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of Engineers
Savannah District

Fort Bragg
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**U.S. ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
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CEGS-03100 (May 1998)

SECTION 03100

STRUCTURAL CONCRETE FORMWORK
05/98

Includes Special Change (Submittal Paragraph)(June/August 2000)

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 347R	(1994) Guide to Formwork for Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 578	(1995) Rigid, Cellular Polystyrene Thermal Insulation

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Formwork

Drawings showing details of formwork, including dimensions of fiber voids, joints, supports, studding and shoring, and sequence of form and shoring removal.

SD-03 Product Data

Design

Design analysis and calculations for form design and methodology used in the design.

Form Materials

Manufacturer's data including literature describing form materials, accessories, and form releasing agents.

Form Releasing Agents

Manufacturer's recommendation on method and rate of application of form releasing agents.

SD-04 Samples

Fiber Voids

One sample unit of fiber voids prior to installation of the voids.

SD-07 Certificates

Fiber Voids

Certificates attesting that fiber voids conform to the specified requirements.

1.3 DESIGN

Formwork shall be designed in accordance with methodology of ACI 347R for anticipated loads, lateral pressures, and stresses. Forms shall be capable of producing a surface which meets the requirements of the class of finish specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. Forms shall be capable of withstanding the pressures resulting from placement and vibration of concrete.

1.4 STORAGE AND HANDLING

Fiber voids shall be stored above ground level in a dry location. Fiber voids shall be kept dry until installed and overlaid with concrete.

PART 2 PRODUCTS

2.1 FORM MATERIALS

2.1.1 Omitted
2.1.2 Omitted

2.1.3 Forms For Class D Finish

Forms for Class D finished surfaces, except where concrete is placed against earth, shall be wood or steel or other approved concrete form material.

2.1.4 Retain-In-Place Metal Forms

Retain-in-place metal forms for concrete slabs and roofs shall be as specified in Section 05300A STEEL DECKING.

2.1.5 Omitted

2.1.6 Form Ties

Form ties shall be factory-fabricated metal ties, shall be of the removable or internal disconnecting or snap-off type, and shall be of a design that will not permit form deflection and will not spall concrete upon removal. Solid backing shall be provided for each tie. Except where removable tie rods are used, ties shall not leave holes in the concrete surface less than 1/4 inch nor more than 1 inch deep and not more than 1 inchin diameter.

Removable tie rods shall be not more than 1-1/2 inches in diameter.

2.1.7 Form Releasing Agents

Form releasing agents shall be commercial formulations that will not bond with, stain or adversely affect concrete surfaces. Agents shall not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds.

2.1.8 Fiber Voids

Fiber voids shall be the product of a reputable manufacturer regularly engaged in the commercial production of fiber voids. The voids shall be constructed of double faced, corrugated fiberboard. The corrugated fiberboard shall be fabricated of standard kraft paper liners, impregnated with paraffin, and laminated with moisture resistant adhesive, and shall have a board strength of 275 psi. Voids which are impregnated with paraffin after construction, in lieu of being constructed with paraffin impregnated fiberboard, are acceptable. Voids shall be designed to support not less than 1000 psf. To prevent separation during concrete placement fiber voids shall be assembled with steel or plastic banding at 4 feet on center maximum, or by adequate stapling or gluing as recommended by the manufacturer. Fiber voids placed under concrete slabs and that are 8 inches in depth may be heavy duty "waffle box" type, constructed of paraffin impregnated corrugated fiberboard.

2.2 FIBER VOID RETAINERS

2.2.1 Polystyrene Rigid Insulation

Polystyrene rigid insulation shall conform to ASTM C 578, Type V, VI, or VII, square edged. Size shall be 1-1/2 inches thick by 16 inches in height by 3 feet in length, unless otherwise indicated.

2.2.2 Precast Concrete

Precast concrete units shall have a compressive strength of not less than 2500 psi, reinforced with 6 inch by 6 inch by W1.4 WWF wire mesh, and 12 inches (height) by 3 feet (length) by 1-5/8 inches (thickness) in size unless indicated.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Formwork

Forms shall be mortar tight, properly aligned and adequately supported to produce concrete surfaces meeting the surface requirements specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE and conforming to construction tolerance given in TABLE 1. Where concrete surfaces are to have a Class A or Class B finish, joints in form panels shall be arranged as approved. Where forms for continuous surfaces are placed in successive units, the forms shall fit over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall not be reused if there is any evidence of surface wear and tear or defects which would impair the quality of the surface. Surfaces of forms to be reused shall be cleaned of mortar from previous concreting and of all other

foreign material before reuse. Form ties that are to be completely withdrawn shall be coated with a nonstaining bond breaker.

3.1.2 Fiber Voids

Voids shall be placed on a smooth firm dry bed of suitable material, to avoid being displaced vertically, and shall be set tight, with no buckled cartons, in order that horizontal displacement cannot take place. Each section of void shall have its ends sealed by dipping in paraffin, with any additional cutting of voids at the jobsite to be field dipped in the same type of sealer, unless liners and flutes are completely impregnated with paraffin. Prior to placing reinforcement, the entire formed area for slabs shall be covered with a 4 x 8 feet minimum flat sheets of fiber void corrugated fiberboard. Joints shall be sealed with a moisture resistant tape having a minimum width of 3 inches. If voids are destroyed or damaged and are not capable of supporting the design load, they shall be replaced prior to placing of concrete.

3.1.3 Fiber Void Retainers

Fiber void retainers shall be installed, continuously, on both sides of fiber voids placed under grade beams in order to retain the cavity after the fiber voids biodegrade.

3.2 CHAMFERING

Except as otherwise shown, external corners that will be exposed shall be chamfered, beveled, or rounded by moldings placed in the forms.

3.3 COATING

Forms for Class A and Class B finished surfaces shall be coated with a form releasing agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's printed or written instructions. Forms for Class C and D finished surfaces may be wet with water in lieu of coating immediately before placing concrete, except that in cold weather with probable freezing temperatures, coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

3.4 REMOVAL OF FORMS

Forms shall be removed preventing injury to the concrete and ensuring the complete safety of the structure. Formwork for columns, walls, side of beams and other parts not supporting the weight of concrete may be removed when the concrete has attained sufficient strength to resist damage from the removal operation but not before at least 24 hours has elapsed since concrete placement. Supporting forms and shores shall not be removed from beams, floors and walls until the structural units are strong enough to carry their own weight and any other construction or natural loads. Supporting forms or shores shall not be removed before the concrete strength has reached 70 percent of design strength, as determined by field cured cylinders or other approved methods. This strength shall be demonstrated by job-cured test specimens, and by a structural analysis considering the proposed loads in relation to these test strengths and the strength of forming and shoring system. The job-cured test specimens for form removal purposes shall be provided in numbers as directed and shall be in addition to those required for concrete quality control. The specimens

shall be removed from molds at the age of 24 hours and shall receive, insofar as possible, the same curing and protection as the structures they represent.

TABLE 1

TOLERANCES FOR FORMED SURFACES

1. Variations from the plumb:	In any 10 feet of length ---------- 1/4 inch
a. In the lines and surfaces of columns, piers, walls and in arises	Maximum for entire length ---------- 1 inch
b. For exposed corner columns,control-joint grooves, and other conspicuous lines	In any 20 feet of length ---------- ---- 1/4 inch Maximum for entire length---------- 1/2 inch
2. Variation from the level or from the grades indicated on the drawings:	In any 10 feet of length ----------1/4 inch In any bay or in any 20 feet of length---------- 3/8 inch
a. In slab soffits, ceilings, beam soffits, and in arises, measured before removal of supporting shores	Maximum for entire length ---------- 3/4 inch
b. In exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines	In any bay or in any 20 feet of length ---------- ----- 1/4 inch Maximum for entire length---------- 1/2 inch
3. Variation of the linear building lines from established position in plan	In any 20 feet --------- 1/2 inch Maximum ----------1 inch
4. Variation of distance between walls, columns, partitions	1/4 inch per 10 feet of distance, but not more than 1/2 inch in any one bay,and not more than 1 inch total variation
5. Variation in the sizes and locations of sleeves, floor openings, and wall opening	Minus ---------- 1/4 inch Plus ---------- 1/2 inch
6. Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls	Minus ---------- 1/4 inch Plus ---------- 1/2 inch

TABLE 1

TOLERANCES FOR FORMED SURFACES

7. Footings:		
a. Variation of dimensions in plan	Minus ---------- 1/2 inch Plus ---------- 2 inches when formed or plus 3 inches when placed against unformed excavation	
b. Misplacement of eccentricity	2 percent of the footing width in the direction of misplacement but not more than 2 inches	
c. Reduction in thickness of specified thickness	Minus ---------- 5 percent	
8. Variation in steps:	Riser ---------- 1/8 inch	
a. In a flight of stairs	Tread ---------- 1/4 inch	
b. In consecutive steps	Riser ---------- 1/16 inch Tread ---------- 1/8 inch	

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SECTION 03150

EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS

05/98

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CEGS-03150 (May 1998)

SECTION 03150

EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS
05/98

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 111	(1983) Inorganic Matter or Ash in Bituminous Materials

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA ANSI/AHA A135.4	(1995) Basic Hardboard

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 109	(1993) Steel, Strip, Carbon, Cold-Rolled
ASTM A 167	(1996) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A 480/A 480M	(1996a) General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
ASTM A 570/A 570M	(1996) Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
ASTM B 152	(1994) Copper Sheet, Strip, Plate, and Rolled Bar
ASTM B 370	(1992) Copper Sheet and Strip for Building Construction
ASTM C 919	(1984; R 1992) Use of Sealants in Acoustical Applications
ASTM C 920	(1995) Elastomeric Joint Sealants
ASTM D 4	(1986; R 1993) Bitumen Content
ASTM D 6	(1995) Loss on Heating of Oil and

	Asphaltic Compounds
ASTM D 412	(1997) Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D 471	(1996) Rubber Property - Effect of Liquids
ASTM D 1190	(1996) Concrete Joint Sealer, Hot-Applied Elastic Type
ASTM D 1191	(1984; R 1994) Test Methods for Concrete Joint Sealers
ASTM D 1751	(1983; R 1991) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 1854	(1996) Specification for Jet-Fuel-Resistant Concrete Joint Sealer, Hot-Poured Elastic Type
ASTM D 1855	(1989) Test Method for Jet-Fuel Resistant Concrete Joint Sealer, Hot-Applied Elastic Type
ASTM D 2628	(1991) Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
ASTM D 2835	(1989; R 1993) Lubricant for Installation of Preformed Compression Seals in Concrete Pavements
ASTM D 5249	(1995) Backer Material for Use With Cold and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints

CORPS OF ENGINEERS (COE)

COE CRD-C 513	(1974) Corps of Engineers Specifications for Rubber Waterstops
COE CRD-C 572	(1974) Corps of Engineers Specifications for Polyvinylchloride Waterstop

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Waterstops

Shop drawings and fabrication drawings provided by the manufacturer or prepared by the Contractor.

SD-03 Product Data

Preformed Expansion Joint Filler
Sealant
Waterstops

Manufacturer's literature, including safety data sheets, for preformed fillers and the lubricants used in their installation; field-molded sealants and primers (when required by sealant manufacturer); preformed compression seals; and waterstops.

Preformed Expansion Joint Filler
Sealant
Waterstops

Manufacturer's recommended instructions for installing preformed fillers, field-molded sealants; preformed compression seals; and waterstops; and for splicing non-metallic waterstops.

SD-04 Samples

Lubricant for Preformed Compression Seals

Specimens identified to indicate the manufacturer, type of material, size and quantity of material, and shipment or lot represented. Each sample shall be a piece not less than 9 feet of 1 inch nominal width or wider seal or a piece not less than 12 feet of compression seal less than 1 inch nominal width. One quart of lubricant shall be provided.

Field-Molded Type

One gallon of field-molded sealant and one quart of primer (when primer is recommended by the sealant manufacturer) identified to indicate manufacturer, type of material, quantity, and shipment or lot represented.

Non-metallic Materials

Specimens identified to indicate manufacturer, type of material, size, quantity of material, and shipment or lot represented. Each sample shall be a piece not less than 12 inches long cut from each 200 feet of finished waterstop furnished, but not less than a total of 4 feet of each type, size, and lot furnished. One splice sample of each size and type for every 50 splices made in the factory and every 10 splices made at the job site. The splice samples shall be made using straight run pieces with the splice located at the mid-length of the sample and finished as required for the installed waterstop. The total length of each splice shall be not less than 12 inches long.

SD-07 Certificates

Preformed Expansion Joint Filler
Sealant
Waterstops

Certificates of compliance stating that the joint filler and sealant materials and waterstops conform to the requirements specified.

1.3 DELIVERY AND STORAGE

Material delivered and placed in storage shall be stored off the ground and protected from moisture, dirt, and other contaminants. Sealants shall be delivered in the manufacturer's original unopened containers. Sealants whose shelf life has expired shall be removed from the site.

PART 2 PRODUCTS

2.1 CONTRACTION JOINT STRIPS

Contraction joint strips shall be 1/8 inch thick tempered hardboard conforming to AHA ANSI/AHA A135.4, Class 1. In lieu of hardboard strips, rigid polyvinylchloride (PVC) or high impact polystyrene (HIPS) insert strips specifically designed to induce controlled cracking in slabs on grade may be used. Such insert strips shall have removable top section.

2.2 PREFORMED EXPANSION JOINT FILLER

Expansion joint filler shall be preformed material conforming to ASTM D 1751 or ASTM D 1752. Unless otherwise indicated, filler material shall be 3/8 inch thick and of a width applicable for the joint formed. Backer material, when required, shall conform to ASTM D 5249.

2.3 SEALANT

Joint sealant shall conform to the following:

2.3.1 Preformed Polychloroprene Elastomeric Type

ASTM D 2628.

2.3.2 Lubricant for Preformed Compression Seals

ASTM D 2835.

2.3.3 Hot-Poured Type

ASTM D 1190 tested in accordance with ASTM D 1191.

2.3.4 Field-Molded Type

ASTM C 920, Type M for horizontal joints or Type NS for vertical joints, Class 25, and Use NT. Bond breaker material shall be polyethylene tape, coated paper, metal foil or similar type materials. The back-up material shall be compressible, non-shrink, nonreactive with sealant, and non-absorptive material type such as extruded butyl or polychloroprene rubber.

2.3.5 Hot-Applied Jet-Fuel Resistant Type

ASTM D 1854 tested in accordance with ASTM D 1855.

2.4 WATERSTOPS

Intersection and change of direction waterstops shall be shop fabricated.

2.4.1 Flexible Metal

Copper waterstops shall conform to ASTM B 152 and ASTM B 370, O60 soft anneal temper and 20 oz mass per sq ft sheet thickness. Stainless steel waterstops shall conform to ASTM A 167 and ASTM A 480/A 480M, UNS S30453 (Type 304L), and 20 gauge thick strip.

2.4.2 Rigid Metal

Flat steel waterstops shall conform to ASTM A 109, No. 2 (half hard) temper, No. 2 edge, No. 1 (matte or dull) finish or ASTM A 570/A 570M, Grade 40.

2.4.3 Non-Metallic Materials`

Non-metallic waterstops shall be manufactured from a prime virgin resin; reclaimed material is not acceptable. The compound shall contain plasticizers, stabilizers, and other additives to meet specified requirements. Rubber waterstops shall conform to COE CRD-C 513. Polyvinylchloride waterstops shall conform to COE CRD-C 572. Thermoplastic elastomeric rubber waterstops shall conform to ASTM D 471.

2.4.4 Non-Metallic Hydrophilic

Swellable strip type compound of polymer modified chloroprene rubber that swells upon contact with water shall conform to ASTM D 412 as follows: Tensile strength 420 psi minimum; ultimate elongation 600 percent minimum. Hardness shall be 50 minimum on the type A durometer and the volumetric expansion ratio in distilled water at 70 degrees F shall be 3 to 1 minimum.

2.4.5 Preformed Elastic Adhesive

Preformed plastic adhesive waterstops shall be produced from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler, and shall contain no solvents, asbestos, irritating fumes or obnoxious odors. The compound shall not depend on oxidizing, evaporating, or chemical action for its adhesive or cohesive strength.

2.4.5.1 Chemical Composition

The chemical composition of the sealing compound shall meet the requirements shown below:

PERCENT BY WEIGHT

COMPONENT	MIN.	MAX.	TEST
Bitumen (Hydrocarbon plastic)	50	70	ASTM D 4
Inert Mineral Filler	30	50	AASHTO T 111
Volatile Matter		2	ASTM D 6

2.4.5.2 Adhesion Under Hydrostatic Pressure

The sealing compound shall not leak at the joints for a period of 24 hours under a vertical 6-foot head pressure. In a separate test, the sealing compound shall not leak under a horizontal pressure of 10 psi which is reached by slowly applying increments of 2 psi every minute.

2.4.5.3 Sag of Flow Resistance

Sagging shall not be detected when tested as follows: Fill a wooden form 1 inch wide and 6 inches long flush with sealing compound and place in an oven at 135 degrees F in a vertical position for 5 days.

2.4.5.4 Chemical Resistance

The sealing compound when immersed separately in a 5% solution of caustic potash, a 5% solution of hydrochloric acid, 5% solution of sulfuric acid and a saturated hydrogen sulfide solution for 30 days at ambient room temperature shall show no visible deterioration.

PART 3 EXECUTION

3.1 JOINTS

Joints shall be installed at locations indicated and as authorized.

3.1.1 Contraction Joints

Contraction joints may be constructed by inserting tempered hardboard strips or rigid PVC or HIPS insert strips into the plastic concrete using a steel parting bar, when necessary, or by cutting the concrete with a saw after concrete has set. Joints shall be approximately 1/8 inch wide and shall extend into the slab one-fourth the slab thickness, minimum, but not less than 1 inch.

3.1.1.1 Joint Strips

Strips shall be of the required dimensions and as long as practicable. After the first floating, the concrete shall be grooved with a tool at the joint locations. The strips shall be inserted in the groove and depressed until the top edge of the vertical surface is flush with the surface of the slab. The slab shall be floated and finished as specified. Working of the concrete adjacent to the joint shall be the minimum necessary to fill voids and consolidate the concrete. Where indicated, the top portion of the strip shall be sawed out after the curing period to form a recess for sealer. The removable section of PVC or HIPS strips shall be discarded and the insert left in place. True alignment of the strips shall be maintained during insertion.

3.1.1.2 Sawed Joints

Joint sawing shall be early enough to prevent uncontrolled cracking in the slab, but late enough that this can be accomplished without appreciable spalling. Concrete sawing machines shall be adequate in number and power, and with sufficient replacement blades to complete the sawing at the required rate. Joints shall be cut to true alignment and shall be cut in sequence of concrete placement. Sludge and cutting debris shall be removed.

3.1.2 Expansion Joints

Preformed expansion joint filler shall be used in expansion and isolation joints in slabs around columns and between slabs on grade and vertical surfaces where indicated. The filler shall extend the full slab depth, unless otherwise indicated. The edges of the joint shall be neatly finished with an edging tool of 1/8 inch radius, except where a resilient floor surface will be applied. Where the joint is to receive a sealant, the filler strips shall be installed at the proper level below the finished floor with a slightly tapered, dressed and oiled wood strip temporarily secured to the top to form a recess to the size shown on the drawings. The wood strip shall be removed after the concrete has set. Contractor may opt to use a removable expansion filler cap designed and fabricated for this purpose in lieu of the wood strip. The groove shall be thoroughly cleaned of laitance, curing compound, foreign materials, protrusions of hardened concrete, and any dust which shall be blown out of the groove with oil-free compressed air.

3.1.3 Joint Sealant

Sawed contraction joints and expansion joints in slabs shall be filled with joint sealant, unless otherwise shown. Joint surfaces shall be clean, dry, and free of oil or other foreign material which would adversely affect the bond between sealant and concrete. Joint sealant shall be applied as recommended by the manufacturer of the sealant.

3.1.3.1 Joints With Preformed Compression Seals

Compression seals shall be installed with equipment capable of installing joint seals to the prescribed depth without cutting, nicking, twisting, or otherwise distorting or damaging the seal or concrete and with no more than 5 percent stretching of the seal. The sides of the joint and, if necessary, the sides of the compression seal shall be covered with a coating of lubricant. Butt joints shall be coated with liberal applications of lubricant.

3.1.3.2 Joints With Field-Molded Sealant

Joints shall not be sealed when the sealant material, ambient air, or concrete temperature is less than 40 degrees F. When the sealants are meant to reduce the sound transmission characteristics of interior walls, ceilings, and floors the guidance provided in ASTM C 919 shall be followed. Joints requiring a bond breaker shall be coated with curing compound or with bituminous paint. Bond breaker and back-up material shall be installed where required. Joints shall be primed and filled flush with joint sealant in accordance with the manufacturer's recommendations.

3.2 WATERSTOPS, INSTALLATION AND SPLICES

Waterstops shall be installed at the locations shown to form a continuous water-tight diaphragm. Adequate provision shall be made to support and completely protect the waterstops during the progress of the work. Any waterstop punctured or damaged shall be repaired or replaced. Exposed waterstops shall be protected during application of form release agents to avoid being coated. Suitable guards shall be provided to protect exposed projecting edges and ends of partially embedded waterstops from damage when concrete placement has been discontinued. Splices shall be made by certified trained personnel using approved equipment and procedures.

3.2.1 Copper And Stainless Steel

Splices in copper waterstops shall be lap joints made by brazing. Splices in stainless steel waterstops shall be welded using a TIG or MIG process utilizing a weld rod to match the stainless. All welds shall not be annealed to maintain physical properties. Carbon flame shall not be used in the annealing process. Damaged waterstops shall be repaired by removing damaged portions and patching. Patches shall overlap a minimum of 1 inch onto undamaged portion of the waterstop.

3.2.2 Flat Steel

Splices in flat steel waterstops shall be properly aligned, butt welded, and cleaned of excessive material.

3.2.3 Non-Metallic

Fittings shall be shop made using a machine specifically designed to mechanically weld the waterstop. A miter guide, proper fixturing (profile dependant), and portable power saw shall be used to miter cut the ends to be joined to ensure good alignment and contact between joined surfaces. The splicing of straight lengths shall be done by squaring the ends to be joined. Continuity of the characteristic features of the cross section of the waterstop (ribs, tabular center axis, protrusions, etc.) shall be maintained across the splice.

3.2.3.1 Rubber Waterstop

Splices shall be vulcanized or shall be made using cold bond adhesive as recommended by the manufacturer. Splices for TPE-R shall be as specified for PVC.

3.2.3.2 Polyvinyl Chloride Waterstop

Splices shall be made by heat sealing the adjacent waterstop edges together using a thermoplastic splicing iron utilizing a non-stick surface specifically designed for waterstop welding. The correct temperature shall be used to sufficiently melt without charring the plastic. The spliced area, when cooled, shall show no signs of separation, holes, or other imperfections when bent by hand in as sharp an angle as possible.

