes after all materials are in mixer, place on clean surface, free from frost, ice, mud, and water. Waterproof sheathing paper shall be laid over extremely dry or pervious earth surfaces receiving concrete.

Concrete shall be handled from the mixer to the forms as rapidly as practicable. Concrete shall be placed in accordance with the A.C.I. Code (A.C.I. 318) recommendations. Immediately after depositing, the concrete shall be vibrated or spaded and tamped to compact the mass and work it into corners and around forms and reinforcing without voids.

Deposit Concrete around unit of work so pour is built up in layers not over 24" deep. Concrete shall not be dropped freely over 3' or in a manner which causes separation of aggregate from concrete matrix. Concrete which has reached initial set or has been retempered will be rejected. Maximum time between mixing and placing: 30 minutes.

D Finishes:

Trowel and broom - Stairs, outside slabs.

Troweled - Enclosed floors.

Rubbed - Foundation walls (that portion above grade or exposed) exposed structural members.

Tool Round - Exposed wall and slab edges.

Grout fill - All honeycombs and voids. Grout Mix: one part cement two parts screened sand.

E. Tolerances: 1/8" plus or minus in 10 ft. for both linear dimensions and flat slabs.

2.04 PROTECTION AND CURING. Protect all concrete from freezing, drying; freshly placed concrete from wash by rains. Keep all concrete wet for five days after placing, except two days is sufficient if high-early-strength cement is used. In freezing weather keep concrete above 70° F for 72 hours or above 50°, except 24 hours is sufficient if high-early-strength cement is used at 70° or 50° for $2\frac{1}{2}$ days.

A. Horizontal Concrete Surfaces: Cover with curing materials as soon as possible after finishing. Carefully maintain curing materials in place not less than 5 days.

B. Vertical Concrete Surfaces:

(1) Keep forms wet and in place for not less than 5 days. Forms shall be loosened to allow water to run down between concrete and forms, or:

(2) Application of an approved type of nonstaining

sprayed or painted protective coating immediately upon removal of the forms: (Where contractor chooses this method of curing walls, forms shall be left in place not less than two days following placing of concrete)

C. Removal of Forms: A.C.I. Par. 702.

2.05 TEST AND SAMPLES: This paragraph may be omitted at the discretion of the Catholic Church.

A. Before any Concrete is Placed:

Contractor shall submit, for approval, evidence based on test made in a recognized laboratory to show that materials proposed for use in concrete conform to specifications requirements, and that when proposed materials are combined, concrete of required strength can be obtained. A "recognized" laboratory is any State Highway, Bureau of Public Roads, or cement and concrete laboratory regularly inspected by Cement Reference Laboratory of N.B.S. Documents submitted shall include:

(1) Mechanical analysis of aggregate, including location of source.

(2) Reports of at least three strength tests on cylinders molded of proposed aggregates in accordance with A.S.T.M. C-31 or C 192, tested in accordance with A.S.T.M. C-39.

(3) Name and address of ready-mix firm supplying concrete or description of on-the-job equipment and operations to be used in mixing concrete.

B. Other Test: As may be deemed necessary during progress of work.

(1) Slump Test: Will be made in accordance with A.S.T.M. C-143.

(2) Test Cylinders: Shall be made in accordance with A.S.T.M. C-31 and tested in accordance with A.S.T.M. C-39. The general practice will be to require 3 test cylinders from each day's pour. Molding and testing of cylinders will be arranged and paid for by the contractor.

SECTION III

MASONRY AND PLASTER

3.01 GENERAL. The success of this phase of the work as well as the resulting character of the restored structure will depend entirely on the esthetic understanding and ability of the Contractor. Decisions such as the extent to which the existing masonry shall be removed can only be determined by his good judgement and his knowledge of construction.

Old adobe construction was never intended to appear mathematically perfect. Bricks molded in wooden forms were rustic objects with soft edges, not intended to be of the sharpness of the modern brick or block. The structure must, of course, be sound, but the signs of age are lost if it is made plumb and level in every part.

3.02 MATERIALS

A. Adobe Brick: Shall be 11" wide, 23" long and 3" to 3½" high, cast from wooden forms of local adobe soil. The raw adobe shall be mixed with clean potable water in accordance with local custom. All bricks shall conform to local building codes for adobe brick.

At the discretion of the contractor and with written approval of the Catholic Church, "Soil-Cement" adobes may be used in the restoration. The soil-cement if used shall

conform to all applicable code for this type of material.