3.2.3.3 Quality Assurance

Edge welding will not be permitted. Centerbulbs shall be compressed or closed when welding to non-centerbulb type. Waterstop splicing defects which are unacceptable include, but are not limited to the following: 1) Tensile strength less than 80 percent of parent section. 2) Free lap joints. 3) Misalignment of centerbulb, ribs, and end bulbs greater than 1/16 inch. 4) Misalignment which reduces waterstop cross section more than 15 percent. 5) Bond failure at joint deeper than 1/16 inch or 15 percent of material thickness. 6) Misalignment of waterstop splice resulting in misalignment of waterstop in excess of 1/2 inch in 10 feet. 7) Visible porosity in the weld area, including pin holes. 8) Charred or burnt material. 9) Bubbles or inadequate bonding. 10) Visible signs of splice separation when cooled splice is bent by hand at a sharp angle.

3.2.4 Non-Metallic Hydrophilic Waterstop Installation

Ends to be joined shall be miter cut with sharp knife or shears. The ends shall be adhered with cyanacryiate (super glue) adhesive. When joining

hydrophilic type waterstop to PVC waterstop, the hydrophilic waterstop shall be positioned as shown on the drawings. A liberal amount of a single component hydrophilic sealant shall be applied to the junction to complete the transition.

3.2.5 Preformed Plastic Adhesive Installation

The installation of preformed plastic adhesive waterstops shall be a prime, peel, place and pour procedure. Joint surfaces shall be clean and dry before priming and just prior to placing the sealing strips. The end of each strip shall be spliced to the next strip with a 1 inch overlap; the overlap shall be pressed firmly to release trapped air. During damp or cold conditions the joint surface shall be flashed with a safe, direct flame to warm and dry the surface adequately; the sealing strips shall be dipped in warm water to soften the material to achieve maximum bond to the concrete surface.

3.3 CONSTRUCTION JOINTS

Construction joints are specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE except that construction joints coinciding with expansion and contraction joints shall be treated as expansion or contraction joints as applicable.

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CEGS-03200 (September 1997)

Includes changes through Notice 1 (November 1999)

SECTION 03200

CONCRETE REINFORCEMENT
09/97

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 318/318R	(1995) Building Code Requirements for Structural Concrete and Commentary

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53	(1999) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 82	(1997a) Steel Wire, Plain, for Concrete Reinforcement
ASTM A 184/A 184M	(1996) Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 185	(1997) Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 615/A 615M	(1996a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 675/A 675M	(1990a; R 1995e1) Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
ASTM A 706/A 706M	(1998) Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 767/A 767M	(1997) Zinc-Coated (Galvanized) Steel Bars in Concrete Reinforcement
ASTM A 775/A 775M	(1997e1) Epoxy-Coated Reinforcement Steel Bars
ASTM A 884/A 884M	(1996ae1) Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement

ASTM C 1116 (1995) Fiber-Reinforced Concrete and Shotcrete

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4 (1998) Structural Welding Code - Reinforcing Steel

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI MSP-1 (1996) Manual of Standard Practice

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Reinforcement

Detail drawings showing reinforcing steel placement, schedules, sizes, grades, and splicing and bending details. Drawings shall show support details including types, sizes and spacing.

SD-03 Product Data

Welding

A list of qualified welders names.

SD-07 Certificates

Reinforcing Steel

Certified copies of mill reports attesting that the reinforcing steel furnished contains no less than 25 percent recycled scrap steel and meets the requirements specified herein, prior to the installation of reinforcing steel.

1.3 WELDING

Welders shall be qualified in accordance with AWS D1.4. Qualification test shall be performed at the worksite and the Contractor shall notify the Contracting Officer 24 hours prior to conducting tests. Special welding procedures and welders qualified by others may be accepted as permitted by AWS D1.4.

1.4 DELIVERY AND STORAGE

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

PART 2 PRODUCTS

2.1 DOWELS

Dowels shall conform to ASTM A 675/A 675M, Grade 80. Steel pipe conforming to ASTM A 53, Schedule 80, may be used as dowels provided the ends are closed with metal or plastic inserts or with mortar.

2.2 FABRICATED BAR MATS

Fabricated bar mats shall conform to ASTM A 184/A 184M.

2.3 REINFORCING STEEL

Reinforcing steel shall be deformed bars conforming to ASTM A 615/A 615M or ASTM A 706/A 706M, grades and sizes as indicated. Cold drawn wire used for spiral reinforcement shall conform to ASTM A 82. In highly corrosive environments or when directed by the Contracting Officer, reinforcing steel shall conform to ASTM A 767/A 767M or ASTM A 775/A 775M as appropriate.

2.4 WELDED WIRE FABRIC

Welded wire fabric shall conform to ASTM A 185. When directed by the Contracting Officer for special applications, welded wire fabric shall conform to ASTM A 884/A 884M.

2.5 WIRE TIES

Wire ties shall be 16 gauge or heavier black annealed steel wire.

2.6 SUPPORTS

Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI MSP-1 and shall be steel or precast concrete blocks. Precast concrete blocks shall have wire ties and shall be not less than 4 inches square when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, steel supports within 1/2 inch of concrete surface shall be galvanized, plastic protected or of stainless steel. Concrete supports used in concrete exposed to view shall have the same color and texture as the finish surface. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.

2.7 SYNTHETIC FIBER REINFORCEMENT

Synthetic fiber shall be polypropylene with a denier less than 100 and a nominal fiber length of 2 inches.

PART 3 EXECUTION

3.1 REINFORCEMENT

Reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318/318R. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Bars shall not be bent after embedment in concrete. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety. Wire tie ends shall face away from the forms.

3.1.1 Placement

Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Reinforcement shall be placed in accordance with ACI 318/318R at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as indicated or as required by ACI 318/318R. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

3.1.2 Splicing

Splices of reinforcement shall conform to ACI 318/318R and shall be made only as required or indicated. Splicing shall be by lapping or by mechanical or welded butt connection; except that lap splices shall not be used for bars larger than No. 11 unless otherwise indicated. Welding shall conform to AWS D1.4. Welded butt splices shall be full penetration butt welds. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 6 inches. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars or of the smaller bar in transition splices. Bars shall be flame dried before butt splicing. Adequate jigs and clamps or other devices shall be provided to support, align, and hold the longitudinal centerline of the bars to be butt spliced in a straight line.

3.2 WELDED-WIRE FABRIC PLACEMENT

Welded-wire fabric shall be placed in slabs as indicated. Fabric placed in slabs on grade shall be continuous between expansion, construction, and contraction joints. Fabric placement at joints shall be as indicated. Lap splices shall be made in such a way that the overlapped area equals the distance between the outermost crosswires plus 2 inches. Laps shall be staggered to avoid continuous laps in either direction. Fabric shall be wired or clipped together at laps at intervals not to exceed 4 feet. Fabric shall be positioned by the use of supports.

3.3 DOWEL INSTALLATION

Dowels shall be installed in slabs on grade at locations indicated and at right angles to joint being doweled. Dowels shall be accurately positioned and aligned parallel to the finished concrete surface before concrete placement. Dowels shall be rigidly supported during concrete placement. One end of dowels shall be coated with a bond breaker.

3.4 SYNTHETIC FIBER REINFORCED CONCRETE

Fiber reinforcement shall be added to the concrete mix in accordance with the applicable sections of ASTM C 1116 and the recommendations of the manufacturer, and in an amount of 0.1 percent by volume.

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SECTION 03300

CAST-IN-PLACE STRUCTURAL CONCRETE
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PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 117/117R	(1990; Errata) Standard Tolerances for Concrete Construction and Materials
ACI 211.1	(1991) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 211.2	(1998) Standard Practice for Selecting Proportions for Structural Lightweight Concrete
ACI 214.3R	(1988; R 1997) Simplified Version of the Recommended Practice for Evaluation of Strength Test Results of Concrete
ACI 305R	(1999) Hot Weather Concreting
ACI 318/318R	(1999) Building Code Requirements for Structural Concrete and Commentary

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(1991; R 1996) Burlap Cloth Made From Jute or Kenaf

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 31/C 31M	(2000) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(1999ael) Concrete Aggregates
ASTM C 39/C 39M	(1999) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 42/C 42M	(1999) Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

ASTM C 78	(1994) Flexural Strength of Concrete (Using Simple Beam With Third-Point Loading)
ASTM C 94/C 94M	(2000) Ready-Mixed Concrete
ASTM C 131	(1996) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 143/C 143M	(2000) Slump of Hydraulic Cement Concrete
ASTM C 150	(1999a) Portland Cement
ASTM C 171	(1997a) Sheet Materials for Curing Concrete
ASTM C 172	(1999) Sampling Freshly Mixed Concrete
ASTM C 173	(1994ael) Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 192/C 192M	(2000) Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	(1997el) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2000) Air-Entraining Admixtures for Concrete
ASTM C 309	(1998a) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 330	(2000) Lightweight Aggregates for Structural Concrete
ASTM C 494/C 494M	(1999a) Chemical Admixtures for Concrete
ASTM C 567	(2000) Unit Weight of Structural Lightweight Concrete
ASTM C 595	(2000a) Blended Hydraulic Cements
ASTM C 618	(2000) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 881	(1999) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 937	(1997) Grout Fluidifier for Preplaced-Aggregate Concrete
ASTM C 940	(1998a) Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory

ASTM C 989	(1999) Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
ASTM C 1017/C 1017M	(1998) Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C 1059	(1999) Latex Agents for Bonding Fresh to Hardened Concrete
ASTM C 1064/C 1064M	(1999) Temperature of Freshly Mixed Portland Cement Concrete
ASTM C 1077	(1998) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1107	(1999) Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C 1116	(2000) Fiber-Reinforced Concrete and Shotcrete
ASTM C 1240	(2000) Silica Fume for Use as a Mineral Admixture in Hydraulic-Cement Concrete, Mortar and Grout
ASTM D 75	(1987; R 1997) Sampling Aggregates
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM E 96	(2000) Water Vapor Transmission of Materials

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 94	(1995) Surface Retarders
COE CRD-C 104	(1980) Method of Calculation of the Fineness Modulus of Aggregate
COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete
COE CRD-C 521	(1981) Standard Test Method for Frequency and Amplitude of Vibrators for Concrete
COE CRD-C 540	(1971; R 1981) Standard Specification for Nonbituminous Inserts for Contraction Joints in Portland Cement Concrete Airfield Pavements, Sawable Type
COE CRD-C 572	(1974) Corps of Engineers Specifications for Polyvinylchloride Waterstop

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST HB 44	(1997) NIST Handbook 44: Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices

NATIONAL READY-MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA CPMB 100	(1996) Concrete Plant Standards
NRMCA TMMB 100	(1994) Truck Mixer Agitator and Front Discharge Concrete Carrier Standards
NRMCA QC 3	(1984) Quality Control Manual: Section 3, Plant Certifications Checklist: Certification of Ready Mixed Concrete Production Facilities

1.2 OMITTED

1.3 LUMP SUM CONTRACT

Under this type of contract concrete items will be paid for by lump sum and will not be measured. The work covered by these items consists of furnishing all concrete materials, reinforcement, miscellaneous embedded materials, and equipment, and performing all labor for the forming, manufacture, transporting, placing, finishing, curing, and protection of concrete in these structures.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Mixture Proportions; G, ED

The results of trial mixture design studies along with a statement giving the maximum nominal coarse aggregate size and the proportions of ingredients that will be used in the manufacture of each strength or class of concrete, at least 14 days prior to commencing concrete placing operations. Aggregate weights shall be based on the saturated surface dry condition. The statement shall be accompanied by test results from an approved independent commercial testing laboratory, showing that mixture design studies have been made with materials proposed for the project and that the proportions selected will produce concrete of the qualities indicated. No substitutions shall be made in the materials used in the mixture design studies without additional tests to show that the quality of the concrete is satisfactory.

Lightweight Aggregate Concrete

Written recommendations from lightweight aggregate supplier on

batching and mixing cycles.

Dry Shake Finish

Manufacturer's written instructions on application of dry shake material 15 days prior to start of construction.

SD-04 Samples

Surface Retarder

Sample of surface retarder material with manufacturer's instructions for application in conjunction with air-water cutting.

SD-06 Test Reports

Testing and Inspection for Contractor Quality Control; G, RE

Certified copies of laboratory test reports, including mill tests and all other test data, for portland cement, blended cement, pozzolan, ground granulated blast furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

SD-07 Certificates

Qualifications

Written documentation for Contractor Quality Control personnel.

1.5 QUALIFICATIONS

Contractor Quality Control personnel assigned to concrete construction shall be American Concrete Institute (ACI) Certified Workmen in one of the following grades or shall have written evidence of having completed similar qualification programs:

Concrete Field Testing Technician, Grade I
Concrete Laboratory Testing Technician, Grade I or II
Concrete Construction Inspector, Level II

Concrete Transportation Construction Inspector or
Reinforced Concrete Special Inspector, Jointly certified by American Concrete Institute (ACI), Building Official and Code Administrators International (BOCA), International Conference of Building Officials (ICBO), and Southern Building Code Congress International (SBCCI).

The foreman or lead journeyman of the flatwork finishing crew shall have similar qualification for ACI Concrete Flatwork Technician/Finisher or equal, with written documentation.

1.6 FIELD TEST PANELS

Field test panels shall be constructed prior to beginning of work using the materials and procedures proposed for use on the job, to demonstrate the results to be attained. The quality and appearance of each panel shall be subject to the approval of the Contracting Officer, and, if not judged satisfactory, additional panels shall be constructed until approval is

attained. Formed or finished surfaces in the completed structure shall match the quality and appearance of the approved field example.

1.7 OMITTED

1.8 GENERAL REQUIREMENTS

1.8.1 Tolerances

Except as otherwise specified herein, tolerances for concrete batching, mixture properties, and construction as well as definition of terms and application practices shall be in accordance with ACI 117/117R. Level and grade tolerance measurements of slabs shall be made as soon as possible after finishing; when forms or shoring are used, the measurements shall be made prior to removal.

1.8.1.1 Floors

For the purpose of this Section the following terminology correlation between ACI 117/117R and this Section shall apply:

Floor Profile Quality Classification From ACI 117/117R	This Section
Conventional Bullfloated	Same
Conventional Straightedged	Same
Flat	Float Finish or Trowel Finish
Very Flat	Same. Use only with F-system

Levelness tolerance shall not apply where design requires floors to be sloped to drains or sloped for other reasons.

1.8.1.2 Omitted

1.8.1.3 Floors by the Straightedge System

The flatness of the floors shall be carefully controlled and the tolerances shall be measured by the straightedge system as specified in paragraph 4.5.7 of ACI 117/117R, using a 10-foot straightedge, within 72 hours after floor slab installation and before shores and/or forms are removed. The listed tolerances shall be met at any and every location at which the straightedge can be placed.

Bullfloated	1/4 inch in 10 feet
Straightedged	1/4 inch in 10 feet
Float Finish	1/4 inch in 10 feet
Trowel Finish	1/4 inch in 10 feet

1.8.2 Strength Requirements and w/c Ratio

1.8.2.1 Strength Requirements

Specified compressive strength (f'c) shall be as follows:

COMPRESSIVE STRENGTH	STRUCTURE OR PORTION OF STRUCTURE
4000 psi at 28 days	All

Concrete made with high-early strength cement shall have a 7-day strength equal to the specified 28-day strength for concrete made with Type I or II portland cement. Compressive strength shall be determined in accordance with ASTM C 39/C 39M. Flexural strength shall be determined in accordance with ASTM C 78.

a. Evaluation of Concrete Compressive Strength. Compressive strength specimens (6- by 12-inch cylinders) shall be fabricated by the Contractor and laboratory cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39/C 39M. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or exceeds the specified compressive strength f'c and no individual test result falls below the specified strength f'c by more than 500 psi. A "test" is defined as the average of two companion cylinders, or if only one cylinder is tested, the results of the single cylinder test. Additional analysis or testing, including taking cores and/or load tests may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient.

b. Investigation of Low-Strength Compressive Test Results. When any strength test of standard-cured test cylinders falls below the specified strength requirement by more than 500 psi or if tests of field-cured cylinders indicate deficiencies in protection and curing, steps shall be taken to assure that the load-carrying capacity of the structure is not jeopardized. When the strength of concrete in place is considered potentially deficient, cores shall be obtained and tested in accordance with ASTM C 42/C 42M. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores will be determined by the Contracting Officer to least impair the strength of the structure. Concrete in the area represented by the core testing will be considered adequate if the average strength of the cores is equal to at least 85 percent of the specified strength requirement and if no single core is less than 75 percent of the specified strength requirement. Non-destructive tests (tests other than test cylinders or cores) shall not be used as a basis for acceptance or rejection. The Contractor shall perform the coring and repair the holes. Cores will be tested by the Government.

c. Load Tests. If the core tests are inconclusive or impractical to obtain or if structural analysis does not confirm the safety of the structure, load tests may be directed by the Contracting Officer in accordance with the requirements of ACI 318/318R. Concrete work evaluated by structural analysis or by results of a load test as being understrength shall be corrected in a manner satisfactory to the Contracting Officer. All investigations, testing, load tests, and correction of deficiencies shall be performed by and at the expense of the Contractor and must be approved by the Contracting Officer, except that if all concrete is found to be in compliance with the drawings and specifications, the cost of investigations, testing, and load tests will be at the expense of the Government.

d. Evaluation of Concrete Flexural Strength. Flexural strength specimens (beams) shall be fabricated by the Contractor and laboratory cured in accordance with ASTM C 31/C 31M and tested in

accordance with ASTM C 78. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or exceeds the specified flexural strength and no individual test result falls below the specified flexural strength by more than 50 psi.A "test" is defined as the average of two companion beams. Additional analysis or testing, including taking cores and/or load tests may be required at the Contractor's expense when the strength of the concrete in the slab is considered potentially deficient.

1.8.3 Air Entrainment

Except as otherwise specified for lightweight concrete, all normal weight concrete shall be air entrained to contain between 4 and 7 percent total air, except that when the nominal maximum size coarse aggregate is 3/4 inch or smaller it shall be between 4.5 and 7.5 percent. Concrete with specified strength over 5000 psi may have 1.0 percent less air than specified above. Specified air content shall be attained at point of placement into the forms. Air content for normal weight concrete shall be determined in accordance with ASTM C 231. Lightweight concrete in the elevated slab parts of the structure shall be air-entrained with a total air content of 4.5 to 7.5 percent, except that if the nominal maximum size coarse aggregate is 3/8 inch or less, the air content shall be 5.5 to 8.5 percent. Air content for lightweight concrete shall be determined in accordance with ASTM C 173.

1.8.4 Slump

Slump of the concrete, as delivered to the point of placement into the forms, shall be within the following limits. Slump shall be determined in accordance with ASTM C 143/C 143M.

Structural Element	Slump Minimum	Slump Maximum
Walls, columns and beams	2 in.	4 in.
Foundation walls, substructure walls, footings, slabs	1 in.	3 in.
Any structural concrete approved for placement by pumping:		
At pump	2 in.	6 in.
At discharge of line	1 in.	4 in.

When use of a plasticizing admixture conforming to ASTM C 1017/C 1017M or when a Type F or G high range water reducing admixture conforming to ASTM C 494/C 494M is permitted to increase the slump of concrete, concrete shall have a slump of 2 to 4 inches before the admixture is added and a maximum slump of 8 inches at the point of delivery after the admixture is added. For troweled floors, slump of structural lightweight concrete with normal weight sand placed by pump shall not exceed 5 inches at the point of placement. For other slabs, slump of lightweight concrete shall not exceed 4 inches at point of placement.

1.8.5 Concrete Temperature

The temperature of the concrete as delivered shall not exceed 90 degrees F. When the ambient temperature during placing is 40 degrees F or less, or is expected to be at any time within 6 hours after placing, the temperature of the concrete as delivered shall be between 55 and 75 degrees F.

1.8.6 Size of Coarse Aggregate

The largest feasible nominal maximum size aggregate (NMSA) specified in paragraph AGGREGATES shall be used in each placement. However, nominal maximum size of aggregate shall not exceed any of the following: three-fourths of the minimum cover for reinforcing bars, three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

1.8.7 Special Properties and Products

Concrete may contain admixtures other than air entraining agents, such as water reducers, superplasticizers, or set retarding agents to provide special properties to the concrete, if specified or approved. Any of these materials to be used on the project shall be used in the mix design studies.

1.8.8 Lightweight Aggregate Structural Concrete

Lightweight aggregate structural concrete shall conform to the requirements specified for normal weight concrete except as specified herein. However, fresh unit weight shall be used for acceptance during concreting, using a correlation factor between the two types of unit weight as determined during mixture design studies. Lightweight aggregate structural concrete floor fill shall have a 28-day compressive strength of at least 2500 psi and an air-dry unit weight not exceeding 115 pcf.

1.8.9 Technical Service for Specialized Concrete

The services of a factory trained technical representative shall be obtained to oversee proportioning, batching, mixing, placing, consolidating, and finishing of specialized structural concrete, such as elevated slabs. The technical representative shall be on the job full time until the Contracting Officer is satisfied that field controls indicate concrete of specified quality is furnished and that the Contractor's crews are capable of continued satisfactory work. The technical representative shall be available for consultation with, and advice to, Government forces.

1.9 MIXTURE PROPORTIONS

Concrete shall be composed of portland cement, other cementitious and pozzolanic materials as specified, aggregates, water and admixtures as specified.

1.9.1 Proportioning Studies for Normal Weight Concrete

Trial design batches, mixture proportioning studies, and testing requirements for various classes and types of concrete specified shall be the responsibility of the Contractor. Except as specified for flexural strength concrete, mixture proportions shall be based on compressive strength as determined by test specimens fabricated in accordance with ASTM C 192/C 192M and tested in accordance with ASTM C 39/C 39M. Samples of all materials used in mixture proportioning studies shall be representative of those proposed for use in the project and shall be accompanied by the

manufacturer's or producer's test reports indicating compliance with these specifications. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in ACI 211.1, using at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required on the project. The maximum water-cement ratios required in paragraph Maximum Allowable Water-Cement Ratio will be the equivalent water-cement ratio as determined by conversion from the weight ratio of water to cement plus pozzolan, silica fume, and ground granulated blast furnace slag (GGBF slag) by the weight equivalency method as described in ACI 211.1. In the case where silica fume or GGBF slag is used, the weight of the silica fume and GGBF slag shall be included in the equations in ACI 211.1 for the term P, which is used to denote the weight of pozzolan. If pozzolan is used in the concrete mixture, the minimum pozzolan content shall be 15 percent by weight of the total cementitious material, and the maximum shall be 35 percent. Laboratory trial mixtures shall be designed for maximum permitted slump and air content. Separate sets of trial mixture studies shall be made for each combination of cementitious materials and each combination of admixtures proposed for use. No combination of either shall be used until proven by such studies, except that, if approved in writing and otherwise permitted by these specifications, an accelerator or a retarder may be used without separate trial mixture study. Separate trial mixture studies shall also be made for concrete for any conveying or placing method proposed which requires special properties and for concrete to be placed in unusually difficult placing locations. The temperature of concrete in each trial batch shall be reported. For each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192/C 192M. They shall be tested at 7 and 28 days in accordance with ASTM C 39/C 39M. From these test results, a curve shall be plotted showing the relationship between water-cement ratio and strength for each set of trial mix studies. In addition, a curve shall be plotted showing the relationship between 7-day and 28-day strengths. Each mixture shall be designed to promote easy and suitable concrete placement, consolidation and finishing, and to prevent segregation and excessive bleeding.

1.9.2 Omitted

1.9.3 Proportioning Studies for Lightweight Aggregate Structural Concrete

Trial design batches, mixture proportioning studies, and testing requirements shall conform to the requirements specified in paragraph Proportioning Studies for Normal Weight Concrete, except as follows. Trial mixtures having proportions, consistencies and air content suitable for the work shall be made based on methodology described in ACI 211.2, using at least three different cement contents. Trial mixes shall be proportioned to produce air dry unit weight and concrete strengths specified in paragraph GENERAL REQUIREMENTS. Trial mixtures shall be proportioned for maximum permitted slump and air content. Test specimens and testing shall be as specified for normal weight concrete except that 28-day compressive strength shall be determined from test cylinders that have been air dried at 50 percent relative humidity for the last 21 days. Air dry unit weight shall be determined in accordance with ASTM C 567 and shall be designed to be at least 2.0 pcf less than the maximum specified air dry unit weight in paragraph GENERAL REQUIREMENTS. Curves shall be plotted using these results showing the relationship between cement factor and strength and air dry unit weight. Normal weight fine aggregate may be substituted for part or all of the lightweight fine aggregate, provided the concrete meets the strength and unit weight. A correlation shall also be developed showing

the ratio between air dry unit weight and fresh concrete unit weight for each mix.

1.9.4 Average Compressive Strength Required for Mixtures

The mixture proportions selected during mixture design studies shall produce a required average compressive strength (f'cr) exceeding the specified compressive strength (f'c) by the amount indicated below. This required average compressive strength, f'cr, will not be a required acceptance criteria during concrete production. However, whenever the daily average compressive strength at 28 days drops below f'cr during concrete production, or daily average 7-day strength drops below a strength correlated with the 28-day f'cr, the mixture shall be adjusted, as approved, to bring the daily average back up to f'cr. During production, the required f'cr shall be adjusted, as appropriate, based on the standard deviation being attained on the job.

1.9.4.1 Computations from Test Records

Where a concrete production facility has test records, a standard deviation shall be established in accordance with the applicable provisions of ACI 214.3R. Test records from which a standard deviation is calculated shall represent materials, quality control procedures, and conditions similar to those expected; shall represent concrete produced to meet a specified strength or strengths (f'c) within 1,000 psi of that specified for proposed work; and shall consist of at least 30 consecutive tests. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days. Required average compressive strength f'cr used as the basis for selection of concrete proportions shall be the larger of the equations that follow using the standard deviation as determined above:

f'cr = f'c + 1.34S where units are in psi

f'cr = f'c + 2.33S - 500 where units are in psi

Where S = standard deviation

Where a concrete production facility does not have test records meeting the requirements above but does have a record based on 15 to 29 consecutive tests, a standard deviation shall be established as the product of the calculated standard deviation and a modification factor from the following table:

NUMBER OF TESTS	MODIFICATION FACTOR FOR STANDARD DEVIATION
15	1.16
20	1.08
25	1.03
30 or more	1.00

1.9.4.2 Computations without Previous Test Records

When a concrete production facility does not have sufficient field strength test records for calculation of the standard deviation, the required average strength f'cr shall be determined as follows:

a. If the specified compressive strength f'c is less than 3,000 psi,

f'cr = f'c + 1000 psi

b. If the specified compressive strength f'c is 3,000 to 5,000 psi,

f'cr = f'c + 1,200 psi

c. If the specified compressive strength f'c is over 5,000 psi,

f'cr = f'c + 1,400 psi

1.10 STORAGE OF MATERIALS

Cement and other cementitious materials shall be stored in weathertight buildings, bins, or silos which will exclude moisture and contaminants and keep each material completely separated. Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of aggregates. Aggregate shall not be stored directly on ground unless a sacrificial layer is left undisturbed. Reinforcing bars and accessories shall be stored above the ground on platforms, skids or other supports. Other materials shall be stored in such a manner as to avoid contamination and deterioration. Admixtures which have been in storage at the project site for longer than 6 months or which have been subjected to freezing shall not be used unless retested and proven to meet the specified requirements. Materials shall be capable of being accurately identified after bundles or containers are opened.

1.11 GOVERNMENT ASSURANCE INSPECTION AND TESTING

Day-to day inspection and testing shall be the responsibility of the Contractor Quality Control (CQC) staff. However, representatives of the Contracting Officer can and will inspect construction as considered appropriate and will monitor operations of the Contractor's CQC staff. Government inspection or testing will not relieve the Contractor of any of his CQC responsibilities.

1.11.1 Materials

The Government will sample and test aggregates, cementitious materials, other materials, and concrete to determine compliance with the specifications as considered appropriate. The Contractor shall provide facilities and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D 75. Other materials will be sampled from storage at the jobsite or from other locations as considered appropriate. Samples may be placed in storage for later testing when appropriate.

1.11.2 Fresh Concrete

Fresh concrete will be sampled as delivered in accordance with ASTM C 172 and tested in accordance with these specifications, as considered necessary.

1.11.3 Hardened Concrete

Tests on hardened concrete will be performed by the Government when such tests are considered necessary.

1.11.4 Inspection

Concrete operations may be tested and inspected by the Government as the project progresses. Failure to detect defective work or material will not prevent rejection later when a defect is discovered nor will it obligate the Government for final acceptance.

PART 2 PRODUCTS

2.1 CEMENTITIOUS MATERIALS

Cementitious materials shall be portland cement, portland-pozzolan cement or portland cement in combination with pozzolan and shall conform to appropriate specifications listed below. Use of cementitious materials in concrete which will have surfaces exposed in the completed structure shall be restricted so there is no change in color, source, or type of cementitious material.

2.1.1 Portland Cement

ASTM C 150, Type I low alkali with a maximum 15 percent amount of tricalcium aluminate, or Type II low alkali including false set requirements. White portland cement shall meet the above requirements except that it may be Type I, Type II or Type III low alkali. White Type III shall be used only in specific areas of the structure, when approved in writing.

2.1.2 High-Early-Strength Portland Cement

ASTM C 150, Type III with tricalcium aluminate limited to 8 percent, low alkali. Type III cement shall be used only in isolated instances and only when approved in writing.

2.1.3 Blended Cements

ASTM C 595, Type IP.

2.1.4 Pozzolan (Fly Ash)

ASTM C 618, Class C with the optional requirements for multiple factor, drying shrinkage, and uniformity from Table 2A of ASTM C 618. Requirement for maximum alkalies from Table 1A of ASTM C 618 shall apply. If pozzolan is used, it shall never be less than 15 percent nor more than 35 percent by weight of the total cementitious material. Fly ash shall conform to EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS.

2.1.5 Ground Granulated Blast-Furnace (GGBF) Slag

ASTM C 989, Grade 120.

2.1.6 Silica Fume

Silica fume shall conform to ASTM C 1240. Available alkalies shall conform to the optimal limit given in Table 2 of ASTM C 1240. Silica fume may be furnished as a dry, densified material or as a slurry. In accordance with paragraph Technical Service for Specialized Concrete, the Contractor shall provide at no cost to the Government the services of a manufacturer's technical representative experienced in mixing, proportioning, placement

procedures, and curing of concrete containing silica fume.

2.2 AGGREGATES

Aggregates shall conform to the following.

2.2.1 Fine Aggregate

Fine aggregate shall conform to the quality and gradation requirements of ASTM C 33.

2.2.2 Coarse Aggregate

Coarse aggregate shall conform to ASTM C 33, Class 5S, size designation 3/4 inch.

2.2.3 Lightweight Aggregate

Lightweight fine and coarse aggregate shall conform to the quality and gradation requirements of ASTM C 330, size 3/4 inch for coarse aggregate. Lightweight aggregate shall be prewetted in accordance with the Manufacturer's instructions unless otherwise specified. For pumped concrete, prewetting shall be sufficient to ensure that slump loss through the pump line does not exceed 4 inches.

2.2.4 Materials for Bonded Topping for Heavy Duty Floors

In addition to the requirements specified above, coarse aggregate used for this purpose shall be a well graded, hard, sound diabase, trap rock, emery, granite or other natural or manufactured aggregate having equivalent hardness and wearing qualities and shall have a percentage of loss not to exceed 30 after 500 revolutions when tested in accordance with ASTM C 131. Gradation of the aggregates when tested in accordance with ASTM C 136 shall be as follows:

Coarse Aggregate

Sieve Size	Cumulative Percent By Weight Passing
3/4 in..	100
1/2 in.	50-100
3/8 in.	25-50
No. 4	0-15
No. 8	0-8

Fine Aggregate

Sieve Size	Cumulative Percent By Weight Passing
3/8 in.	100
No. 4	95-100
No. 8	65-80
No. 16	45-65
No. 30	25-45
No. 50	5-15

Fine Aggregate

Sieve Size	Cumulative Percent By Weight Passing
No. 100	0-5

2.3 CHEMICAL ADMIXTURES

Chemical admixtures, when required or permitted, shall conform to the appropriate specification listed. Admixtures shall be furnished in liquid form and of suitable concentration for easy, accurate control of dispensing.

2.3.1 Air-Entraining Admixture

ASTM C 260 and shall consistently entrain the air content in the specified ranges under field conditions.

2.3.2 Accelerating Admixture

ASTM C 494/C 494M, Type C or E, except that calcium chloride or admixtures containing calcium chloride shall not be used.

2.3.3 Water-Reducing or Retarding Admixture

ASTM C 494/C 494M, Type A, B, or D, except that the 6-month and 1 year compressive and flexural strength tests are waived.

2.3.4 High-Range Water Reducer

ASTM C 494/C 494M, Type F or G, except that the 6-month and 1-year strength requirements are waived. The admixture shall be used only when approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

2.3.5 Surface Retarder

COE CRD-C 94.

2.3.6 Expanding Admixture

Aluminum powder type expanding admixture conforming to ASTM C 937.

2.3.7 Other Chemical Admixtures

Chemical admixtures for use in producing flowing concrete shall comply with ASTM C 1017/C 1017M, Type I or II. These admixtures shall be used only when approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

2.4 CURING MATERIALS

2.4.1 Impervious-Sheet

Impervious-sheet materials shall conform to ASTM C 171, type optional, except, that polyethylene sheet shall not be used.

2.4.2 Membrane-Forming Compound

Membrane-Forming curing compound shall conform to ASTM C 309, Type 1-D or 2, except that only a styrene acrylate or chlorinated rubber compound meeting Class B requirements shall be used for surfaces that are to be painted or are to receive bituminous roofing, or waterproofing, or floors that are to receive adhesive applications of resilient flooring. The curing compound selected shall be compatible with any subsequent paint, roofing, waterproofing, or flooring specified. Nonpigmented compound shall contain a fugitive dye, and shall have the reflective requirements in ASTM C 309 waived.

2.4.3 Burlap and Cotton Mat

Burlap and cotton mat used for curing shall conform to AASHTO M 182.

2.5 WATER

Water for mixing and curing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water may be used if it meets the requirements of COE CRD-C 400.

2.6 NONSHRINK GROUT

Nonshrink grout shall conform to ASTM C 1107, Grade A, and shall be a commercial formulation suitable for the proposed application.

2.7 NONSLIP SURFACING MATERIAL

Nonslip surfacing material shall consist of 55 percent, minimum, aluminum oxide or silicon-dioxide abrasive ceramically bonded together to form a homogeneous material sufficiently porous to provide a good bond with portland cement paste; or factory-graded emery aggregate consisting of not less than 45 percent aluminum oxide and 25 percent ferric oxide. The aggregate shall be well graded from particles retained on the No. 30 sieve to particles passing the No. 8 sieve.

2.8 LATEX BONDING AGENT

Latex agents for bonding fresh to hardened concrete shall conform to ASTM C 1059.

2.9 EPOXY RESIN

Epoxy resins for use in repairs shall conform to ASTM C 881, Type V, Grade 2. Class as appropriate to the existing ambient and surface temperatures.

2.10 EMBEDDED ITEMS

Embedded items shall be of the size and type indicated or as needed for the application. Dovetail slots shall be galvanized steel. Hangers for suspended ceilings shall be as specified in Section 09510A ACOUSTICAL CEILINGS. Inserts for shelf angles and bolt hangers shall be of malleable iron or cast or wrought steel.

2.11 FLOOR HARDENER

Floor hardener shall be a colorless aqueous solution containing zinc

silicofluoride, magnesium silicofluoride, or sodium silicofluoride. These silicofluorides can be used individually or in combination. Proprietary hardeners may be used if approved in writing by the Contracting Officer.

2.12 OMITTED

2.13 VAPOR BARRIER

Vapor barrier shall be polyethylene sheeting with a minimum thickness of 6 mils or other equivalent material having a vapor permeance rating not exceeding 0.5 perms as determined in accordance with ASTM E 96.

2.14 JOINT MATERIALS

2.14.1 Joint Fillers, Sealers, and Waterstops

Expansion joint fillers shall be preformed materials conforming to ASTM D 1751. Materials for waterstops shall be in accordance with Section 03150 EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS. Materials for and sealing of joints shall conform to the requirements of Section 07900 JOINT SEALING.

2.14.2 Contraction Joints in Slabs

Sawable type contraction joint inserts shall conform to COE CRD-C 540. Nonsawable joint inserts shall have sufficient stiffness to permit placement in plastic concrete without undue deviation from a straight line and shall conform to the physical requirements of COE CRD-C 540, with the exception of Section 3.4 "Resistance to Sawing". Plastic inserts shall be polyvinyl chloride conforming to the materials requirements of COE CRD-C 572.

2.15 SYNTHETIC FIBERS FOR REINFORCING

Synthetic fibers shall conform to ASTM C 1116, Type III, Synthetic Fiber, and as follows. Fibers shall be 100 percent virgin polypropylene fibrillated fibers containing no reprocessed olefin materials. Fibers shall have a specific gravity of 0.9, a minimum tensile strength of 70 ksi graded per manufacturer, and specifically manufactured to an optimum gradation for use as concrete secondary reinforcement.

PART 3 EXECUTION

3.1 PREPARATION FOR PLACING

Before commencing concrete placement, the following shall be performed. Surfaces to receive concrete shall be clean and free from frost, ice, mud, and water. Forms shall be in place, cleaned, coated, and adequately supported, in accordance with Section 03100 STRUCTURAL CONCRETE FORMWORK. Reinforcing steel shall be in place, cleaned, tied, and adequately supported, in accordance with Section 03200 CONCRETE REINFORCEMENT. Transporting and conveying equipment shall be in-place, ready for use, clean, and free of hardened concrete and foreign material. Equipment for consolidating concrete shall be at the placing site and in proper working order. Equipment and material for curing and for protecting concrete from weather or mechanical damage shall be at the placing site, in proper working condition and in sufficient amount for the entire placement. When hot, windy conditions during concreting appear probable, equipment and material shall be at the placing site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage cracking or other

damaging drying of the concrete.

3.1.1 Foundations

3.1.1.1 Concrete on Earth Foundations

Earth (subgrade, base, or subbase courses) surfaces upon which concrete is to be placed shall be clean, damp, and free from debris, frost, ice, and standing or running water. Prior to placement of concrete, the foundation shall be well drained and shall be satisfactorily graded and uniformly compacted.

3.1.1.2 Omitted

3.1.1.3 Excavated Surfaces in Lieu of Forms

Concrete for footings may be placed directly against the soil provided the earth or rock has been carefully trimmed, is uniform and stable, and meets the compaction requirements of Section 02315 EXCAVATION, FILLING, AND BACKFILLING FOR BUILDINGS. The concrete shall be placed without becoming contaminated by loose material, and the outline of the concrete shall be within the specified tolerances.

3.1.2 Previously Placed Concrete

Concrete surfaces to which additional concrete is to be bonded shall be prepared for receiving the next horizontal lift by cleaning the construction joint surface with either air-water cutting, sandblasting, high-pressure water jet, or other approved method. Concrete at the side of vertical construction joints shall be prepared as approved by the Contracting Officer. Air-water cutting shall not be used on formed surfaces or surfaces congested with reinforcing steel. Regardless of the method used, the resulting surfaces shall be free from all laitance and inferior concrete so that clean surfaces of well bonded coarse aggregate are exposed and make up at least 10 percent of the surface area, distributed uniformly throughout the surface. The edges of the coarse aggregate shall not be undercut. The surface of horizontal construction joints shall be kept continuously wet for the first 12 hours during the 24-hour period prior to placing fresh concrete. The surface shall be washed completely clean as the last operation prior to placing the next lift. For heavy duty floors and two-course floors a thin coat of neat cement grout of about the consistency of thick cream shall be thoroughly scrubbed into the existing surface immediately ahead of the topping placing. The grout shall be a 1:1 mixture of portland cement and sand passing the No. 8 sieve. The topping concrete shall be deposited before the grout coat has had time to stiffen.

3.1.2.1 Air-Water Cutting

Air-water cutting of a fresh concrete surface shall be performed at the proper time and only on horizontal construction joints. The air pressure used in the jet shall be 100 psi plus or minus, 10 psi, and the water pressure shall be just sufficient to bring the water into effective influence of the air pressure. When approved by the Contracting Officer, a surface retarder complying with the requirements of COE CRD-C 94 may be applied to the surface of the lift in order to prolong the period of time during which air-water cutting is effective. After cutting, the surface shall be washed and rinsed as long as there is any trace of cloudiness of the wash water. Where necessary to remove accumulated laitance, coatings,

stains, debris, and other foreign material, high-pressure waterjet or sandblasting shall be used as the last operation before placing the next lift.

3.1.2.2 High-Pressure Water Jet

A stream of water under a pressure of not less than 3,000 psi shall be used for cutting and cleaning. Its use shall be delayed until the concrete is sufficiently hard so that only the surface skin or mortar is removed and there is no undercutting of coarse-aggregate particles. If the waterjet is incapable of a satisfactory cleaning, the surface shall be cleaned by sandblasting.

3.1.2.3 Wet Sandblasting

Wet sandblasting shall be used after the concrete has reached sufficient strength to prevent undercutting of the coarse aggregate particles. After wet sandblasting, the surface of the concrete shall then be washed thoroughly to remove all loose materials.

3.1.2.4 Waste Disposal

The method used in disposing of waste water employed in cutting, washing, and rinsing of concrete surfaces shall be such that the waste water does not stain, discolor, or affect exposed surfaces of the structures, or damage the environment of the project area. The method of disposal shall be subject to approval.

3.1.2.5 Preparation of Previously Placed Concrete

Concrete surfaces to which other concrete is to be bonded shall be abraded in an approved manner that will expose sound aggregate uniformly without damaging the concrete. Laitance and loose particles shall be removed. Surfaces shall be thoroughly washed and shall be moist but without free water when concrete is placed.

3.1.3 Vapor Barrier

Vapor barrier shall be provided beneath the interior on-grade concrete floor slabs. The greatest widths and lengths practicable shall be used to eliminate joints wherever possible. Joints shall be lapped a minimum of 12 inches. Torn, punctured, or damaged vapor barrier material shall be removed and new vapor barrier shall be provided prior to placing concrete. For minor repairs, patches may be made using laps of at least 12 inches. Lapped joints shall be sealed and edges patched with pressure-sensitive adhesive or tape not less than 2 inches wide and compatible with the membrane. Vapor barrier shall be placed directly on underlying subgrade, base course, or capillary water barrier, unless it consists of crushed material or large granular material which could puncture the vapor barrier. In this case, the surface shall be choked with a light layer of sand, as approved, before placing the vapor barrier. A 2 inch layer of compacted, clean concrete sand (fine aggregate) shall be placed on top of the vapor barrier before placing concrete. Concrete placement shall be controlled so as to prevent damage to the vapor barrier, or any covering sand.

3.1.4 Perimeter Insulation

Perimeter insulation shall be installed at locations indicated. Adhesive shall be used where insulation is applied to the interior surface of

foundation walls and may be used for exterior application.

3.1.5 Embedded Items

Before placement of concrete, care shall be taken to determine that all embedded items are firmly and securely fastened in place as indicated on the drawings, or required. Conduit and other embedded items shall be clean and free of oil and other foreign matter such as loose coatings or rust, paint, and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into voids. Welding shall not be performed on embedded metals within 1 feet of the surface of the concrete. Tack welding shall not be performed on or to embedded items.

3.2 CONCRETE PRODUCTION

3.2.1 Batching, Mixing, and Transporting Concrete

Concrete shall either be batched and mixed onsite or shall be furnished from a ready-mixed concrete plant. Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C 94/C 94M, except as otherwise specified. Truck mixers, agitators, and nonagitating transporting units shall comply with NRMCA TMMB 100. Ready-mix plant equipment and facilities shall be certified in accordance with NRMCA QC 3. Approved batch tickets shall be furnished for each load of ready-mixed concrete. Site-mixed concrete shall conform to the following subparagraphs.

3.2.1.1 General

The batching plant shall be located off site close to the project. The batching, mixing and placing system shall have a capacity of at least 50 cubic yards per hour. The batching plant shall conform to the requirements of NRMCA CPMB 100 and as specified; however, rating plates attached to batch plant equipment are not required.