B. Mortar: Shall be of the same adobe soil and mixed with clean potable water.

C. Horizontal Reinforcing: Shall be "Dur-O-Wall" or equal spaced at 24" vertically, and the first two courses above and below all wall openings. Vertical reinforcing shall be installed as required.

3.03 BOND BEAMS. A 12" deep continuous reinforced bond beam shall be installed in all walls to support the vigas. Width to be as permitted by the wall thickness.

3.04 CONSTRUCTION

A. Existing Walls: All badly weathered facing adobe brick shall be removed to the top of the foundation. Weathered adobe brick comprising the wall core shall also be removed until sound brick are exposed. The core shall be capped with a 12" deep continuous reinforced concrete bond beam. A veneer of adobe bricks shall be installed with ties and reinforcing as necessary. The entire wall shall be laid to the height as shown on the drawings. The finish wall width shall equal the width of the supporting foundation. The bond beam shall be reinforced with 3' 3/4" dia. rods with lap of 24 diameter.

B. New Walls: When necessary to remove entire existing adobe walls, the width of the reconstructed wall shall be the same as the supporting foundation. Bond beams (2) shall be

installed. Horizontal reinforcing shall be installed.

C. Exterior Plaster: Shall be natural color adobe, approximately 1" thick, shall be applied directly to the adobe brick. The plaster shall be mixed and applied using native techniques. Adobe plaster walls shall be applied on wire mesh or chicken wire (1" mesh) attached to the wall with spacer nails. In no case will the plaster be applied in a smooth, even manner, but shall follow and accent the irregularities of the underlying adobe wall.

All exterior plaster shall extend 6" below finish grade. Sound existing plaster shall not be removed.

White gypsum plaster finish coat shall be applied from grade to balcony roof on the south face of the north tower, the east face of the main facade between the towers and the north face of the south tower.

D. Interior Plaster: Sound existing plaster shall not be removed. New adobe plaster shall be applied to wall surface on wire mesh or chicken wire (1" mesh) from floor to ceiling. Surface coat to white gypsum, matching existing plaster. New plaster shall be same thickness as the existing and shall be mixed and applied using native techniques.

E. Hardener: All plaster shall be treated with Pencapsula. See Section VIII, paragraph 8.05 Hardener.

SECTION IV

CARPENTRY AND MILLWORK

4.01 GENERAL. The work under this section is most important to the success of the restoration. The Contractor will be called upon repeatedly to experiment with various methods until acceptable results are achieved. All exposed woodwork and millwork shall be fabricated so that its final appearance will be that of the work of the period of restoration. This may mean that various types of primitive tools must be used, in many cases boards and timbers must be cut by hand or hand hewn with broadaxe or adze. While good construction practices must be followed, woodwork should not be plumb or square. Finished lumber should not show mill marks caused by the knives in a modern planing mill. Work should be characteristic of that performed by unskilled native craftsmen.

4.02 LUMBER

A. General: In so far as possible all sound old timbers removed from the structure shall be reworked and used in the construction of windows, doors, joist, rails, etc.

B. Grading: Vigas, beams, lintels and joist shall be dense structural grade not less than 1600f as graded by the West Coast Lumber Inspection Bureau. Rails, doors, windows, framing, sheathing and all other woodwork shall be construction grade. Savinos shall be peeled sticks $1\frac{1}{2}$" to 3" diameter. To save material savinos may be split and laid

with the round side exposed. Existing savinos found on the site shall be reused. Existing savinos in place shall not be removed but incorporated in the work.

Plywood subflooring shall be waterproof, exterior grade conforming to the grading rules of the American Plywood Association.

4.03 WOOD PRESERVATIVE TREATMENT: All vigas, beams, lintels, joist, post, frames and other lumber in contact with earth, masonry, plaster or concrete shall be treated with a five percent solution of pentachlorophenol in mineral spirits or a two percent solution of copper naphthenate in mineral spirits. When used on lumber to be stained, solution shall be a type compatable to the treatment. Raw surfaces of lumber cut after treatment, all bolt holes and other apertures shall be brushed with or dipped into the solution used for treatment.

In lieu of the above treatment the contractor may substitute treatment with "Nevarot Wood Preserver" as manufactured by Texas Refinery Corp., applied as directed by the manufacturer.