3.2.1.2 Batching Equipment

The batching controls shall be semiautomatic or automatic, as defined in NRMCA CPMB 100. A semiautomatic batching system shall be provided with interlocks such that the discharge device cannot be actuated until the indicated material is within the applicable tolerance. The batching system shall be equipped with accurate recorder or recorders that meet the requirements of NRMCA CPMB 100. The weight of water and admixtures shall be recorded if batched by weight. Separate bins or compartments shall be provided for each size group of aggregate and type of cementitious material, to prevent intermingling at any time. Aggregates shall be weighed either in separate weigh batchers with individual scales or, provided the smallest size is batched first, cumulatively in one weigh batcher on one scale. Aggregate shall not be weighed in the same batcher with cementitious material. If both portland cement and other cementitious material are used, they may be batched cumulatively, provided that the portland cement is batched first, except that silica fume shall always be batched separately. Water may be measured by weight or volume. Water shall not be weighed or measured cumulatively with another ingredient. Filling and discharging valves for the water metering or batching system shall be so interlocked that the discharge valve cannot be opened before the filling valve is fully closed. Piping for water and for admixtures shall be free from leaks and shall be properly valved to prevent backflow

or siphoning. Admixtures shall be furnished as a liquid of suitable concentration for easy control of dispensing. An adjustable, accurate, mechanical device for measuring and dispensing each admixture shall be provided. Each admixture dispenser shall be interlocked with the batching and discharging operation of the water so that each admixture is separately batched and individually discharged automatically in a manner to obtain uniform distribution throughout the water as it is added to the batch in the specified mixing period. Different admixtures shall not be combined prior to introduction in water and shall not be allowed to intermingle until in contact with the cement. Admixture dispensers shall have suitable devices to detect and indicate flow during dispensing or have a means for visual observation. The plant shall be arranged so as to facilitate the inspection of all operations at all times. Suitable facilities shall be provided for obtaining representative samples of aggregates from each bin or compartment, and for sampling and calibrating the dispensing of cementitious material, water, and admixtures. Filling ports for cementitious materials bins or silos shall be clearly marked with a permanent sign stating the contents.

3.2.1.3 Scales

The weighing equipment shall conform to the applicable requirements of CPMB Concrete Plant Standard, and of NIST HB 44, except that the accuracy shall be plus or minus 0.2 percent of scale capacity. The Contractor shall provide standard test weights and any other auxiliary equipment required for checking the operating performance of each scale or other measuring devices. The tests shall be made at the specified frequency in the presence of a Government inspector. The weighing equipment shall be arranged so that the plant operator can conveniently observe all dials or indicators.

3.2.1.4 Batching Tolerances

(A) Tolerances with Weighing Equipment

MATERIAL	PERCENT OF REQUIRED WEIGHT
Cementitious materials	0 to plus 2
Aggregate	plus or minus 2
Water	plus or minus 1
Chemical admixture	0 to plus 6

(B) Tolerances with Volumetric Equipment

For volumetric batching equipment used for water and admixtures, the following tolerances shall apply to the required volume of material being batched:

MATERIAL	PERCENT OF REQUIRED MATERIAL
Water:	plus or minus 1 percent
Chemical admixtures:	0 to plus 6 percent

3.2.1.5 Moisture Control

The plant shall be capable of ready adjustment to compensate for the varying moisture content of the aggregates and to change the weights of the materials being batched.

3.2.1.6 Concrete Mixers

Mixers shall be stationary mixers or truck mixers. Mixers shall be capable of combining the materials into a uniform mixture and of discharging this mixture without segregation. The mixers shall not be charged in excess of the capacity recommended by the manufacturer. The mixers shall be operated at the drum or mixing blade speed designated by the manufacturer. The mixers shall be maintained in satisfactory operating condition, and the mixer drums shall be kept free of hardened concrete. Should any mixer at any time produce unsatisfactory results, its use shall be promptly discontinued until it is repaired.

3.2.1.7 Stationary Mixers

Concrete plant mixers shall be drum-type mixers of tilting, nontilting, horizontal-shaft, or vertical-shaft type, or shall be pug mill type and shall be provided with an acceptable device to lock the discharge mechanism until the required mixing time has elapsed. The mixing time and uniformity shall conform to all the requirements in ASTM C 94/C 94M applicable to central-mixed concrete.

3.2.1.8 Truck Mixers

Truck mixers, the mixing of concrete therein, and concrete uniformity shall conform to the requirements of ASTM C 94/C 94M. A truck mixer may be used either for complete mixing (transit-mixed) or to finish the partial mixing done in a stationary mixer (shrink-mixed). Each truck shall be equipped with two counters from which it is possible to determine the number of revolutions at mixing speed and the number of revolutions at agitating speed. Or, if approved in lieu of this, the number of revolutions shall be marked on the batch tickets. Water shall not be added at the placing site unless specifically approved; and in no case shall it exceed the specified w/c. Any such water shall be injected at the base of the mixer, not at the discharge end.

3.3 OMITTED

3.4 LIGHTWEIGHT AGGREGATE CONCRETE

In addition to the requirements specified for normal weight concrete, lightweight aggregate concrete shall conform to the following. The batching and mixing cycle shall be as directed based on written recommendations from the aggregate supplier which the Contractor shall furnish. Unless otherwise directed, the mixer shall be charged with approximately 2/3 of the total mixing water and all of the aggregate. This shall be mixed for at least 1-1/2 minutes in a stationary mixer or 15 revolutions at mixing speed in a truck mixer. The remaining ingredients shall then be added and mixing continued as specified for normal weight concrete. Lightweight aggregate concrete shall not be vibrated to the extent that large particles of aggregate float to the surface. During finishing, lightweight aggregate concrete shall not be worked to the extent that mortar is driven down and lightweight coarse aggregate appears at the surface. Lightweight aggregate concrete to be pumped shall have a cement content of at least 564 pounds per cubic yard.

3.5 FIBER REINFORCED CONCRETE

Fiber reinforced concrete shall conform to ASTM C 1116 and as follows, using the fibers specified in PART 2. A minimum of 1.5 pounds of fibers per cubic yard of concrete shall be used. Fibers shall be added at the batch plant. Toughness indices shall meet requirements for performance level I of ASTM C 1116. The services of a qualified technical representative shall be provided to instruct the concrete supplier in proper batching and mixing of materials to be provided.

3.6 TRANSPORTING CONCRETE TO PROJECT SITE

Concrete shall be transported to the placing site in truck mixers, or by approved pumping equipment. Nonagitating equipment, other than pumps, shall not be used for transporting lightweight aggregate concrete.

3.7 CONVEYING CONCRETE ON SITE

Concrete shall be conveyed from mixer or transporting unit to forms as rapidly as possible and within the time interval specified by methods which will prevent segregation or loss of ingredients using following equipment. Conveying equipment shall be cleaned before each placement.

3.7.1 Buckets

The interior hopper slope shall be not less than 58 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least 5 times the nominal maximum-size aggregate, and the area of the gate opening shall not be less than 2 square feet. The maximum dimension of the gate opening shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically, or hydraulically operated except that buckets larger than 2 cubic yardsshall not be manually operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

3.7.2 Transfer Hoppers

Concrete may be charged into nonagitating hoppers for transfer to other conveying devices. Transfer hoppers shall be capable of receiving concrete directly from delivery vehicles and shall have conical-shaped discharge features. The transfer hopper shall be equipped with a hydraulically operated gate and with a means of external vibration to effect complete discharge. Concrete shall not be held in nonagitating transfer hoppers more than 30 minutes.

3.7.3 Trucks

Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM C 94/C 94M. Nonagitating equipment shall be used only for transporting plant-mixed concrete over a smooth road and when the hauling time is less than 15 minutes. Bodies of nonagitating equipment shall be smooth, watertight, metal containers specifically designed to transport concrete, shaped with rounded corners to minimize segregation, and equipped with gates that will permit positive control of the discharge of the concrete.

3.7.4 Chutes

When concrete can be placed directly from a truck mixer, agitator, or nonagitating equipment, the chutes normally attached to this equipment by the manufacturer may be used. A discharge deflector shall be used when required by the Contracting Officer. Separate chutes and other similar equipment will not be permitted for conveying concrete.

3.7.5 Belt Conveyors

Belt conveyors shall be designed and operated to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and shall be provided with positive means, such as discharge baffle or hopper, for preventing segregation of the concrete at the transfer points and the point of placing. Belt conveyors shall be constructed such that the idler spacing shall not exceed 36 inches. The belt speed shall be a minimum of 300 feet per minute and a maximum of 750 feet per minute. If concrete is to be placed through installed horizontal or sloping reinforcing bars, the conveyor shall discharge concrete into a pipe or elephant truck that is long enough to extend through the reinforcing bars.

3.7.6 Concrete Pumps

Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure type; pneumatic placing equipment shall not be used. The pipeline shall be rigid steel pipe or heavy-duty flexible hose. The inside diameter of the pipe shall be at least 3 times the nominal maximum-size coarse aggregate in the concrete mixture to be pumped but not less than 4 inches. Aluminum pipe shall not be used.

3.8 PLACING CONCRETE

Mixed concrete shall be discharged within 1-1/2 hours or before the mixer drum has revolved 300 revolutions, whichever comes first after the introduction of the mixing water to the cement and aggregates. When the concrete temperature exceeds 85 degrees F, the time shall be reduced to 45 minutes. Concrete shall be placed within 15 minutes after it has been discharged from the transporting unit. Concrete shall be handled from mixer or transporting unit to forms in a continuous manner until the approved unit of operation is completed. Adequate scaffolding, ramps and walkways shall be provided so that personnel and equipment are not supported by in-place reinforcement. Placing will not be permitted when the sun, heat, wind, or limitations of facilities furnished by the Contractor prevent proper consolidation, finishing and curing. Sufficient placing capacity shall be provided so that concrete can be kept free of cold joints.

3.8.1 Depositing Concrete

Concrete shall be deposited as close as possible to its final position in the forms, and there shall be no vertical drop greater than 5 feet except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it will be effectively consolidated in horizontal layers not more than 12 inches thick, except that all slabs shall be placed in a single layer. Concrete to receive other construction shall be screeded to the proper level. Concrete shall be deposited continuously in one layer or in layers so that fresh concrete is deposited on in-place concrete that is still plastic. Fresh concrete shall not be deposited on concrete that has

hardened sufficiently to cause formation of seams or planes of weakness within the section. Concrete that has surface dried, partially hardened, or contains foreign material shall not be used. When temporary spreaders are used in the forms, the spreaders shall be removed as their service becomes unnecessary. Concrete shall not be placed in slabs over columns and walls until concrete in columns and walls has been in-place at least two hours or until the concrete begins to lose its plasticity. Concrete for beams, girders, brackets, column capitals, haunches, and drop panels shall be placed at the same time as concrete for adjoining slabs.

3.8.2 Consolidation

Immediately after placing, each layer of concrete shall be consolidated by internal vibrators, except for slabs 4 inches thick or less. The vibrators shall at all times be adequate in effectiveness and number to properly consolidate the concrete; a spare vibrator shall be kept at the jobsite during all concrete placing operations. The vibrators shall have a frequency of not less than 10,000 vibrations per minute, an amplitude of at least 0.025 inch, and the head diameter shall be appropriate for the structural member and the concrete mixture being placed. Vibrators shall be inserted vertically at uniform spacing over the area of placement. The distance between insertions shall be approximately 1-1/2 times the radius of action of the vibrator so that the area being vibrated will overlap the adjacent just-vibrated area by a reasonable amount. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the preceding layer if there is such. Vibrator shall be held stationary until the concrete is consolidated and then vertically withdrawn slowly while operating. Form vibrators shall not be used unless specifically approved and unless forms are constructed to withstand their use. Vibrators shall not be used to move concrete within the forms. Slabs 4 inches and less in thickness shall be consolidated by properly designed vibrating screeds or other approved technique. Excessive vibration of lightweight concrete resulting in segration or flotation of coarse aggregate shall be prevented. Frequency and amplitude of vibrators shall be determined in accordance with COE CRD-C 521. Grate tampers ("jitterbugs") shall not be used.

3.8.3 Cold Weather Requirements

Special protection measures, approved by the Contracting Officer, shall be used if freezing temperatures are anticipated before the expiration of the specified curing period. The ambient temperature of the air where concrete is to be placed and the temperature of surfaces to receive concrete shall be not less than 40 degrees F. The temperature of the concrete when placed shall be not less than 50 degrees F nor more than 75 degrees F. Heating of the mixing water or aggregates will be required to regulate the concrete placing temperature. Materials entering the mixer shall be free from ice, snow, or frozen lumps. Salt, chemicals or other materials shall not be incorporated in the concrete to prevent freezing. Upon written approval, an accelerating admixture conforming to ASTM C 494/C 494M, Type C or E may be used, provided it contains no calcium chloride. Calcium chloride shall not be used.

3.8.4 Hot Weather Requirements

When the ambient temperature during concrete placing is expected to exceed 85 degrees F, the concrete shall be placed and finished with procedures previously submitted and as specified herein. The concrete temperature at time of delivery to the forms shall not exceed the temperature shown in the table below when measured in accordance with ASTM C 1064/C 1064M. Cooling

of the mixing water or aggregates or placing concrete in the cooler part of the day may be required to obtain an adequate placing temperature. A retarder may be used, as approved, to facilitate placing and finishing. Steel forms and reinforcements shall be cooled as approved prior to concrete placement when steel temperatures are greater than 120 degrees F. Conveying and placing equipment shall be cooled if necessary to maintain proper concrete-placing temperature.

Maximum Allowable Concrete Placing Temperature

Relative Humidity, Percent, During Time of Concrete Placement	Maximum Allowable Concrete Temperature Degrees
Greater than 60	90 F
40-60	85 F
Less than 40	80 F

3.8.5 Prevention of Plastic Shrinkage Cracking

During hot weather with low humidity, and particularly with appreciable wind, as well as interior placements when space heaters produce low humidity, the Contractor shall be alert to the tendency for plastic shrinkage cracks to develop and shall institute measures to prevent this. Particular care shall be taken if plastic shrinkage cracking is potentially imminent and especially if it has developed during a previous placement. Periods of high potential for plastic shrinkage cracking can be anticipated by use of Fig. 2.1.5 of ACI 305R. In addition the concrete placement shall be further protected by erecting shades and windbreaks and by applying fog sprays of water, sprinkling, ponding or wet covering. Plastic shrinkage cracks that occur shall be filled by injection of epoxy resin as directed, after the concrete hardens. Plastic shrinkage cracks shall never be troweled over or filled with slurry.

3.8.6 Omitted

3.8.7 Placing Concrete in Congested Areas

Special care shall be used to ensure complete filling of the forms, elimination of all voids, and complete consolidation of the concrete when placing concrete in areas congested with reinforcing bars, embedded items, waterstops and other tight spacing. An appropriate concrete mixture shall be used, and the nominal maximum size of aggregate (NMSA) shall meet the specified criteria when evaluated for the congested area. Vibrators with heads of a size appropriate for the clearances available shall be used, and the consolidation operation shall be closely supervised to ensure complete and thorough consolidation at all points. Where necessary, splices of reinforcing bars shall be alternated to reduce congestion. Where two mats of closely spaced reinforcing are required, the bars in each mat shall be placed in matching alignment to reduce congestion. Reinforcing bars may be temporarily crowded to one side during concrete placement provided they are returned to exact required location before concrete placement and consolidation are completed.

3.8.8 Placing Flowable Concrete

If a plasticizing admixture conforming to ASTM C 1017/C 1017M is used or if

a Type F or G high range water reducing admixture is permitted to increase the slump, the concrete shall meet all requirements of paragraph GENERAL REQUIREMENTS in PART 1. Extreme care shall be used in conveying and placing the concrete to avoid segregation. Consolidation and finishing shall meet all requirements of paragraphs Placing Concrete, Finishing Formed Surfaces, and Finishing Unformed Surfaces. No relaxation of requirements to accommodate flowable concrete will be permitted.

3.9 JOINTS

Joints shall be located and constructed as indicated or approved. Joints not indicated on the drawings shall be located and constructed to minimize the impact on the strength of the structure. In general, such joints shall be located near the middle of the spans of supported slabs, beams, and girders unless a beam intersects a girder at this point, in which case the joint in the girder shall be offset a distance equal to twice the width of the beam. Joints in walls and columns shall be at the underside of floors, slabs, beams, or girders and at the tops of footings or floor slabs, unless otherwise approved. Joints shall be perpendicular to the main reinforcement. All reinforcement shall be continued across joints; except that reinforcement or other fixed metal items shall not be continuous through expansion joints, or through construction or contraction joints in slabs on grade. Reinforcement shall be 2 inches clear from each joint. Except where otherwise indicated, construction joints between interior slabs on grade and vertical surfaces shall consist of 30 pound asphalt-saturated felt, extending for the full depth of the slab. The perimeters of the slabs shall be free of fins, rough edges, spalling, or other unsightly appearance. Reservoir for sealant for construction and contraction joints in slabs shall be formed to the dimensions shown on the drawings by removing snap-out joint-forming inserts. Joints to be sealed shall be cleaned and sealed as indicated and in accordance with Section 07900 JOINT SEALING.

3.9.1 Construction Joints

For concrete other than slabs on grade, construction joints shall be located so that the unit of operation does not exceed 65 feet. Concrete shall be placed continuously so that each unit is monolithic in construction. Fresh concrete shall not be placed against adjacent hardened concrete until it is at least 24 hours old. Construction joints shall be located as indicated or approved. Where concrete work is interrupted by weather, end of work shift or other similar type of delay, location and type of construction joint shall be subject to approval of the Contracting Officer. Unless otherwise indicated and except for slabs on grade, reinforcing steel shall extend through construction joints. Construction joints in slabs on grade shall be keyed or doweled as shown. Concrete columns, walls, or piers shall be in place at least 2 hours, or until the concrete begins to lose its plasticity, before placing concrete for beams, girders, or slabs thereon. In walls having door or window openings, lifts shall terminate at the top and bottom of the opening. Other lifts shall terminate at such levels as to conform to structural requirements or architectural details. Where horizontal construction joints in walls or columns are required, a strip of 1 inchsquare-edge lumber, bevelled and oiled to facilitate removal, shall be tacked to the inside of the forms at the construction joint. Concrete shall be placed to a point 1 inch above the underside of the strip. The strip shall be removed 1 hour after the concrete has been placed, and any irregularities in the joint line shall be leveled off with a wood float, and all laitance shall be removed. Prior to placing additional concrete, horizontal construction joints shall be

prepared as specified in paragraph Previously Placed Concrete.

3.9.2 Contraction Joints in Slabs on Grade

Contraction joints shall be located and detailed as shown on the drawings. Contraction joints shall be produced by forming a weakened plane in the concrete slab by use of snap-out plastic joint forming inserts or sawing a continuous slot with a concrete saw. Regardless of method used to produce the weakened plane, it shall be 1/4 the depth of the slab thickness and between 1/8 and 3/16 inch wide. For saw-cut joints, cutting shall be timed properly with the set of the concrete. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent ravelling of the edges of the saw cut. Cutting shall be completed before shrinkage stresses become sufficient to produce cracking. Reservoir for joint sealant shall be formed as previously specified.

3.9.3 Expansion Joints

Installation of expansion joints and sealing of these joints shall conform to the requirements of Section 03150 EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS and Section 07900 JOINT SEALING.

3.9.4 Waterstops

Waterstops shall be installed in conformance with the locations and details shown on the drawings using materials and procedures specified in Section 03150 EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS.

3.9.5 Dowels and Tie Bars

Dowels and tie bars shall be installed at the locations shown on the drawings and to the details shown, using materials and procedures specified in Section 03200 CONCRETE REINFORCEMENT and herein. Conventional smooth "paving" dowels shall be installed in slabs using approved methods to hold the dowel in place during concreting within a maximum alignment tolerance of 1/8 inch in 12 inches. "Structural" type deformed bar dowels, or tie bars, shall be installed to meet the specified tolerances. Care shall be taken during placing adjacent to and around dowels and tie bars to ensure there is no displacement of the dowel or tie bar and that the concrete completely embeds the dowel or tie bar and is thoroughly consolidated.

3.10 FINISHING FORMED SURFACES

Forms, form materials, and form construction are specified in Section 03100 STRUCTURAL CONCRETE FORMWORK. Finishing of formed surfaces shall be as specified herein. Unless another type of architectural or special finish is specified, surfaces shall be left with the texture imparted by the forms except that defective surfaces shall be repaired. Unless painting of surfaces is required, uniform color of the concrete shall be maintained by use of only one mixture without changes in materials or proportions for any structure or portion of structure that requires a Class A or B finish. Except for major defects, as defined hereinafter, surface defects shall be repaired as specified herein within 24 hours after forms are removed. Repairs of the so-called "plaster-type" will not be permitted in any location. Tolerances of formed surfaces shall conform to the requirements of ACI 117/117R. These tolerances apply to the finished concrete surface, not to the forms themselves; forms shall be set true to line and grade. Form tie holes requiring repair and other defects whose depth is at least as great as their surface diameter shall be repaired as specified in

paragraph Damp-Pack Mortar Repair. Defects whose surface diameter is greater than their depth shall be repaired as specified in paragraph Repair of Major Defects. Repairs shall be finished flush with adjacent surfaces and with the same surface texture. The cement used for all repairs shall be a blend of job cement with white cement proportioned so that the final color after curing and aging will be the same as the adjacent concrete. Concrete with excessive honeycomb, or other defects which affect the strength of the member, will be rejected. Repairs shall be demonstrated to be acceptable and free from cracks or loose or drummy areas at the completion of the contract and, for Class A and B Finishes, shall be inconspicuous. Repairs not meeting these requirements will be rejected and shall be replaced.

3.10.1 Class A Finish and Class B Finish

Class A finish is required where indicated on the drawings. Fins, ravelings, and loose material shall be removed, all surface defects over 1/2 inch in diameter or more than 1/2 inch deep, shall be repaired and, except as otherwise indicated or as specified in Section 03100 STRUCTURAL CONCRETE FORMWORK, holes left by removal of form ties shall be reamed and filled. Defects more than 1/2 inch in diameter shall be cut back to sound concrete, but in all cases at least 1 inch deep. The Contractor shall prepare a sample panel for approval (as specified in PART 1) before commencing repair, showing that the surface texture and color match will be attained. Metal tools shall not be used to finish repairs in Class A surfaces.

3.10.2 Class D Finish

Class D finish is required where indicated on the drawings. Fins, ravelings, and loose material shall be removed, and, except as otherwise indicated or as specified in Section 03100 STRUCTURAL CONCRETE FORMWORK, holes left by removal of form ties shall be reamed and filled. Honeycomb and other defects more than 1/2 inch deep or more than 2 inches in diameter shall be repaired. Defects more than 2 inches in diameter shall be cut back to sound concrete, but in all cases at least 1 inch deep.

3.10.3 Special Finishes

Special finishes shall conform to the requirements specified herein.

3.10.3.1 Smooth Finish

After other concrete construction is complete in each overall separate contiguous area of the structure, smooth finish shall be applied to the areas indicated on the drawings. A mortar mix consisting of one part portland cement and two parts well-graded sand passing a No. 30 sieve, with water added to give the consistency of thick paint, shall be used. Where the finished surface will not receive other applied surface, white cement shall be used to replace part of the job cement to produce an approved color, which shall be uniform throughout the surfaces of the structure. After the surface has been thoroughly wetted and allowed to approach surface dryness, the mortar shall be vigorously applied to the area by clean burlap pads or by cork or wood-floating, to completely fill all surface voids. Excess grout shall be scraped off with a trowel. As soon as it can be accomplished without pulling the mortar from the voids, the area shall be rubbed with burlap pads having on their surface the same sand-cement mix specified above but without any mixing water, until all of the visible grout film is removed. The burlap pads used for this operation

shall be stretched tightly around a board to prevent dishing the mortar in the voids. The finish of any area shall be completed in the same day, and the limits of a finished area shall be made at natural breaks in the surface. The surface shall be continuously moist cured for 48 hours commencing immediately after finishing operations in each area. The temperature of the air adjacent to the surface shall be not less than 50 degrees F for 24 hours prior to, and 48 hours after, the application. In hot, dry weather the smooth finish shall be applied in shaded areas or at night, and shall never be applied when there is significant hot, dry wind.

3.11 REPAIRS

3.11.1 Damp-Pack Mortar Repair

Form tie holes requiring repair and other defects whose depth is at least as great as their surface diameter but not over 4 inches shall be repaired by the damp-pack mortar method. Form tie holes shall be reamed and other similar defects shall be cut out to sound concrete. The void shall then be thoroughly cleaned, thoroughly wetted, brush-coated with a thin coat of neat cement grout and filled with mortar. Mortar shall be a stiff mix of 1 part portland cement to 2 parts fine aggregate passing the No. 16 mesh sieve, and minimum amount of water. Only sufficient water shall be used to produce a mortar which, when used, will stick together on being molded into a ball by a slight pressure of the hands and will not exude water but will leave the hands damp. Mortar shall be mixed and allowed to stand for 30 to 45 minutes before use with remixing performed immediately prior to use. Mortar shall be thoroughly tamped in place in thin layers using a hammer and hardwood block. Holes passing entirely through walls shall be completely filled from the inside face by forcing mortar through to the outside face. All holes shall be packed full. Damp-pack repairs shall be moist cured for at least 48 hours.

3.11.2 Repair of Major Defects

Major defects will be considered to be those more than 1/2 inch deep or, for Class A and D finishes, more than 2 inches in diameter. Also included are any defects of any kind whose depth is over 4 inches or whose surface diameter is greater than their depth. Major defects shall be repaired as specified below.

3.11.2.1 Surface Application of Mortar Repair

Defective concrete shall be removed, and removal shall extend into completely sound concrete. Approved equipment and procedures which will not cause cracking or microcracking of the sound concrete shall be used. If reinforcement is encountered, concrete shall be removed so as to expose the reinforcement for at least 2 inches on all sides. All such defective areas greater than 12 square inches shall be outlined by saw cuts at least 1 inch deep. Defective areas less than 12 square inches shall be outlined by a 1 inch deep cut with a core drill in lieu of sawing. All saw cuts shall be straight lines in a rectangular pattern in line with the formwork panels. After concrete removal, the surface shall be thoroughly cleaned by high pressure washing to remove all loose material. Surfaces shall be kept continually saturated for the first 12 of the 24 hours immediately before placing mortar and shall be damp but not wet at the time of commencing mortar placement. The Contractor, at his option, may use either hand-placed mortar or mortar placed with a mortar gun. If hand-placed mortar is used, the edges of the cut shall be perpendicular to the surface of the concrete. The prepared area shall be brush-coated with a thin coat

of neat cement grout. The repair shall then be made using a stiff mortar, preshrunk by allowing the mixed mortar to stand for 30 to 45 minutes and then remixed, thoroughly tamped into place in thin layers. If hand-placed mortar is used, the Contractor shall test each repair area for drumminess by firm tapping with a hammer and shall inspect for cracks, both in the presence of the Contracting Officer's representative, immediately before completion of the contract, and shall replace any showing drumminess or cracking. If mortar placed with a mortar gun is used, the gun shall be a small compressed air-operated gun to which the mortar is slowly hand fed and which applies the mortar to the surface as a high-pressure stream, as approved. Repairs made using shotcrete equipment will not be accepted. The mortar used shall be the same mortar as specified for damp-pack mortar repair. If gun-placed mortar is used, the edges of the cut shall be beveled toward the center at a slope of 1:1. All surface applied mortar repairs shall be continuously moist cured for at least 7 days. Moist curing shall consist of several layers of saturated burlap applied to the surface immediately after placement is complete and covered with polyethylene sheeting, all held closely in place by a sheet of plywood or similar material rigidly braced against it. Burlap shall be kept continually wet.

3.11.2.2 Repair of Deep and Large Defects

Deep and large defects will be those that are more than 6 inches deep and also have an average diameter at the surface more than 18 inches or that are otherwise so identified by the Project Office. Such defects shall be repaired as specified herein or directed, except that defects which affect the strength of the structure shall not be repaired and that portion of the structure shall be completely removed and replaced. Deep and large defects shall be repaired by procedures approved in advance including forming and placing special concrete using applied pressure during hardening. Preparation of the repair area shall be as specified for surface application of mortar. In addition, the top edge (surface) of the repair area shall be sloped at approximately 20 degrees from the horizontal, upward toward the side from which concrete will be placed. The special concrete shall be a concrete mixture with low water content and low slump, and shall be allowed to age 30 to 60 minutes before use. Concrete containing a specified expanding admixture may be used in lieu of the above mixture; the paste portion of such concrete mixture shall be designed to have an expansion between 2.0 and 4.0 percent when tested in accordance with ASTM C 940. A full width "chimney" shall be provided at the top of the form on the placing side to ensure filling to the top of the opening. A pressure cap shall be used on the concrete in the chimney with simultaneous tightening and revibrating the form during hardening to ensure a tight fit for the repair. The form shall be removed after 24 hours and immediately the chimney shall be carefully chipped away to avoid breaking concrete out of the repair; the surface of the repair concrete shall be dressed as required.

3.11.3 Resinous and Latex Material Repair

In lieu of the portland cement bonding coats specified above, an epoxy resin or a latex bonding agent may be used.

3.12 FINISHING UNFORMED SURFACES

The finish of all unformed surfaces shall meet the requirements of paragraph Tolerances in PART 1, when tested as specified herein.

3.12.1 General

The ambient temperature of spaces adjacent to unformed surfaces being finished and of the base on which concrete will be placed shall be not less than 50 degrees F. In hot weather all requirements of paragraphs Hot Weather Requirements and Prevention of Plastic Shrinkage Cracking shall be met. Unformed surfaces that are not to be covered by additional concrete or backfill shall have a float finish, with additional finishing as specified below, and shall be true to the elevation shown on the drawings. Surfaces to receive additional concrete or backfill shall be brought to the elevation shown on the drawings, properly consolidated, and left true and regular. Unless otherwise shown on the drawings, exterior surfaces shall be sloped for drainage, as directed. Where drains are provided, interior floors shall be evenly sloped to the drains. Joints shall be carefully made with a jointing or edging tool. The finished surfaces shall be protected from stains or abrasions. Grate tampers or "jitterbugs" shall not be used for any surfaces. The dusting of surfaces with dry cement or other materials or the addition of any water during finishing shall not be permitted. If bleedwater is present prior to finishing, the excess water shall be carefully dragged off or removed by absorption with porous materials such as burlap. During finishing operations, extreme care shall be taken to prevent over finishing or working water into the surface; this can cause "crazing" (surface shrinkage cracks which appear after hardening) of the surface. Any slabs with surfaces which exhibit significant crazing shall be removed and replaced. During finishing operations, surfaces shall be checked with a 10 foot straightedge, applied in both directions at regular intervals while the concrete is still plastic, to detect high or low areas.

3.12.2 Rough Slab Finish

As a first finishing operation for unformed surfaces and as final finish for slabs to receive mortar setting beds, the surface shall receive a rough slab finish prepared as follows. The following areas shown as recessed areas for ceramic setting beds shall receive only a rough slab finish. The concrete shall be uniformly placed across the slab area, consolidated as previously specified, and then screeded with straightedge strikeoffs immediately after consolidation to bring the surface to the required finish level with no coarse aggregate visible. Side forms and screed rails shall be provided, rigidly supported, and set to exact line and grade. Allowable tolerances for finished surfaces apply only to the hardened concrete, not to forms or screed rails. Forms and screed rails shall be set true to line and grade. "Wet screeds" shall not be used.

3.12.3 Floated Finish

Slabs to receive more than a rough slab finish shall next be given a wood float finish. Exposed interior slabs shall be given only a float finish. The screeding shall be followed immediately by darbying or bull floating before bleeding water is present, to bring the surface to a true, even plane. Then, after the concrete has stiffened so that it will withstand a man's weight without imprint of more than 1/4 inch and the water sheen has disappeared, it shall be floated to a true and even plane free of ridges. Floating shall be performed by use of suitable hand floats or power driven equipment. Sufficient pressure shall be used on the floats to bring a film of moisture to the surface. Hand floats shall be made of wood, magnesium, or aluminum. Lightweight concrete or concrete that exhibits stickiness shall be floated with a magnesium float. Care shall be taken to prevent over-finishing or incorporating water into the surface.

3.12.4 Troweled Finish

All areas receiving floor coverings shall be given a trowel finish. After floating is complete and after the surface moisture has disappeared, unformed surfaces shall be steel-troweled to a smooth, even, dense finish, free from blemishes including trowel marks. In lieu of hand finishing, an approved power finishing machine may be used in accordance with the directions of the machine manufacturer. Additional trowelings shall be performed, either by hand or machine until the surface has been troweled 2 times, with waiting period between each. Care shall be taken to prevent blistering and if such occurs, troweling shall immediately be stopped and operations and surfaces corrected. A final hard steel troweling shall be done by hand, with the trowel tipped, and using hard pressure, when the surface is at a point that the trowel will produce a ringing sound. The finished surface shall be thoroughly consolidated and shall be essentially free of trowel marks and be uniform in texture and appearance. The concrete mixture used for troweled finished areas shall be adjusted, if necessary, in order to provide sufficient fines (cementitious material and fine sand) to finish properly.

3.12.5 Omitted

3.12.6 Non-Slip Finish

Non-slip floors shall be constructed in accordance with the following subparagraphs.

3.12.6.1 Broomed

Areas as indicated on the drawings shall be given a broomed finish. After floating, the surface shall be lightly steel troweled, and then carefully scored by pulling a coarse fiber push-type broom across the surface. Brooming shall be transverse to traffic or at right angles to the slope of the slab. After the end of the curing period, the surface shall be vigorously broomed with a coarse fiber broom to remove all loose or semi-detached particles.

3.13 FLOOR HARDENER

Areas as indicated on the drawings shall be treated with floor hardener. Floor hardener shall be applied after the concrete has been cured and then air dried for 28 days. Three coats shall be applied, each the day after the preceding coat was applied. For the first application, one pound of the silocofluoride shall be dissolved in one gallon of water. For subsequent applications, the solution shall be two pounds of silicofluoride to each gallon of water. Floor should be mopped with clear water shortly after the preceding application has dried to remove encrusted salts. Proprietary hardeners shall be applied in accordance with the manufacturer's instructions. During application, area should be well ventilated. Precautions shall be taken when applying silicofluorides due to the toxicity of the salts. Any compound that contacts glass or aluminum should be immediately removed with clear water.

3.14 EXTERIOR SLAB AND RELATED ITEMS

3.14.1 Pavements

Pavements shall be constructed where shown on the drawings. After forms

are set and underlying material prepared as specified, the concrete shall be placed uniformly throughout the area and thoroughly vibrated. As soon as placed and vibrated, the concrete shall be struck off and screeded to the crown and cross section and to such elevation above grade that when consolidated and finished, the surface of the pavement will be at the required elevation. The entire surface shall be tamped with the strike off, or consolidated with a vibrating screed, and this operation continued until the required compaction and reduction of internal and surface voids are accomplished. Care shall be taken to prevent bringing excess paste to the surface. Immediately following the final consolidation of the surface, the pavement shall be floated longitudinally from bridges resting on the side forms and spanning but not touching the concrete. If necessary, additional concrete shall be placed and screeded, and the float operated until a satisfactory surface has been produced. The floating operation shall be advanced not more than half the length of the float and then continued over the new and previously floated surfaces. After finishing is completed but while the concrete is still plastic, minor irregularities and score marks in the pavement surface shall be eliminated by means of long-handled cutting straightedges. Straightedges shall be 12 feet in length and shall be operated from the sides of the pavement and from bridges. A straightedge operated from the side of the pavement shall be equipped with a handle 3 feet longer than one-half the width of the pavement. The surface shall then be tested for trueness with a 12 foot straightedge held in successive positions parallel and at right angles to the center line of the pavement, and the whole area covered as necessary to detect variations. The straightedge shall be advanced along the pavement in successive stages of not more than one-half the length of the straightedge. Depressions shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. Projections above the required elevation shall also be struck off and refinished. The straightedge testing and finishing shall continue until the entire surface of the concrete is true. Before the surface sheen has disappeared and well before the concrete becomes nonplastic, the surface of the pavement shall be given a nonslip sandy surface texture by use of a burlap drag. A strip of clean, wet burlap from 3 to 5 feet wide and 2 feet longer than the pavement width shall be carefully pulled across the surface. Edges and joints shall be rounded with an edger having a radius of 1/8 inch. Curing shall be as specified.

3.14.2 Sidewalks

Concrete shall be 4 inches minimum thickness. Contraction joints shall be provided at 5 feet spaces unless otherwise indicated. Contraction joints shall be cut 1 inch deep with a jointing tool after the surface has been finished. Transverse expansion joints 1/2 inch thick shall be provided at changes in direction and where sidewalk abuts curbs, steps, rigid pavement, or other similar structures. Sidewalks shall be given a lightly broomed finish. A transverse slope of 1/4 inch per foot shall be provided, unless otherwise indicated. Variations in cross section shall be limited to 1/4 inch in 5 feet.

3.14.3 Curbs and Gutters

Concrete shall be formed, placed, and finished by hand using a properly shaped "mule" or constructed using a slipform machine specially designed for this work. Contraction joints shall be cut 3 inches deep with a jointing tool after the surface has been finished. Expansion joints (1/2 inch wide) shall be provided at 100 feetmaximum spacing unless otherwise indicated. Exposed surfaces shall be finished using a stiff bristled brush.

3.14.4 Pits and Trenches

Pits and trenches shall be constructed as indicated on the drawings. Bottoms and walls shall be placed monolithically or waterstops and keys, shall be provided as approved.

3.15 CURING AND PROTECTION

3.15.1 General

Concrete shall be cured by an approved method for the period of time given below:

Concrete with Type III cement	3 days
All other concrete	7 days

Immediately after placement, concrete shall be protected from premature drying, extremes in temperatures, rapid temperature change, mechanical injury and damage from rain and flowing water for the duration of the curing period. Air and forms in contact with concrete shall be maintained at a temperature above 50 degrees F for the first 3 days and at a temperature above 32 degrees F for the remainder of the specified curing period. Exhaust fumes from combustion heating units shall be vented to the outside of the enclosure, and heaters and ducts shall be placed and directed so as not to cause areas of overheating and drying of concrete surfaces or to create fire hazards. Materials and equipment needed for adequate curing and protection shall be available and at the site prior to placing concrete. No fire or excessive heat, including welding, shall be permitted near or in direct contact with the concrete at any time. Except as otherwise permitted by paragraph Membrane Forming Curing Compounds, moist curing shall be provided for any areas to receive floor hardener, any paint or other applied coating, or to which other concrete is to be bonded. Concrete containing silica fume shall be initially cured by fog misting during finishing, followed immediately by continuous moist curing. Except for plastic coated burlap, impervious sheeting alone shall not be used for curing.

3.15.2 Moist Curing

Concrete to be moist-cured shall be maintained continuously wet for the entire curing period, commencing immediately after finishing. If water or curing materials used stain or discolor concrete surfaces which are to be permanently exposed, the concrete surfaces shall be cleaned as approved. When wooden forms are left in place during curing, they shall be kept wet at all times. If steel forms are used in hot weather, nonsupporting vertical forms shall be broken loose from the concrete soon after the concrete hardens and curing water continually applied in this void. If the forms are removed before the end of the curing period, curing shall be carried out as on unformed surfaces, using suitable materials. Surfaces shall be cured by ponding, by continuous sprinkling, by continuously saturated burlap or cotton mats, or by continuously saturated plastic coated burlap. Burlap and mats shall be clean and free from any contamination and shall be completely saturated before being placed on the concrete. The Contractor shall have an approved work system to ensure that moist curing is continuous 24 hours per day.

3.15.3 Omitted
3.15.4 Omitted

3.15.5 Omitted

3.15.6 Cold Weather Curing and Protection

When the daily ambient low temperature is less than 32 degrees F the temperature of the concrete shall be maintained above 40 degrees F for the first 7 days after placing. During the period of protection removal, the air temperature adjacent to the concrete surfaces shall be controlled so that concrete near the surface will not be subjected to a temperature differential of more than 25 degrees F as determined by suitable temperature measuring devices furnished by the Government, as required, and installed adjacent to the concrete surface and 2 inches inside the surface of the concrete. The installation of the thermometers shall be made by the Contractor as directed.

3.16 SETTING BASE PLATES AND BEARING PLATES

After being properly positioned, column base plates, bearing plates for beams and similar structural members, and machinery and equipment base plates shall be set to the proper line and elevation with damp-pack bedding mortar, except where nonshrink grout is indicated. The thickness of the mortar or grout shall be approximately 1/24 the width of the plate, but not less than 3/4 inch. Concrete and metal surfaces in contact with grout shall be clean and free of oil and grease, and concrete surfaces in contact with grout shall be damp and free of laitance when grout is placed.

3.16.1 Damp-Pack Bedding Mortar

Damp-pack bedding mortar shall consist of 1 part cement and 2-1/2 parts fine aggregate having water content such that a mass of mortar tightly squeezed in the hand will retain its shape but will crumble when disturbed. The space between the top of the concrete and bottom of the bearing plate or base shall be packed with the bedding mortar by tamping or ramming with a bar or rod until it is completely filled.

3.16.2 Nonshrink Grout

Nonshrink grout shall be a ready-mixed material requiring only the addition of water. Water content shall be the minimum that will provide a flowable mixture and completely fill the space to be grouted without segregation, bleeding, or reduction of strength.

3.16.2.1 Mixing and Placing of Nonshrink Grout

Mixing and placing shall be in conformance with the material manufacturer's instructions and as specified therein. Ingredients shall be thoroughly dry-mixed before adding water. After adding water, the batch shall be mixed for 3 minutes. Batches shall be of size to allow continuous placement of freshly mixed grout. Grout not used within 30 minutes after mixing shall be discarded. The space between the top of the concrete or machinery-bearing surface and the plate shall be filled solid with the grout. Forms shall be of wood or other equally suitable material for completely retaining the grout on all sides and on top and shall be removed after the grout has set. The placed grout shall be carefully worked by rodding or other means to eliminate voids; however, overworking and breakdown of the initial set shall be avoided. Grout shall not be retempered or subjected to vibration from any source. Where clearances are unusually small, placement shall be under pressure with a grout pump. Temperature of the grout, and of surfaces receiving the grout, shall be

maintained at 65 to 85 degrees F until after setting.

3.16.2.2 Treatment of Exposed Surfaces

For metal-oxidizing nonshrink grout, exposed surfaces shall be cut back 1 inch and immediately covered with a parge coat of mortar consisting of 1 part portland cement and 2-1/2 parts fine aggregate by weight, with sufficient water to make a plastic mixture. The parge coat shall have a smooth finish. For other mortars or grouts, exposed surfaces shall have a smooth-dense finish and be left untreated. Curing shall comply with paragraph CURING AND PROTECTION.

3.17 TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL

The Contractor shall perform the inspection and tests described below and, based upon the results of these inspections and tests, shall take the action required and shall submit specified reports. When, in the opinion of the Contracting Officer, the concreting operation is out of control, concrete placement shall cease and the operation shall be corrected. The laboratory performing the tests shall be onsite and shall conform with ASTM C 1077. Materials may be subjected to check testing by the Government from samples obtained at the manufacturer, at transfer points, or at the project site. The Government will inspect the laboratory, equipment, and test procedures prior to start of concreting operations and at least once per month thereafter for conformance with ASTM C 1077.

3.17.1 Grading and Corrective Action

3.17.1.1 Fine Aggregate

At least once during each shift when the concrete plant is operating, there shall be one sieve analysis and fineness modulus determination in accordance with ASTM C 136 and COE CRD-C 104 for the fine aggregate or for each fine aggregate if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. When the amount passing on any sieve is outside the specification limits, the fine aggregate shall be immediately resampled and retested. If there is another failure on any sieve, the fact shall immediately reported to the Contracting Officer, concreting shall be stopped, and immediate steps taken to correct the grading.

3.17.1.2 Coarse Aggregate

At least once during each shift in which the concrete plant is operating, there shall be a sieve analysis in accordance with ASTM C 136 for each size of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor shall be responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken at the same locations shall show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than as delivered to the mixer to allow for degradation during handling. When the amount passing any sieve is outside the specification limits, the coarse aggregate shall be immediately resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the Contracting Officer. Where two

consecutive averages of 5 tests are outside specification limits, the operation shall be considered out of control and shall be reported to the Contracting Officer. Concreting shall be stopped and immediate steps shall be taken to correct the grading.

3.17.2 Quality of Aggregates

Thirty days prior to the start of concrete placement, the Contractor shall perform all tests for aggregate quality required by ASTM C 33. In addition, after the start of concrete placement, the Contractor shall perform tests for aggregate quality at least every three months, and when the source of aggregate or aggregate quality changes. Samples tested after the start of concrete placement shall be taken immediately prior to entering the concrete mixer.

3.17.3 Scales, Batching and Recording

The accuracy of the scales shall be checked by test weights prior to start of concrete operations and at least once every three months. Such tests shall also be made as directed whenever there are variations in properties of the fresh concrete that could result from batching errors. Once a week the accuracy of each batching and recording device shall be checked during a weighing operation by noting and recording the required weight, recorded weight, and the actual weight batched. At the same time, the Contractor shall test and ensure that the devices for dispensing admixtures are operating properly and accurately. When either the weighing accuracy or batching accuracy does not comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made. Discrepancies in recording accuracies shall be corrected immediately.

3.17.4 Batch-Plant Control

The measurement of concrete materials including cementitious materials, each size of aggregate, water, and admixtures shall be continuously controlled. The aggregate weights and amount of added water shall be adjusted as necessary to compensate for free moisture in the aggregates. The amount of air-entraining agent shall be adjusted to control air content within specified limits. A report shall be prepared indicating type and source of cement used, type and source of pozzolan or slag used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubic yard, amount of water as free moisture in each size of aggregate, and the batch aggregate and water weights per cubic yard for each class of concrete batched during each day's plant operation.