4.04 FRAMING:

A. Roof framing: Members shall be assembled, fitted and set as shown on the drawings.

B. Doors, windows, frames and rails: Shall be fabricated to details shown. Material shall be pre-treated on all surfaces

with preservative. Joints shall be tongue and grooved and glued with waterproof glue.

C. Anchors and connections: Install post anchors, beam connections and framing anchors where shown or as required.

4.05 ROUGH HARDWARE. Provide all miscellaneous rough hardware including nails, bolts, dowels, clips, etc. as may be required to complete the work.

Install lag screws in holes drilled 1/16" less than diameter of base of screw for the threaded portion. Install bolts through holes same size as bolts in both members to be bolted. Draw up all bolted members tight when placed and retighten before closing in framing.

4.06 NAILING. All concealed nails shall be common wire nails. All concealed exterior nailing shall be with aluminum alloy or hot dip galvanized nails. All exposed nails shall be flathead square nails.

4.07 GROUNDS AND NAILERS. Provide wood grounds, nailers, blocking, etc., throughout the work for proper anchorage and installation of all work including equipment, plaster, roofing, wood trim and other finish millwork, all as detailed, specified or required.

SECTION V

ROOFING

5.01 GENERAL. This section of the specifications includes built-up roofing, metal flashing, and related work as specified and as shown on the drawings.

5.02 MATERIALS. Roofing shall be Texas Refinery Corporation three ply (smooth surface) applied over base feet in accordance with the manufacturers specifications.

5.03 APPLICATION.

A. Preparation. Roof deck shall be firm, dry and clean, and properly graded to outlets. Cant strips shall be installed in the angles formed by the deck and vertical surfaces.

B. Base Felt. Lay one thickness of 45 lb. Base Felt, lapping the sheets 2" and nailing through in caps at 6" o.c. through the laps and at 18" o.c. through the longitudinal center of each sheet in two lines spaced 10" apart, the nails to be staggered.

C. Plies. Over the base felt, lay three plies of 15 lb. felt lapping each sheet 22" over the preceding one, mopping the full width under each with 30 lbs. of asphalt per ply, per square, and nailing through tin caps at 9" o.c. adjacent to the back edge.

D. Coating. Finish the entire surface with a mopping of "Mightyplate" Roof Coating as manufactured by Texas Refinery

Corporation using approximately 2½ gallons per 100 sq. ft. of roof area.

5.04 FLASHING. Provide galvanized sheet metal flashing and counter-flashing where indicated on the drawings or where required to make the work water tight.

SECTION VI

GLASS AND GLAZING

6.01 MATERIALS

A. Glass: Shall be double strength "B" cut to fit opening accurately all around with proper clearance. Cuts shall be straight and true with no ragged edges.

B. Elastic Glazing Compound: Shall be especially formulated for channel glazing with wood sash and stops. It shall be used as it comes from the container without alteration and only after thorough remixing. If thinning is required, use only white gasoline and not more than one tablespoon per gallon of compound.

6.02 GLAZING: Surfaces shall be dry and free from dust or ice before glazing. Dirty surfaces shall be cleaned with a cloth saturated with turpentine or mineral spirits before glazing. Glazing compound shall not be applied in temperatures below 40 degree F. or during damp or rainy weather. Do not glaze wood windows until they have received one application of stain. Complete installation shall be sound and waterproof.

SECTION VII

STRUCTURAL STEEL AND MISC. IRON

7.01 GENERAL: Furnish and install structural steel beam as indicated by the drawings. Provide all necessary anchors, bolts and other miscellaneous fastenings as required for proper installation of the work of this section. Set anchors, etc., accurately in position during construction of the building in order to avoid delay, unnecessary cutting and patching. Provide temporary supports and bracing where necessary.

7.02 PIPE RAIL: Shall be fabricated of galvanized iron pipe, with an inside diameter of $1\frac{1}{4}$". All joints shall be welded. Rail to be set in concrete without sleeves.

7.03 SHOP PAINTING: All structural steel and misc. iron shall receive one heavy shop coat of rust inhibitive paint. Clean all surfaces of dirt, rust, grease, and scale and paint after fabrication but before erection.

SECTION VIII

ADOBE FLOORS

8.01 GENERAL: Adobe floors of the narthex, nave, sanctuary, choir loft, balcony, porch, and the top, sides and front of all three altars shall be covered by this section.