3.17.5 Concrete Mixture

a. Air Content Testing. Air content tests shall be made when test specimens are fabricated. In addition, at least two tests for air content shall be made on randomly selected batches of each separate concrete mixture produced during each 8-hour period of concrete production. Additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector. Tests shall be made in accordance with ASTM C 231 for normal weight concrete and ASTM C 173 for lightweight concrete. Test results shall be plotted on control charts which shall at all times be readily available to the Government and shall be submitted weekly. Copies of the current control charts shall be kept in the field by testing crews

and results plotted as tests are made. When a single test result reaches either the upper or lower action limit, a second test shall immediately be made. The results of the two tests shall be averaged and this average used as the air content of the batch to plot on both the air content and the control chart for range, and for determining need for any remedial action. The result of each test, or average as noted in the previous sentence, shall be plotted on a separate control chart for each mixture on which an "average line" is set at the midpoint of the specified air content range from paragraph Air Entrainment. An upper warning limit and a lower warning limit line shall be set 1.0 percentage point above and below the average line, respectively. An upper action limit and a lower action limit line shall be set 1.5 percentage points above and below the average line, respectively. The range between each two consecutive tests shall be plotted on a secondary control chart for range where an upper warning limit is set at 2.0 percentage points and an upper action limit is set at 3.0 percentage points. Samples for air content may be taken at the mixer, however, the Contractor is responsible for delivering the concrete to the placement site at the stipulated air content. If the Contractor's materials or transportation methods cause air content loss between the mixer and the placement, correlation samples shall be taken at the placement site as required by the Contracting Officer, and the air content at the mixer controlled as directed.

b. Air Content Corrective Action. Whenever points on the control chart for percent air reach either warning limit, an adjustment shall immediately be made in the amount of air-entraining admixture batched. As soon as practical after each adjustment, another test shall be made to verify the result of the adjustment. Whenever a point on the secondary control chart for range reaches the warning limit, the admixture dispenser shall be recalibrated to ensure that it is operating accurately and with good reproducibility. Whenever a point on either control chart reaches an action limit line, the air content shall be considered out of control and the concreting operation shall immediately be halted until the air content is under control. Additional air content tests shall be made when concreting is restarted.

c. Slump Testing. In addition to slump tests which shall be made when test specimens are fabricated, at least four slump tests shall be made on randomly selected batches in accordance with ASTM C 143/C 143M for each separate concrete mixture produced during each 8-hour or less period of concrete production each day. Also, additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector. Test results shall be plotted on control charts which shall at all times be readily available to the Government and shall be submitted weekly. Copies of the current control charts shall be kept in the field by testing crews and results plotted as tests are made. When a single slump test reaches or goes beyond either the upper or lower action limit, a second test shall immediately be made. The results of the two tests shall be averaged and this average used as the slump of the batch to plot on both the control charts for slump and the chart for range, and for determining need for any remedial action. Limits shall be set on separate control charts for slump for each type of mixture. The upper warning limit shall be set at 1/2 inch below the maximum

allowable slump specified in paragraph Slump in PART 1 for each type of concrete and an upper action limit line and lower action limit line shall be set at the maximum and minimum allowable slumps, respectively, as specified in the same paragraph. The range between each consecutive slump test for each type of mixture shall be plotted on a single control chart for range on which an upper action limit is set at 2 inches. Samples for slump shall be taken at the mixer. However, the Contractor is responsible for delivering the concrete to the placement site at the stipulated slump. If the Contractor's materials or transportation methods cause slump loss between the mixer and the placement, correlation samples shall be taken at the placement site as required by the Contracting Officer, and the slump at the mixer controlled as directed.

d. Slump Corrective Action. Whenever points on the control charts for slump reach the upper warning limit, an adjustment shall immediately be made in the batch weights of water and fine aggregate. The adjustments are to be made so that the total water content does not exceed that amount allowed by the maximum w/c ratio specified, based on aggregates which are in a saturated surface dry condition. When a single slump reaches the upper or lower action limit, no further concrete shall be delivered to the placing site until proper adjustments have been made. Immediately after each adjustment, another test shall be made to verify the correctness of the adjustment. Whenever two consecutive individual slump tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range at or above the upper action limit, the concreting operation shall immediately be halted, and the Contractor shall take appropriate steps to bring the slump under control. Additional slump tests shall be made as directed.

e. Temperature. The temperature of the concrete shall be measured when compressive strength specimens are fabricated. Measurement shall be in accordance with ASTM C 1064/C 1064M. The temperature shall be reported along with the compressive strength data.

f. Strength Specimens. At least one set of test specimens shall be made, for compressive or flexural strength as appropriate, on each different concrete mixture placed during the day for each 500 cubic yards or portion thereof of that concrete mixture placed each day. Additional sets of test specimens shall be made, as directed by the Contracting Officer, when the mixture proportions are changed or when low strengths have been detected. A truly random (not haphazard) sampling plan shall be developed by the Contractor and approved by the Contracting Officer prior to the start of construction. The plan shall assure that sampling is done in a completely random and unbiased manner. A set of test specimens for concrete with a 28-day specified strength per paragraph Strength Requirements in PART 1 shall consist of four specimens, two to be tested at 7 days and two at 28 days. Test specimens shall be molded and cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39/C 39M for test cylinders and ASTM C 78 for test beams. Results of all strength tests shall be reported immediately to the Contracting Officer. Quality control charts shall be kept for individual strength "tests", ("test" as defined in paragraph Strength Requirements in PART 1) moving average of last 3 "tests" for strength, and moving

average for range for the last 3 "tests" for each mixture. The charts shall be similar to those found in ACI 214.3R.

3.17.6 Inspection Before Placing

Foundations, construction joints, forms, and embedded items shall be inspected by the Contractor in sufficient time prior to each concrete placement in order to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing.

3.17.7 Placing

The placing foreman shall supervise placing operations, shall determine that the correct quality of concrete or grout is placed in each location as specified and as directed by the Contracting Officer, and shall be responsible for measuring and recording concrete temperatures and ambient temperature hourly during placing operations, weather conditions, time of placement, volume placed, and method of placement. The placing foreman shall not permit batching and placing to begin until it has been verified that an adequate number of vibrators in working order and with competent operators are available. Placing shall not be continued if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

3.17.8 Vibrators

The frequency and amplitude of each vibrator shall be determined in accordance with COE CRD-C 521 prior to initial use and at least once a month when concrete is being placed. Additional tests shall be made as directed when a vibrator does not appear to be adequately consolidating the concrete. The frequency shall be determined while the vibrator is operating in concrete with the tachometer being held against the upper end of the vibrator head while almost submerged and just before the vibrator is withdrawn from the concrete. The amplitude shall be determined with the head vibrating in air. Two measurements shall be taken, one near the tip and another near the upper end of the vibrator head, and these results averaged. The make, model, type, and size of the vibrator and frequency and amplitude results shall be reported in writing. Any vibrator not meeting the requirements of paragraph Consolidation, shall be immediately removed from service and repaired or replaced.

3.17.9 Curing Inspection

a. Moist Curing Inspections. At least once each shift, and not less than twice per day on both work and non-work days, an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be noted and recorded.

b. Moist Curing Corrective Action. When a daily inspection report lists an area of inadequate curing, immediate corrective action shall be taken, and the required curing period for those areas shall be extended by 1 day.

c. Membrane Curing Inspection. No curing compound shall be applied until the Contractor has verified that the compound is properly mixed and ready for spraying. At the end of each operation, the Contractor shall estimate the quantity of compound used by

measurement of the container and the area of concrete surface covered, shall compute the rate of coverage in square feet per gallon, and shall note whether or not coverage is uniform.

d. Membrane Curing Corrective Action. When the coverage rate of the curing compound is less than that specified or when the coverage is not uniform, the entire surface shall be sprayed again.

e. Sheet Curing Inspection. At least once each shift and once per day on non-work days, an inspection shall be made of all areas being cured using impervious sheets. The condition of the covering and the tightness of the laps and tapes shall be noted and recorded.

f. Sheet Curing Corrective Action. When a daily inspection report lists any tears, holes, or laps or joints that are not completely closed, the tears and holes shall promptly be repaired or the sheets replaced, the joints closed, and the required curing period for those areas shall be extended by 1 day.

3.17.10 Cold-Weather Protection

At least once each shift and once per day on non-work days, an inspection shall be made of all areas subject to cold-weather protection. Any deficiencies shall be noted, corrected, and reported.

3.17.11 Mixer Uniformity

a. Stationary Mixers. Prior to the start of concrete placing and once every 6 months when concrete is being placed, or once for every 75,000 cubic yards of concrete placed, whichever results in the shortest time interval, uniformity of concrete mixing shall be determined in accordance with ASTM C 94/C 94M.

b. Truck Mixers. Prior to the start of concrete placing and at least once every 6 months when concrete is being placed, uniformity of concrete mixing shall be determined in accordance with ASTM C 94/C 94M. The truck mixers shall be selected randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of the blades may be regarded as satisfactory.

c. Mixer Uniformity Corrective Action. When a mixer fails to meet mixer uniformity requirements, either the mixing time shall be increased, batching sequence changed, batch size reduced, or adjustments shall be made to the mixer until compliance is achieved.

3.17.12 Reports

All results of tests or inspections conducted shall be reported informally as they are completed and in writing daily. A weekly report shall be prepared for the updating of control charts covering the entire period from the start of the construction season through the current week. During periods of cold-weather protection, reports of pertinent temperatures shall be made daily. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has

the right to examine all contractor quality control records.

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SECTION 04200A

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SECTION 04200A

MASONRY
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PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI SP-66	(1994) ACI Detailing Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 82	(1997a) Steel Wire, Plain, for Concrete Reinforcement
ASTM A 153/A 153M	(2000) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 615/A 615M	(2000) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 67	(2000) Sampling and Testing Brick and Structural Clay Tile
ASTM C 90	(2000) Loadbearing Concrete Masonry Units
ASTM C 91	(1999) Masonry Cement
ASTM C 140	(1999b) Sampling and Testing Concrete Masonry Units
ASTM C 216	(2000) Facing Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C 270	(2000) Mortar for Unit Masonry
ASTM C 476	(1999) Grout for Masonry
ASTM C 494/C 494M	(1999a) Chemical Admixtures for Concrete
ASTM C 578	(1995) Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 641	(1982; R 1998el) Staining Materials in Lightweight Concrete Aggregates
ASTM C 780	(2000) Preconstruction and Construction Evaluation of Mortars for Plain and

	Reinforced Unit Masonry
ASTM C 1019	(2000) Sampling and Testing Grout
ASTM C 1072	(2000) Measurement of Masonry Flexural Bond Strength
ASTM C 1289	(1998) Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM D 2000	(1999) Rubber Products in Automotive Applications
ASTM D 2240	(2000) Rubber Property - Durometer Hardness
ASTM D 2287	(1996a) Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Masonry Work; G, ED

Drawings including plans, elevations, and details of wall reinforcement; details of reinforcing bars at corners and wall intersections; offsets; tops, bottoms, and ends of walls; control and expansion joints; and wall openings. Bar splice locations shall be shown. Bent bars shall be identified on a bending diagram and shall be referenced and located on the drawings. Wall dimensions, bar clearances, and wall openings greater than one masonry unit in area shall be shown. No approval will be given to the shop drawings until the Contractor certifies that all openings, including those for mechanical and electrical service, are shown. If, during construction, additional masonry openings are required, the approved shop drawings shall be resubmitted with the additional openings shown along with the proposed changes. Location of these additional openings shall be clearly highlighted. The minimum scale for wall elevations shall be 1/4 inch per foot. Reinforcement bending details shall conform to the requirements of ACI SP-66.

SD-03 Product Data

Clay or Shale Brick
Insulation

Manufacturer's descriptive data.

Cold Weather Installation

Cold weather construction procedures.

SD-04 Samples

Concrete Masonry Units (CMU)
Clay or Shale Brick

Color samples of three stretcher units and one unit for each type of special shape. Units shall show the full range of color and texture.

Anchors, Ties, and Bar Positioners

Two of each type used.

Expansion-Joint Material

One piece of each type used.

Joint Reinforcement

One piece of each type used, including corner and wall intersection pieces, showing at least two cross wires.

Insulation

One piece of board type insulation, not less than 16 by 24 inches in size, containing the label indicating the rated permeance and R-values.

Portable Panel; G, RE

One panel of clay or shale brick, 2 by 2 feet, containing approximately 24 brick facings to establish range of color and texture.

SD-06 Test Reports

Efflorescence Test
Field Testing of Mortar
Field Testing of Grout
Masonry Cement
Fire-rated CMU

Test reports from an approved independent laboratory. Test reports on a previously tested material shall be certified as the same as that proposed for use in this project.

SD-07 Certificates

Clay or Shale Brick
Concrete Masonry Units (CMU)
Control Joint Keys
Anchors, Ties, and Bar Positioners
Expansion-Joint Materials
Joint Reinforcement
Reinforcing Steel Bars and Rods
Masonry Cement
Mortar Coloring
Insulation

Precast Concrete Items
Mortar Admixtures
Grout Admixtures

Certificates of compliance stating that the materials meet the specified requirements.

Insulation

Certificate attesting that the polyurethane or polyisocyanurate insulation furnished for the project contains recovered material, and showing an estimated percent of such recovered material.

1.3 SAMPLE MASONRY PANELS

After material samples are approved and prior to starting masonry work, sample masonry panels shall be constructed for each type and color of masonry required. At least 48 hours prior to constructing the sample panel or panels, the Contractor shall submit written notification to the Contracting Officer's Representative. Sample panels shall not be built in, or as part of the structure, but shall be located where directed.

1.3.1 Configuration

Panels shall be L-shaped or otherwise configured to represent all of the wall elements. Panels shall be of the size necessary to demonstrate the acceptable level of workmanship for each type of masonry represented on the project. The minimum size of a straight panel or a leg of an L-shaped panel shall be 8 feet long by 6 feet high.

1.3.2 Composition

Panels shall show full color range, texture, and bond pattern of the masonry work. The Contractor's method for mortar joint tooling; grouting of reinforced vertical cores, collar joints, bond beams, and lintels; positioning, securing, and lapping of reinforcing steel; positioning and lapping of joint reinforcement (including prefabricated corners); and cleaning of masonry work shall be demonstrated during the construction of the panels. Installation or application procedures for anchors, wall ties, CMU control joints, brick expansion joints, insulation, flashing, brick soldier, row lock courses and weep holes shall be shown in the sample panels. The panels shall contain a masonry bonded corner that includes a bond beam corner. Panels shall show installation of electrical boxes and conduit. Panels that represent reinforced masonry shall contain a 2 by 2 foot opening placed at least 2 feet above the panel base and 2 feet away from all free edges, corners, and control joints. Required reinforcing shall be provided around this opening as well as at wall corners and control joints.

1.3.3 Construction Method

Where anchored veneer walls are required, the Contractor shall demonstrate and receive approval for the method of construction; i.e., either bring up the two wythes together or separately, with the insulation and appropriate ties placed within the specified tolerances across the cavity. Temporary provisions shall be demonstrated to preclude mortar or grout droppings in the cavity and to provide a clear open air space of the dimensions shown on the drawings. Where masonry is to be grouted, the Contractor shall demonstrate and receive approval on the method that will be used to bring

up the masonry wythes; support the reinforcing bars; and grout cells, bond beams, lintels, and collar joints using the requirements specified herein. If sealer is specified to be applied to the masonry units, sealer shall be applied to the sample panels. Panels shall be built on a properly designed concrete foundation.

1.3.4 Usage

The completed panels shall be used as the standard of workmanship for the type of masonry represented. Masonry work shall not commence until the sample panel for that type of masonry construction has been completed and approved. Panels shall be protected from the weather and construction operations until the masonry work has been completed and approved. After completion of the work, the sample panels, including all foundation concrete, shall become the property of the Contractor and shall be removed from the construction site.

1.4 DELIVERY, HANDLING, AND STORAGE

Materials shall be delivered, handled, stored, and protected to avoid chipping, breakage, and contact with soil or contaminating material.

1.4.1 Masonry Units

Concrete masonry units shall be covered or protected from inclement weather. Prefabricated lintels shall be marked on top sides to show either the lintel schedule number or the number and size of top and bottom bars.

1.4.2 Reinforcement, Anchors, and Ties

Steel reinforcing bars, coated anchors, ties, and joint reinforcement shall be stored above the ground. Steel reinforcing bars and uncoated ties shall be free of loose mill scale and rust.

1.4.3 Cementitious Materials, Sand and Aggregates

Cementitious and other packaged materials shall be delivered in unopened containers, plainly marked and labeled with manufacturers' names and brands. Cementitious material shall be stored in dry, weathertight enclosures or be completely covered. Cement shall be handled in a manner that will prevent the inclusion of foreign materials and damage by water or dampness. Sand and aggregates shall be stored in a manner to prevent contamination or segregation.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

The source of materials which will affect the appearance of the finished work shall not be changed after the work has started except with Contracting Officer's approval.

2.2 CLAY OR SHALE BRICK

Color range and texture of clay or shale brick shall be as indicated in Section 09000 BUILDING COLOR AND FINISH SCHEDULE and shall conform to the approved sample. Grade SW shall be used for brick in contact with earth or grade and for all exterior work. Grade SW or MW shall be used in other brickwork. Brick shall be tested for efflorescence. Clay or shale brick

units shall be delivered factory-blended to provide a uniform appearance and color range in the completed wall.

2.2.1 Solid Clay or Shale Brick

Solid clay or shale brick shall conform to ASTM C 216, Type FBS. Brick size shall be modular and the nominal size of the brick used shall be 2-2/3 inches thick, 4 inches wide, and 8 inches long. Minimum compressive strength of the brick shall be 2,500 psi.

2.3 OMITTED

2.4 CONCRETE MASONRY UNITS (CMU)

Hollow and solid concrete masonry units shall conform to ASTM C 90. Cement shall have a low alkali content and be of one brand.

2.4.1 Aggregates

Lightweight aggregates and blends of lightweight and heavier aggregates in proportions used in producing the units, shall comply with the following requirements when tested for stain-producing iron compounds in accordance with ASTM C 641: by visual classification method, the iron stain deposited on the filter paper shall not exceed the "light stain" classification.

2.4.2 Kinds and Shapes

Units shall be modular in size and shall include closer, jamb, header, lintel, and bond beam units and special shapes and sizes to complete the work as indicated. In exposed interior masonry surfaces, units having a bullnose shall be used for vertical external corners except at door, window, and louver jambs. Radius of the bullnose shall be 1 inch. Units used in exposed masonry surfaces in any one building shall have a uniform fine to medium texture and a uniform color.

2.4.3 Fire-Rated CMU

Concrete masonry units used in fire-rated construction shown on the drawings shall be of minimum equivalent thickness for the fire rating indicated and the corresponding type of aggregates indicated in TABLE I. Units containing more than one of the aggregates listed in TABLE I will be rated on the aggregate requiring the greater minimum equivalent thickness to produce the required fire rating.

TABLE I

FIRE-RATED CONCRETE MASONRY UNITS

See note (a) below

Aggregate Type	Minimum equivalent thickness inches for fire rating of: 4 hours	3 hours	2 hours
Pumice	4.7	4.0	3.0
Expanded slag	5.0	4.2	3.3

TABLE I

FIRE-RATED CONCRETE MASONRY UNITS

See note (a) below

Expanded clay, shale, or slate	5.7	4.8	3.7
Limestone, scoria, cinders or unexpanded slag	5.9	5.0	4.0
Calcareous gravel	6.2	5.3	4.2
Siliceous gravel	6.7	5.7	4.5

(a) Minimum equivalent thickness shall equal net volume as determined in conformance with ASTM C 140 divided by the product of the actual length and height of the face shell of the unit in inches. Where walls are to receive plaster or be faced with brick, or otherwise form an assembly; the thickness of plaster or brick or other material in the assembly will be included in determining the equivalent thickness.

2.5 OMITTED
2.6 OMITTED
2.7 OMITTED

2.8 PRECAST CONCRETE ITEMS

Splashblocks shall be factory-made units from a plant regularly engaged in producing precast concrete units. Unless otherwise indicated, concrete shall be 4,000 psi minimum conforming to Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE using 1/2 inch to No. 4 nominal-size coarse aggregate, and minimum reinforcement shall be the reinforcement required for handling of the units. Clearance of 3/4 inch shall be maintained between reinforcement and faces of units. Unless precast-concrete items have been subjected during manufacture to saturated-steam pressure of at least 120 psi for at least 5 hours, the items, after casting, shall be either damp-cured for 24 hours or steam-cured and shall then be aged under cover for 28 days or longer. Cast-concrete members weighing over 80 pounds shall have built-in loops of galvanized wire or other approved provisions for lifting and anchoring. Units shall have beds and joints at right angles to the face, with sharp true arises and shall be cast with drip grooves on the underside where units overhang walls. Exposed-to-view surfaces shall be free of surface voids, spalls, cracks, and chipped or broken edges. Precast units exposed-to-view shall be of uniform appearance and color. Unless otherwise specified, units shall have a smooth dense finish. Prior to use, each item shall be wetted and inspected for crazing. Items showing evidence of dusting, spalling, crazing, or having surfaces treated with a protective coating will be rejected.

2.8.1 Omitted
2.8.2 Omitted

2.8.3 Splash Blocks

Splash blocks shall be as detailed. Reinforcement shall be the

manufacturer's standard.

2.9 OMITTED

2.10 MORTAR

Mortar shall be Type S in accordance with the proportion specification of ASTM C 270 except Type S cement-lime mortar proportions shall be 1 part cement, 1/2 part lime and 4-1/2 parts aggregate; when masonry cement ASTM C 91 is used the maximum air content shall be limited to 12 percent and performance equal to cement-lime mortar shall be verified. Verification of masonry cement performance shall be based on ASTM C 780 and ASTM C 1072. Cement shall have a low alkali content and be of one brand. Aggregates shall be from one source.

2.10.1 Admixtures

In cold weather, a non-chloride based accelerating admixture may be used subject to approval. Accelerating admixture shall be non-corrosive, shall contain less than 0.2 percent chlorides, and shall conform to ASTM C 494/C 494M, Type C.

2.10.2 Coloring

Mortar coloring shall be added to the mortar used for exposed masonry surfaces to produce a uniform color indicated in Section 09000 BUILDING COLOR AND FINISH SCHEDULE. Mortar coloring shall not exceed 3 percent of the weight of cement for carbon black and ten percent of the weight of cement for all other pigments. Mortar coloring shall be chemically inert, of finely ground limeproof pigment, and furnished in accurately pre-measured and packaged units that can be added to a measured amount of cement.

2.11 GROUT

Grout shall conform to ASTM C 476. Cement used in grout shall have a low alkali content. Grout slump shall be between 8 and 10 inches. Grout shall be used subject to the limitations of Table III. Proportions shall not be changed and materials with different physical or chemical characteristics shall not be used in grout for the work unless additional evidence is furnished that the grout meets the specified requirements.

2.11.1 Admixtures

In cold weather, a non-chloride based accelerating admixture may be used subject to approval. Accelerating admixture shall be non-corrosive, shall contain less than 0.2 percent chlorides, and shall conform to ASTM C 494/C 494M, Type C.

2.11.2 Grout Barriers

Grout barriers for vertical cores shall consist of fine mesh wire, fiberglass, or expanded metal.

2.12 ANCHORS, TIES, AND BAR POSITIONERS

Anchors and ties shall be fabricated without drips or crimps and shall be zinc-coated in accordance with ASTM A 153/A 153M, Class B-2. Steel wire used for anchors and ties shall be fabricated from steel wire conforming to

ASTM A 82. Anchors and ties shall be sized to provide a minimum of 5/8 inch mortar cover from either face.

2.12.1 Wire Mesh Ties

Wire mesh for tying 4-inch thick concrete masonry unit partitions to other intersecting masonry partitions shall be 1/2 inch mesh of minimum 16 gauge steel wire. Minimum lengths shall be not less than 12 inches.

2.12.2 Wall Ties

Wall ties shall be rectangular-shaped or Z-shaped fabricated of 3/16 inch diameter zinc-coated steel wire. Rectangular wall ties shall be no less than 4 inches wide. Wall ties may also be of a continuous type conforming to paragraph JOINT REINFORCEMENT. Adjustable type wall ties, if approved for use, shall consist of two essentially U-shaped elements fabricated of 3/16 inch diameter zinc-coated steel wire. Adjustable ties shall be of the double pintle to eye type and shall allow a maximum of 1/2 inch eccentricity between each element of the tie. Play between pintle and eye opening shall be not more than 1/16 inch. The pintle and eye elements shall be formed so that both can be in the same plane.

2.12.3 Dovetail Anchors

Dovetail anchors shall be of the flexible wire type, 3/16 inch diameter zinc-coated steel wire, triangular shaped, and attached to a 12 gauge or heavier steel dovetail section. These anchors shall be used for anchorage of veneer wythes or composite-wall facings extending over the face of concrete columns, beams, or walls. Cells within vertical planes of these anchors shall be filled solid with grout for full height of walls or partitions, or solid units may be used. Dovetail slots are specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

2.12.4 Adjustable Anchors

Adjustable anchors shall be 3/16 inch diameter steel wire, triangular-shaped. Anchors attached to steel shall be 5/16 inch diameter steel bars placed to provide 1/16 inch play between flexible anchors and structural steel members. Spacers shall be welded to rods and columns. Equivalent welded-on steel anchor rods or shapes standard with the flexible-anchor manufacturer may be furnished when approved. Welds shall be cleaned and given one coat of zinc-rich touch up paint.

2.12.5 Bar Positioners

Bar positioners, used to prevent displacement of reinforcing bars during the course of construction, shall be factory fabricated from 9 gauge steel wire or equivalent, and coated with a hot-dip galvanized finish. Not more than one wire shall cross the cell.

2.13 JOINT REINFORCEMENT

Joint reinforcement shall be factory fabricated from steel wire conforming to ASTM A 82, welded construction. Tack welding will not be acceptable in reinforcement used for wall ties. Wire shall have zinc coating conforming to ASTM A 153/A 153M, Class B-2. All wires shall be a minimum of 9 gauge. Reinforcement shall be ladder type design, having one longitudinal wire in the mortar bed of each face shell for hollow units and one wire for solid units. Joint reinforcement shall be placed a minimum of 5/8 inch cover

from either face. The distance between crosswires shall not exceed 16 inches. Joint reinforcement for straight runs shall be furnished in flat sections not less than 10 feet long. Joint reinforcement shall be provided with factory formed corners and intersections. If approved for use, joint reinforcement may be furnished with adjustable wall tie features.

2.14 REINFORCING STEEL BARS AND RODS

Reinforcing steel bars and rods shall conform to ASTM A 615/A 615M, Grade 60.

2.15 CONTROL JOINT KEYS

Control joint keys shall be a factory fabricated solid section of natural or synthetic rubber (or combination thereof) conforming to ASTM D 2000or polyvinyl chloride conforming to ASTM D 2287. The material shall be resistant to oils and solvents. The control joint key shall be provided with a solid shear section not less than 5/8 inchthick and 3/8 inch thick flanges, with a tolerance of plus or minus 1/16 inch. The control joint key shall fit neatly, but without forcing, in masonry unit jamb sash grooves. The control joint key shall be flexible at a temperature of minus 30 degrees F after five hours exposure, and shall have a durometer hardness of not less than 70 when tested in accordance with ASTM D 2240.

2.16 EXPANSION-JOINT MATERIALS

Backer rod and sealant shall be adequate to accommodate joint compression equal to 50 percent of the width of the joint. The backer rod shall be compressible rod stock of polyethylene foam, polyurethane foam, butyl rubber foam, or other flexible, nonabsorptive material as recommended by the sealant manufacturer. Sealant shall conform to Section 07900 JOINT SEALING.

2.17 INSULATION

2.17.1 Rigid Board-Type Insulation

Rigid board-type insulation shall be extruded polystyrene, polyurethane, or polyisocyanurate. Polystyrene shall conform to ASTM C 578. Polyisocyanurate shall conform to ASTM C 1289, Type I, Class 1 or 2, faced with aluminum foil on both sides of the foam. The insulation shall be a standard product and shall be marked with not less than the manufacturer's trademark or name, the specification number, the permeance and R-values.

2.17.1.1 Insulation Thickness and Air Space

The cavity space shall allow for a maximum insulation thickness of 2 inches, and a minimum air space of 3/4 inch.

2.17.1.2 Aged R-Value

The insulation shall provide a minimum aged R-value as indicated for the overall thickness. The aged R-value shall be determined at 75 degrees F in accordance with the appropriate referenced specification. The stated R-value of the insulation shall be certified by an independent testing laboratory or certified by an independent Registered Professional Engineer if tests are conducted in the manufacturer's laboratory.

2.17.1.3 Recovered Material

Contractor shall comply with EPA requirements in accordance with Section 01670 RECYCLED / RECOVERD MATERIALS. The polyurethane or polyisocyanurate foam shall have a minimum recovered material content of 9 percent by weight of the core material.

2.17.2 Insulation Adhesive

Insulation adhesive shall be specifically prepared to adhere the insulation to the masonry and, where applicable, to the thru-wall flashing. The adhesive shall not deleteriously affect the insulation, and shall have a record of satisfactory and proven performance for the conditions under which to be used.

2.18 FLASHING

Flashing shall be as specified in Section 07600 SHEET METALWORK, GENERAL.

2.19 WEEP HOLE VENTILATORS

Weephole ventilators shall be prefabricated aluminum grill type vents designed to prevent insect entry with maximum air entry. Ventilators shall be sized to match modular construction with a standard 3/8 inch mortar joint.

PART 3 EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

3.1.1 Hot Weather Installation

The following precautions shall be taken if masonry is erected when the ambient air temperature is more than 99 degrees F in the shade and the relative humidity is less than 50 percent. All masonry materials shall be shaded from direct sunlight; mortar beds shall be spread no more than 4 feet ahead of masonry; masonry units shall be set within one minute of spreading mortar; and after erection, masonry shall be protected from direct exposure to wind and sun for 48 hours.

3.1.2 Cold Weather Installation

Before erecting masonry when ambient temperature or mean daily air temperature falls below 40 degrees F, a written statement of proposed cold weather construction procedures shall be submitted for approval. The following precautions shall be taken during all cold weather erection.

3.1.2.1 Preparation

Ice or snow formed on the masonry bed shall be thawed by the application of heat. Heat shall be applied carefully until the top surface of the masonry is dry to the touch. Sections of masonry deemed frozen and damaged shall be removed before continuing construction of those sections.

a. Air Temperature 40 to 32 Degrees F. Sand or mixing water shall be heated to produce mortar temperatures between 40 and 120 degrees F.

b. Air Temperature 32 to 25 Degrees F. Sand and mixing water shall be heated to produce mortar temperatures between 40 and 120 degrees F. Temperature of mortar on boards shall be maintained

above freezing.

c. Air Temperature 25 to 20 Degrees F. Sand and mixing water shall be heated to provide mortar temperatures between 40 and 120 degrees F. Temperature of mortar on boards shall be maintained above freezing. Sources of heat shall be used on both sides of walls under construction. Windbreaks shall be employed when wind is in excess of 15 mph.

d. Air Temperature 20 Degrees F and below. Sand and mixing water shall be heated to provide mortar temperatures between 40 and 120 degrees F. Enclosure and auxiliary heat shall be provided to maintain air temperature above 32 degrees F. Temperature of units when laid shall not be less than 20 degrees F.

3.1.2.2 Completed Masonry and Masonry Not Being Worked On

a. Mean daily air temperature 40 to 32 degrees F. Masonry shall be protected from rain or snow for 24 hours by covering with weather-resistive membrane.

b. Mean daily air temperature 32 to 25 degrees F. Masonry shall be completely covered with weather-resistant membrane for 24 hours.

c. Mean Daily Air Temperature 25 to 20 degrees F. Masonry shall be completely covered with insulating blankets or equally protected for 24 hours.

d. Mean Daily Temperature 20 degrees F and Below. Masonry temperature shall be maintained above 32 degrees F for 24 hours by enclosure and supplementary heat, by electric heating blankets, infrared heat lamps, or other approved methods.

3.2 LAYING MASONRY UNITS

Masonry units shall be laid in running bond pattern. Facing courses shall be level with back-up courses, unless the use of adjustable ties has been approved in which case the tolerances shall be plus or minus 1/2 inch. Each unit shall be adjusted to its final position while mortar is still soft and plastic. Units that have been disturbed after the mortar has stiffened shall be removed, cleaned, and relaid with fresh mortar. Air spaces, cavities, chases, expansion joints, and spaces to be grouted shall be kept free from mortar and other debris. Units used in exposed masonry surfaces shall be selected from those having the least amount of chipped edges or other imperfections detracting from the appearance of the finished work. Vertical joints shall be kept plumb. Units being laid and surfaces to receive units shall be free of water film and frost. Solid units shall be laid in a nonfurrowed full bed of mortar. Mortar for veneer wythes shall be beveled and sloped toward the center of the wythe from the cavity side. Units shall be shoved into place so that the vertical joints are tight. Vertical joints of brick and the vertical face shells of concrete masonry units, except where indicated at control, expansion, and isolation joints, shall be completely filled with mortar. Mortar will be permitted to protrude up to 1/2 inch into the space or cells to be grouted. Means shall be provided to prevent mortar from dropping into the space below. In double wythe construction, the inner wythe may be brought up not more than 16 inches ahead of the outer wythe. Collar joints shall be filled with mortar or grout during the laying of the facing wythe, and filling shall not lag the laying of the facing wythe by more than 8 inches.

3.2.1 Surface Preparation

Surfaces upon which masonry is placed shall be cleaned of laitance, dust, dirt, oil, organic matter, or other foreign materials and shall be slightly roughened to provide a surface texture with a depth of at least 1/8 inch. Sandblasting shall be used, if necessary, to remove laitance from pores and to expose the aggregate.

3.2.2 Forms and Shores

Forms and shores shall be sufficiently rigid to prevent deflections which may result in cracking or other damage to supported masonry and sufficiently tight to prevent leakage of mortar and grout. Supporting forms and shores shall not be removed in less than 10 days.

3.2.3 Concrete Masonry Units

Units in piers, pilasters, columns, starting courses on footings, solid foundation walls, lintels, and beams, and where cells are to be filled with grout shall be full bedded in mortar under both face shells and webs. Other units shall be full bedded under both face shells. Head joints shall be filled solidly with mortar for a distance in from the face of the unit not less than the thickness of the face shell. Foundation walls below grade shall be grouted solid. Jamb units shall be of the shapes and sizes to conform with wall units. Solid units may be incorporated in the masonry work where necessary to fill out at corners, gable slopes, and elsewhere as approved. Double walls shall be stiffened at wall-mounted plumbing fixtures by use of strap anchors, two above each fixture and two below each fixture, located to avoid pipe runs, and extending from center to center of the double wall. Walls and partitions shall be adequately reinforced for support of wall-hung plumbing fixtures when chair carriers are not specified.

3.2.4 Clay or Shale Brick Units

Brick facing shall be laid with the better face exposed. Brick shall be laid in running bond with each course bonded at corners, unless otherwise indicated. Molded brick shall be laid with the frog side down. Brick that is cored, recessed, or has other deformations may be used in sills, treads, soldier courses, except where deformations will be exposed to view.

3.2.4.1 Wetting of Units

Wetting of clay, shale brick, or hollow brick units having an initial rate of absorption of more than 1 gram per minute per square inch of bed surface shall be in conformance with ASTM C 67. The method of wetting shall ensure that each unit is nearly saturated but surface dry when laid.

3.2.4.2 Solid Units

Bed, head, and collar joints shall be completely filled with mortar.

3.2.4.3 Hollow Units

Hollow units shall be laid as specified for concrete masonry units.

3.2.5 Tolerances

Masonry shall be laid plumb, true to line, with courses level. Bond pattern shall be kept plumb throughout. Corners shall be square unless noted otherwise. Except for walls constructed of prefaced concrete masonry units, masonry shall be laid within the following tolerances (plus or minus unless otherwise noted):

TABLE II

TOLERANCES

Variation from the plumb in the lines and surfaces of columns, walls and arises	
In adjacent masonry units	1/8 inch
In 10 feet	1/4 inch
In 20 feet	3/8 inch
In 40 feet or more	1/2 inch
Variations from the plumb for external corners, expansion joints, and other conspicuous lines	
In 20 feet	1/4 inch
In 40 feet or more	1/2 inch
Variations from the level for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines	
In 20 feet	1/4 inch
In 40 feet or more	1/2 inch
Variation from level for bed joints and top surfaces of bearing walls	
In 10 feet	1/4 inch
In 40 feet or more	1/2 inch
Variations from horizontal lines	
In 10 feet	1/4 inch
In 20 feet	3/8 inch
In 40 feet or more	1/2 inch
Variations in cross sectional dimensions of columns and in thickness of walls	
Minus	1/4 inch
Plus	1/2 inch

3.2.6 Cutting and Fitting

Full units of the proper size shall be used wherever possible, in lieu of cut units. Cutting and fitting, including that required to accommodate the

work of others, shall be done by masonry mechanics using power masonry saws. Concrete masonry units may be wet or dry cut. Wet cut units, before being placed in the work, shall be dried to the same surface-dry appearance as uncut units being laid in the wall. Cut edges shall be clean, true and sharp. Openings in the masonry shall be made carefully so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will have bottoms parallel with the masonry bed joints. Reinforced masonry lintels shall be provided above openings over 12 inches wide for pipes, ducts, cable trays, and other wall penetrations, unless steel sleeves are used.

3.2.7 Jointing

Joints shall be tooled when the mortar is thumbprint hard. Horizontal joints shall be tooled last. Joints shall be brushed to remove all loose and excess mortar. Mortar joints shall be finished as follows:

3.2.7.1 Flush Joints

Joints in concealed masonry surfaces and joints at electrical outlet boxes in wet areas shall be flush cut. Flush cut joints shall be made by cutting off the mortar flush with the face of the wall. Joints in unparged masonry walls below grade shall be pointed tight. Flush joints for architectural units, such as fluted units, shall completely fill both the head and bed joints.

3.2.7.2 Tooled Joints

Joints in exposed exterior and interior masonry surfaces shall be tooled slightly concave. Joints shall be tooled with a jointer slightly larger than the joint width so that complete contact is made along the edges of the unit. Tooling shall be performed so that the mortar is compressed and the joint surface is sealed. Jointer of sufficient length shall be used to obtain a straight and true mortar joint.

3.2.7.3 Door and Window Frame Joints

On the exposed interior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch. On the exterior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch.

3.2.8 Joint Widths

Joint widths shall be as follows:

3.2.8.1 Concrete Masonry Units

Concrete masonry units shall have 3/8 inch joints.

3.2.8.2 Omitted

3.2.8.3 Brick

Brick joint widths shall be the difference between the actual and nominal dimensions of the brick in either height or length. Brick expansion joint widths shall be as shown.

3.2.9 Embedded Items

Spaces around built-in items shall be filled with mortar. Openings around flush-mount electrical outlet boxes in wet locations shall be pointed with mortar. Anchors, ties, wall plugs, accessories, flashing, pipe sleeves and other items required to be built-in shall be embedded as the masonry work progresses. Anchors, ties and joint reinforcement shall be fully embedded in the mortar. Cells receiving anchor bolts and cells of the first course below bearing plates shall be filled with grout.

3.2.10 Unfinished Work

Unfinished work shall be stepped back for joining with new work. Toothing may be resorted to only when specifically approved. Loose mortar shall be removed and the exposed joints shall be thoroughly cleaned before laying new work.

3.2.11 Masonry Wall Intersections

Each course shall be masonry bonded at corners and elsewhere as shown. Masonry walls shall be anchored or tied together at corners and intersections with bond beam reinforcement and prefabricated corner or tee pieces of joint reinforcement as shown.

3.2.12 Partitions

Partitions shall be continuous from floor to underside of floor or roof deck where shown. Openings in firewalls around joists or other structural members shall be filled as indicated or approved. Where suspended ceilings on both sides of partitions are indicated, the partitions other than those shown to be continuous may be stopped approximately 4 inches above the ceiling level. An isolation joint shall be placed in the intersection between partitions and structural or exterior walls as shown. Interior partitions having 4-inch nominal thick units shall be tied to intersecting partitions of 4-inch units, 5 inches into partitions of 6-inch units, and 7 inches into partitions of 8 inch or thicker units. Cells within vertical plane of ties shall be filled solid with grout for full height of partition or solid masonry units may be used. Interior partitions having masonry walls over 4 inches thick shall be tied together with joint reinforcement. Partitions containing joint reinforcement shall be provided with prefabricated pieces at corners and intersections or partitions.

3.3 ANCHORED VENEER CONSTRUCTION

The inner and outer wythes shall be completely separated by a continuous airspace as shown on the drawings. Both the inner and the outer wythes shall be laid up together except when adjustable joint reinforcement assemblies are approved for use. When both wythes are not brought up together, through-wall flashings shall be protected from damage until they are fully enclosed in the wall. The airspace between the wythes shall be kept clear and free of mortar droppings by temporary wood strips laid on the wall ties and carefully lifted out before placing the next row of ties. A coarse gravel or drainage material shall be placed behind the weep holes in the cavity to a minimum depth of 4 inches of coarse aggregate or 10 inches of drainage material to keep mortar droppings from plugging the weep holes.

3.4 WEEP HOLES

Weep holes shall be provided not more than 24 inches on centers in mortar

joints of the exterior wythe above wall flashing, over foundations, bond beams, and any other horizontal interruptions of the cavity. Weep holes shall be formed by placing short lengths of well-greased No. 10, 5/16 inch nominal diameter, braided cotton sash cord in the mortar and withdrawing the cords after the wall has been completed or weep holes shall be constructed using weep hole ventilators. Other approved methods may be used for providing weep holes. Weep holes shall be kept free of mortar and other obstructions.

3.5 OMITTED
3.6 OMITTED
3.7 OMITTED
3.8 OMITTED

3.9 MORTAR

Mortar shall be mixed in a mechanically operated mortar mixer for at least 3 minutes, but not more than 5 minutes. Measurement of ingredients for mortar shall be by volume. Ingredients not in containers, such as sand, shall be accurately measured by the use of measuring boxes. Water shall be mixed with the dry ingredients in sufficient amount to provide a workable mixture which will adhere to the vertical surfaces of masonry units. Mortar that has stiffened because of loss of water through evaporation shall be retempered by adding water to restore the proper consistency and workability. Mortar that has reached its initial set or that has not been used within 2-1/2 hours after mixing shall be discarded.

3.10 REINFORCING STEEL

Reinforcement shall be cleaned of loose, flaky rust, scale, grease, mortar, grout, or other coating which might destroy or reduce its bond prior to placing grout. Bars with kinks or bends not shown on the drawings shall not be used. Reinforcement shall be placed prior to grouting. Unless otherwise indicated, vertical wall reinforcement shall extend to within 2 inches of tops of walls.

3.10.1 Positioning Bars

Vertical bars shall be accurately placed within the cells at the positions indicated on the drawings. A minimum clearance of 1/2 inch shall be maintained between the bars and masonry units. Minimum clearance between parallel bars shall be one diameter of the reinforcement. Vertical reinforcing may be held in place using bar positioners located near the ends of each bar and at intermediate intervals of not more than 192 diameters of the reinforcement. Column and pilaster ties shall be wired in position around the vertical steel. Ties shall be in contact with the vertical reinforcement and shall not be placed in horizontal bed joints.

3.10.2 Splices

Bars shall be lapped a minimum of 48 diameters of the reinforcement. Welded or mechanical connections shall develop at least 125 percent of the specified yield strength of the reinforcement.

3.11 JOINT REINFORCEMENT

Joint reinforcement shall be installed at 16 inches on center or as indicated. Reinforcement shall be lapped not less than 6 inches. Prefabricated sections shall be installed at corners and wall

intersections. The longitudinal wires of joint reinforcement shall be placed to provide not less than 5/8 inch cover to either face of the unit.

3.12 PLACING GROUT

Cells containing reinforcing bars shall be filled with grout. Hollow masonry units in walls or partitions supporting plumbing, heating, or other mechanical fixtures, voids at door and window jambs, and other indicated spaces shall be filled solid with grout. Cells under lintel bearings on each side of openings shall be filled solid with grout for full height of openings. Walls below grade, lintels, and bond beams shall be filled solid with grout. Units other than open end units may require grouting each course to preclude voids in the units. Grout not in place within 1-1/2 hours after water is first added to the batch shall be discarded. Sufficient time shall be allowed between grout lifts to preclude displacement or cracking of face shells of masonry units. If blowouts, flowouts, misalignment, or cracking of face shells should occur during construction, the wall shall be torn down and rebuilt.

3.12.1 Vertical Grout Barriers for Fully Grouted Walls

Grout barriers shall be provided not more than 30 feet apart, or as required, to limit the horizontal flow of grout for each pour.

3.12.2 Horizontal Grout Barriers

Grout barriers shall be embedded in mortar below cells of hollow units receiving grout.

3.12.3 Grout Holes and Cleanouts

3.12.3.1 Grout Holes

Grouting holes shall be provided in slabs, spandrel beams, and other in-place overhead construction. Holes shall be located over vertical reinforcing bars or as required to facilitate grout fill in bond beams. Additional openings spaced not more than 16 inches on centers shall be provided where grouting of all hollow unit masonry is indicated. Openings shall not be less than 4 inches in diameter or 3 by 4 inches in horizontal dimensions. Upon completion of grouting operations, grouting holes shall be plugged and finished to match surrounding surfaces.