8.02 NARTHEX, NAVE AND PORCH: The finished floor in these areas shall be 6 inches thick, laid in 3-2 inch layers. The adobe mix shall be stiff. After each layer is placed it shall be thoroughly tamped and covered with damp burlap for 24 hours before the next layer is placed. The top layer shall be tamped each day, for three days and kept covered with damp burlap. Should cracks appear after curing, the surface shall be fog sprayed and tamped daily until all cracks are eliminated.

8.03 CHOIR LOFT, BALCONY AND SANCTUARY: The thickness of these floors shall be as indicated on the drawings. They shall be laid in the same manner as floors covered in 8.02 NARTHEX AND NAVE.

8.04 ALTARS: The adobe finish shall be applied to the top, front and sides of the three altars as shown by the drawings and tamped in a manner similar to the floors. Before the adobe has set, five crosses shall be incised in the top of the altars as directed by the Priest in charge of the work. A finish coat of white gypsum plaster shall be applied to the top, front and sides.

8.05 HARDENER

A. General: After the floors are completely dry they shall be treated by the application of a hardening agent.

B. Material

a. Pencapsula as manufactured by the Texas Refining Corp., 830-850 N. Main St., Fort Worth, Texas 76101.

b. Mineral Spirits (Odorless) Paint thinner complying with Fed. Spec. TT-T-295a.

C. Mixing: All mixing of the hardening agent shall be done by the contractor at the job site. Only such amounts as can be applied within one day shall be mixed at one time

The proportion of the ingredients shall be as follows:

T.R.C. Pencapsula	1 part
Odorless Mineral Spirits	5 parts

D. Application: The hardening agent shall be applied at the rate of 40 sq. ft. per gallon by low pressure garden type spray equipment. Two coats shall be applied. There shall be an interval of 48 hours between applications. Maximum absorption and penetration is desired rather than maximum surface coverage.

SECTION IX

FOUNDATION DAMPPROOFING

9.01 GENERAL: All concrete foundations shall be dampproofed below grade as indicated by the drawings or as specified herein.

9.02 MATERIAL

A. Asphalt for dampproofing shall comply with ASTM D-449, type A.

B. Asphalt Saturated Felt for dampproofing shall comply with ASTM D-226.

9.03 DAMPPROOFING: Mop the face of the foundation with asphalt, preceded by application of asphalt primer. Asphalt to be applied at the rate recommended by the manufacturer. Before this has become cold or set, embed one layer of asphalt saturated felt. Remop and apply second layer of asphalt saturated felt. Apply final coat of asphalt. Operation consists of two layers of asphalt saturated felt, asphalt primer and three moppings of asphalt.

SECTION X

METAL DOOR AND HARDWARE

10.01 DOOR: To be 3'0"x6'8", 1 3/4" thick, full flush type hollow metal door. Minimum steel thickness for panels and stiles to be 18 gage. Door shall be prepared to receive panic hardware and hinges.

10.02 FRAME: To be standard channel iron or 16 gage pressed steel. Frame shall be prepared to receive strikes and hinges. It shall be provided with not less than 3 wall anchors per jamb and 1 anchor to the floor of each jamb. Anchors to be at least 18 gage steel.

10.03 HARDWARE: Mortise type panic bolt for exit door only. 1½ pair 4½"x4½" ball bearing hinges for type of frame used. Overhead surface mounted liquid controlled door closer, size IV.

10.04 SHOP PAINTING: Both door and frame to be shop primed.

SECTION XI

PAINTING AND FINISHING

11.01 COLOR: All new exposed wood shall be treated to match the color of the existing aged wood. This will require extensive testing by the Contractor to achieve the desired color. The coloring used shall not obscure the natural grain of the wood. The Contractor shall prepare color sample of treated wood for approval by the Priest-In-Charge before any application is made to any portion of the wood portions of the building.

11.02 PROCEDURE: The Contractor shall mix according to manufacturer instructions small quantities of Cabots #241 Bleaching Oil, Cabots Weathering Gray Stains and similar products of other manufacturers and apply to samples of the wood to be used in the construction until a satisfactory matching color is produced.

11.03 METAL DOORS, FRAMES AND PIPE RAIL: Shall be painted two coats of flat oil paint to match the adjacent adobe plaster.

11.04 PAINTED DECORATION: New choir loft joist shall be painted to match the existing painted decorations after staining.

11.05 SIGNS: "Emergency Exit Only" shall be painted on the upper panel of the emergency exit door in contrasting color.