3.12.3.2 Cleanouts for Hollow Unit Masonry Construction

Cleanout holes shall be provided at the bottom of every pour in cores containing vertical reinforcement when the height of the grout pour exceeds 5 feet. Where all cells are to be grouted, cleanout courses shall be constructed using bond beam units in an inverted position to permit cleaning of all cells. Cleanout holes shall be provided at a maximum spacing of 32 inches where all cells are to be filled with grout. A new series of cleanouts shall be established if grouting operations are stopped for more than 4 hours. Cleanouts shall not be less than 3 by 4 inch openings cut from one face shell. Manufacturer's standard cutout units may be used at the Contractor's option. Cleanout holes shall not be closed until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected. For walls which will be exposed to view, cleanout holes shall be closed in an approved manner to match surrounding masonry.

3.12.3.3 Cleanouts for Solid Unit Masonry Construction

Cleanouts for construction of walls consisting of a grout filled cavity between solid masonry wythes shall be provided at the bottom of every pour by omitting every other masonry unit from one wythe. A new series of cleanouts shall be established if grouting operations are stopped for more than 4 hours. Cleanout holes shall not be plugged until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected. For walls which will be exposed to view, cleanout holes shall be closed in an approved manner to match surrounding masonry.

3.12.4 Grouting Equipment

3.12.4.1 Grout Pumps

Pumping through aluminum tubes will not be permitted. Pumps shall be operated to produce a continuous stream of grout without air pockets, segregation, or contamination. Upon completion of each day's pumping, waste materials and debris shall be removed from the equipment, and disposed of outside the masonry.

3.12.4.2 Vibrators

Internal vibrators shall maintain a speed of not less than 5,000 impulses per minute when submerged in the grout. At least one spare vibrator shall be maintained at the site at all times. Vibrators shall be applied at uniformly spaced points not further apart than the visible effectiveness of the machine. Duration of vibration shall be limited to time necessary to produce satisfactory consolidation without causing segregation.

3.12.5 Grout Placement

Masonry shall be laid to the top of a pour before placing grout. Grout shall not be placed in two-wythe solid unit masonry cavity until mortar joints have set for at least 3 days during hot weather and 5 days during cold damp weather. Grout shall not be placed in hollow unit masonry until mortar joints have set for at least 24 hours. Grout shall be placed using a hand bucket, concrete hopper, or grout pump to completely fill the grout spaces without segregation of the aggregates. Vibrators shall not be inserted into lower pours that are in a semi-solidified state. The height of grout pours and type of grout used shall be limited by the dimensions of grout spaces as indicated in Table III. Low-lift grout methods may be used on pours up to and including 5 feet in height. High-lift grout methods shall be used on pours exceeding 5 feet in height.

3.12.5.1 Low-Lift Method

Grout shall be placed at a rate that will not cause displacement of the masonry due to hydrostatic pressure of the grout. Mortar protruding more than 1/2 inch into the grout space shall be removed before beginning the grouting operation. Grout pours 12 inches or less in height shall be consolidated by mechanical vibration or by puddling. Grout pours over 12 inches in height shall be consolidated by mechanical vibration and reconsolidated by mechanical vibration after initial water loss and settlement has occurred. Vibrators shall not be inserted into lower pours that are in a semi-solidified state. Low-lift grout shall be used subject to the limitations of Table III.

3.12.5.2 High-Lift Method

Mortar droppings shall be cleaned from the bottom of the grout space and from reinforcing steel. Mortar protruding more than 1/4 inch into the grout space shall be removed by dislodging the projections with a rod or stick as the work progresses. Reinforcing, bolts, and embedded connections shall be rigidly held in position before grouting is started. CMU units shall not be pre-wetted. Grout, from the mixer to the point of deposit in the grout space shall be placed as rapidly as practical by pumping and placing methods which will prevent segregation of the mix and cause a minimum of grout splatter on reinforcing and masonry surfaces not being immediately encased in the grout lift. The individual lifts of grout shall be limited to 4 feet in height. The first lift of grout shall be placed to a uniform height within the pour section and vibrated thoroughly to fill all voids. This first vibration shall follow immediately behind the pouring of the grout using an approved mechanical vibrator. After a waiting period sufficient to permit the grout to become plastic, but before it has taken any set, the succeeding lift shall be poured and vibrated 12 to 18 inches into the preceding lift. If the placing of the succeeding lift is going to be delayed beyond the period of workability of the preceding, each lift shall be reconsolidated by reworking with a second vibrator as soon as the grout has taken its settlement shrinkage. The waiting, pouring, and reconsolidation steps shall be repeated until the top of the pour is reached. The top lift shall be reconsolidated after the required waiting period. The high-lift grouting of any section of wall between vertical grout barriers shall be completed to the top of a pour in one working day unless a new series of cleanout holes is established and the resulting horizontal construction joint cleaned. High-lift grout shall be used subject to the limitations in Table III.

TABLE III

POUR HEIGHT AND TYPE OF GROUT FOR VARIOUS GROUT SPACE DIMENSIONS

Maximum Grout Pour Height (feet) (4)	Grout Type	Grouting Procedure	Minimum Dimensions of the Total Clear Areas Within Grout Spaces and Cells (in.) (1,2) Multiwythe Masonry (3)	Hollow-unit Masonry
1	Fine	Low Lift	3/4	1-1/2 x 2
5	Fine	Low Lift	2	2 x 3
8	Fine	High Lift	2	2 x 3
12	Fine	High Lift	2-1/2	2-1/2 x 3
24	Fine	High Lift	3	3 x 3
1	Coarse	Low Lift	1-1/2	1-1/2 x 3
5	Coarse	Low Lift	2	2-1/2 x 3
8	Coarse	High Lift	2	3 x 3
12	Coarse	High Lift	2-1/2	3 x 3
24	Coarse	High Lift	3	3 x 4

Notes:

(1) The actual grout space or cell dimension must be larger than the sum of the following items:
a) The required minimum dimensions of total clear areas given in the table above;
b) The width of any mortar projections within the space;
c) The horizontal projections of the diameters of the horizontal

reinforcing bars within a cross section of the grout space or cell.

(2) The minimum dimensions of the total clear areas shall be made up of one or more open areas, with at least one area being 3/4 inch or greater in width.

(3) For grouting spaces between masonry wythes.

(4) Where only cells of hollow masonry units containing reinforcement are grouted, the maximum height of the pour shall not exceed the distance between horizontal bond beams.

3.13 BOND BEAMS

Bond beams shall be filled with grout and reinforced as indicated on the drawings. Grout barriers shall be installed under bond beam units to retain the grout as required. Reinforcement shall be continuous, including around corners, except through control joints or expansion joints, unless otherwise indicated on the drawings. Where splices are required for continuity, reinforcement shall be lapped 48 bar diameters. A minimum clearance of 1/2 inch shall be maintained between reinforcement and interior faces of units.

3.14 CONTROL JOINTS

Control joints shall be provided as indicated and shall be constructed by using mortar to fill the head joint, special control-joint units, sash jamb units with control joint key or open end stretcher units in accordance with the details shown on the drawings. Sash jamb units shall have a 3/4 by 3/4 inch groove near the center at end of each unit. The vertical mortar joint at control joint locations shall be continuous, including through all bond beams. This shall be accomplished by utilizing half blocks in alternating courses on each side of the joint. The control joint key shall be interrupted in courses containing continuous bond beam steel. In single wythe exterior masonry walls, the exterior control joints shall be raked to a depth of 3/4 inch; backer rod and sealant shall be installed in accordance with Section 07900 JOINT SEALING. Exposed interior control joints shall be raked to a depth of 1/4 inch. Concealed control joints shall be flush cut.

3.15 BRICK EXPANSION JOINTS AND CONCRETE MASONRY VENEER JOINTS

Brick expansion joints and concrete masonry veneer joints shall be provided and constructed as shown on the drawings. Joints shall be kept free of mortar and other debris.

3.16 SHELF ANGLES

Shelf angles shall be adjusted as required to keep the masonry level and at the proper elevation. Shelf angles shall be galvanized. Shelf angles shall be provided in sections not longer than 10 feet and installed with a 1/4 inch gap between sections. Shelf angles shall be mitered and welded at building corners with each angle not shorter than 4 feet, unless limited by wall configuration.

3.17 LINTELS

3.17.1 Masonry Lintels

Masonry lintels shall be constructed with lintel units filled solid with grout in all courses and reinforced with a minimum of two No. 4 bars in the bottom course unless otherwise indicated on the drawings. Lintel reinforcement shall extend beyond each side of masonry opening 40 bar diameters or 24 inches, whichever is greater. Reinforcing bars shall be supported in place prior to grouting and shall be located 1/2 inch above the bottom inside surface of the lintel unit.

3.17.2 Steel Lintels

Steel lintels shall be as shown on the drawings. Lintels shall be set in a full bed of mortar with faces plumb and true. Steel and precast lintels shall have a minimum bearing length of 8 inches unless otherwise indicated on the drawings.

3.18 OMITTED

3.19 ANCHORAGE TO CONCRETE AND STRUCTURAL STEEL

3.19.1 Anchorage to Concrete

Anchorage of masonry to the face of concrete columns, beams, or walls shall be with dovetail anchors spaced not over 16 inches on centers vertically and 24 inches on center horizontally.

3.19.2 Anchorage to Structural Steel

Masonry shall be anchored to vertical structural steel framing with adjustable steel wire anchors spaced not over 16 inches on centers vertically, and if applicable, not over 24 inches on centers horizontally.

3.20 OMITTED

3.21 INSULATION

Anchored veneer walls shall be insulated, where shown, by installing board-type insulation on the cavity side of the inner wythe. Board type insulation shall be applied directly to the masonry or thru-wall flashing with adhesive. Insulation shall be neatly fitted between obstructions without impaling of insulation on ties or anchors. The insulation shall be applied in parallel courses with vertical joints breaking midway over the course below and shall be applied in moderate contact with adjoining units without forcing, and shall be cut to fit neatly against adjoining surfaces.

3.22 SPLASH BLOCKS

Splash blocks shall be located as shown.

3.23 POINTING AND CLEANING

After mortar joints have attained their initial set, but prior to hardening, mortar and grout daubs or splashings shall be completely removed from masonry-unit surfaces that will be exposed or painted. Before completion of the work, defects in joints of masonry to be exposed or painted shall be raked out as necessary, filled with mortar, and tooled to match existing joints. Immediately after grout work is completed, scum and stains which have percolated through the masonry work shall be removed using a high pressure stream of water and a stiff bristled brush. Masonry

surfaces shall not be cleaned, other than removing excess surface mortar, until mortar in joints has hardened. Masonry surfaces shall be left clean, free of mortar daubs, dirt, stain, and discoloration, including scum from cleaning operations, and with tight mortar joints throughout. Metal tools and metal brushes shall not be used for cleaning.

3.23.1 Concrete Masonry Unit Surfaces

Exposed concrete masonry unit surfaces shall be dry-brushed at the end of each day's work and after any required pointing, using stiff-fiber bristled brushes.

3.23.2 Clay or Shale Brick Surfaces

Exposed clay or shale brick masonry surfaces shall be cleaned as necessary to obtain surfaces free of stain, dirt, mortar and grout daubs, efflorescence, and discoloration or scum from cleaning operations. After cleaning, the sample panel of similar material shall be examined for discoloration or stain as a result of cleaning. If the sample panel is discolored or stained, the method of cleaning shall be changed to assure that the masonry surfaces in the structure will not be adversely affected. The exposed masonry surfaces shall be water-soaked and then cleaned with a solution proportioned 1/2 cup trisodium phosphate and 1/2 cup laundry detergent to one gallon of water or cleaned with a proprietary masonry cleaning agent specifically recommended for the color and texture by the clay products manufacturer. The solution shall be applied with stiff fiber brushes, followed immediately by thorough rinsing with clean water. Proprietary cleaning agents shall be used in conformance with the cleaning product manufacturer's printed recommendations. Efflorescence shall be removed in conformance with the brick manufacturer's recommendations.

3.24 BEARING PLATES

Bearing plates for beams, joists, joist girders and similar structural members shall be set to the proper line and elevation with damp-pack bedding mortar, except where non-shrink grout is indicated. Bedding mortar and non-shrink grout shall be as specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

3.25 PROTECTION

Facing materials shall be protected against staining. Top of walls shall be covered with nonstaining waterproof covering or membrane when work is not in progress. Covering of the top of the unfinished walls shall continue until the wall is waterproofed with a complete roof or parapet system. Covering shall extend a minimum of 2 feet down on each side of the wall and shall be held securely in place. Before starting or resuming, top surface of masonry in place shall be cleaned of loose mortar and foreign material.

3.26 TEST REPORTS

3.26.1 Field Testing of Mortar

At least three specimens of mortar shall be taken each day. A layer of mortar 1/2 to 5/8 inch thick shall be spread on the masonry units and allowed to stand for one minute. The specimens shall then be prepared and tested for compressive strength in accordance with ASTM C 780.

3.26.2 Field Testing of Grout

Field sampling and testing of grout shall be in accordance with the applicable provisions of ASTM C 1019. A minimum of three specimens of grout per day shall be sampled and tested. Each specimen shall have a minimum ultimate compressive strength of 2000 psi at 28 days.

3.26.3 Efflorescence Test

Brick which will be exposed to weathering shall be tested for efflorescence. Tests shall be scheduled far enough in advance of starting masonry work to permit retesting if necessary. Sampling and testing shall conform to the applicable provisions of ASTM C 67. Units meeting the definition of "effloresced" will be subject to rejection.

-- End of Section --

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SECTION 04220A

NONBEARING MASONRY VENEER/STEEL STUD WALLS
01/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC ASD Manual	(1989) Manual of Steel Construction Allowable Stress Design

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI Cold-Formed Mnl	(1996) Cold-Formed Steel Design Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123/A 123M	(2001) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2001) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 36/A 36M	(2000a) Carbon Structural Steel
ASTM A 653/A 653M	(2000) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 82	(1997ae1) Steel Wire, Plain, for Concrete Reinforcement
ASTM C 1072	(2000) Measurement of Masonry Flexural Bond Strength
ASTM C 216	(2000) Facing Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C 270	(2000) Mortar for Unit Masonry
ASTM C 494/C 494M	(1999ae1) Chemical Admixtures for Concrete
ASTM C 665	(1998) Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
ASTM C 67	(2000) Sampling and Testing Brick and Structural Clay Tile

ASTM C 780	(2000) Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
ASTM C 79/C 79M	(2000) Treated Core and Nontreated Core Gypsum Sheathing Board
ASTM C 91	(1999) Masonry Cement
ASTM C 954	(2000) Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
ASTM C 955	(2000a) Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases
ASTM D 1056	(2000) Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 1330	(1985; R 1995el) Rubber Sheet Gaskets
ASTM D 1667	(1997) Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam)
ASTM D 2103	(1997) Polyethylene Film and Sheeting
ASTM D 226	(1997a) Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE Hdbk-IP	(1997) Handbook, Fundamentals I-P Edition

AMERICAN WELDING SOCIETY (AWS)

AWS D1.3	(1998) Structural Welding Code - Sheet Steel

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings; G, ED

Details of cold-formed steel framing and support around openings, including framing connections, steel lintels, steel shelf angles, attachment to other building elements and bridging. Drawings shall indicate thickness, material, dimensions, protective coatings, and section properties of all steel lintels and shelf angles used in exterior wall framing. Drawings shall also indicate size and type of all fasteners including size and type of all welds.

SD-04 Samples

Expansion Joint Materials
Clay or Shale Brick
Sample Panel

A portable panel, approximately 2 by 2 feet, containing approximately 24 brick facings to establish the range of color and texture. One of each type of masonry veneer anchor used.

SD-06 Test Reports

Masonry Veneer/Steel Stud Wall System; G, ED

Calculations demonstrating the structural adequacy of steel lintels and shelf angles for the calculated gravity loads being supported; this analysis shall be in accordance with AISC ASD Manual. Test results demonstrating that the veneer anchors are structurally adequate to resist the specified loadings shall be submitted for approval. Calculations demonstrating the insulation shown on the drawings provides the specified U-value for heat transmission of the completed exterior wall construction; this analysis shall be in accordance with ASHRAE Hdbk-IP. Manufacturer's descriptive data and installation instructions for the insulation, the vapor barrier and the moisture barrier.

SD-07 Certificates

Clay or Shale Brick
Expansion Joint Materials
Insulation
Exterior Sheathing
Moisture Barrier
Vapor Retarder
Veneer Anchors
Welding

Certificates stating that the materials and welders meet the requirements specified. Each certificate shall be signed by an authorized certification official and shall include their organization and position and shall identify the products covered under their certifying signature.

1.3 SAMPLE PANEL

After the material samples are approved and prior to starting masonry work, a sample masonry panel shall be built on the project site where directed. The sample panel shall be not less than 6 feet long by 4 feet high. The panel shall be of typical wall thickness for the construction represented. The panel shall show color range, texture, bond pattern, expansion joints,

and cleaning of the masonry as required in the work. The panel shall also show cold-formed steel framing, insulation, gypsum wallboard, gypsum sheathing, moisture barrier, vapor barrier, veneer anchors, joint reinforcement, steel shelf angles, flashing and weep holes. The approved sample panel shall be used as a standard of workmanship required in the actual installation. The sample panel shall be protected from weather and construction operations and shall not be removed until the masonry veneer/steel stud wall work has been completed and accepted.

1.4 DELIVERY, HANDLING AND STORAGE

Materials shall be delivered and handled avoiding chipping, breakage, bending or other damage, and contact with soil or other contaminating materials. The masonry products shall be stored off the ground and protected from inclement weather. Cementitious materials shall be delivered in unopened containers plainly marked and labeled with manufacturer's names and brands. Cementitious materials shall be stored in dry, weathertight enclosures or covers. Sand and other aggregates shall be stored preventing contamination or segregation and under a weather-tight covering permitting good air circulation. Finish of the framing members shall be maintained at all times, using an approved high zinc dust content galvanizing repair paint whenever necessary to prevent the formation of rust. Insulation, moisture barrier, and gypsum sheathing shall be stored in dry, well ventilated, weather-tight areas protected from sunlight and excessive heat. Air infiltration type vapor barrier shall be stored in accordance with the manufacturer's recommendations.

1.5 EFFLORESCENCE TESTS

Efflorescence tests shall be performed by an approved commercial testing laboratory. Sampling for the tests shall be the responsibility of the Contractor. Brick shall be sampled and tested for efflorescence in accordance with ASTM C 67 and the rating shall be: "not effloresced".

PART 2 PRODUCTS

2.1 VENEER WYTHE

The source of masonry materials which will affect the appearance of the finished work shall not be changed after the work has started except with the Contracting Officer's approval.

2.1.1 Clay or Shale Brick

Clay or shale brick veneer shall be masonry units conforming to ASTM C 216, Type FBS. Color range and texture shall be as indicated and shall conform to the approved sample. Grade SW shall be used for all brickwork. Brick unit sizes shall be modular 2-2/3 inches thick, 4 inches wide and 8 inches long.

2.2 MORTAR

Mortar shall conform to ASTM C 270, Type S. Mortar mix shall be based on proportion specifications. Laboratory testing of mortar shall be in accordance with the preconstruction evaluation of mortar section of ASTM C 780. Cement shall have a low alkali content and be of one brand. Aggregates shall be from one source.

2.2.1 Masonry Cement

Masonry cement in conformance with ASTM C 91 may be used in the mortar. When using a masonry cement a comparative test shall be performed between a Portland cement-lime mortar and the masonry cement mortar proposed for the project to evaluate the ASTM C 1072 bond and the ASTM C 780 compressive strength of the two mixes. The test shall be conducted with the proposed masonry units for the project. The masonry cement mortar will be acceptable if the bond and compressive strength values are equal to or higher than the portland cement-lime mix. The air-content of the masonry cement shall be limited to 12 percent maximum.

2.2.2 Admixtures

In cold weather, a non-chloride based accelerating admixture may be used subject to approval. Accelerating admixtures shall be non-corrosive, contain less than 0.2 percent chlorides, and conform to ASTM C 494/C 494M, Type C.

2.3 JOINT REINFORCEMENT

Joint reinforcement shall be of steel wire conforming to ASTM A 82. Fabrication shall be by welding. Tack welding will not be permitted. Reinforcement shall be zinc-coated after fabrication in accordance with ASTM A 153/A 153M, Class B-2. Joint reinforcement shall consist of at least 1 continuous longitudinal wire in the veneer wythe. Minimum wire cross section shall be 0.017 square inch.

2.4 COLD-FORMED STEEL FRAMING

Cold-formed framing shall consist of steel studs, top and bottom tracks, runners, horizontal bridging, and other cold-formed members and other accessories. All members and components made of sheet steel shall be hot-dip galvanized in accordance with ASTM A 653/A 653M with a minimum coating thickness of G60. Framing covered herein shall be used only in framing the exterior masonry veneer steel stud wall system as indicated on the detail drawings. Metal framing for interior partitions are specified in Section 09250A GYPSUM BOARD.

2.4.1 Steel Studs

Studs shall be furnished as shown in the contract drawings.

2.4.2 Runners, Tracks, Bridging and Accessories

Cold-formed steel sheet framing members, components, and accessories, other than the steel studs, shall conform to ASTM C 955 and be of steel conforming to ASTM A 653/A 653M, Grade 33, having a minimum yield strength of 33,000 psi.

2.5 INSULATION

The Contractor shall comply with EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS.

2.5.1 Blanket Insulation

Insulation placed between the steel studs shall be batt or blanket type mineral wool conforming to ASTM C 665, Type I.

2.6 GYPSUM WALLBOARD

Gypsum wallboard that is installed on the interior side of the cold-formed steel framing system shall be as specified in Section 09250A GYPSUM BOARD.

2.7 EXTERIOR SHEATHING

Gypsum sheathing that is installed on the exterior side of the cold-formed steel framing system shall have a minimum thickness of 1/2 inch and shall be 4 feet wide. Gypsum sheathing shall conform to ASTM C 79/C 79M. Gypsum sheathing shall have a water-resistant gypsum core with a water-repellent paper firmly bonded to the core.

2.8 MOISTURE PROTECTION

2.8.1 Moisture Barrier

The moisture barrier shall be 15-pound asphalt-saturated felt conforming to ASTM D 226 Type I (No. 15).

2.8.2 Vapor Retarder

The vapor retarder shall be polyethylene film conforming to ASTM D 2103, 6 mil minimum thickness.

2.8.3 Staples

Staples for attaching the moisture barrier to the exterior sheathing shall be the type and size best suited to provide a secure connection. Staples shall be made from either galvanized steel or stainless steel wire.

2.8.4 Joint Tape

Tape for sealing the joints in the vapor retarder shall be laminated tape with pressure sensitive adhesive as recommended by the manufacturer of the polyethylene film.

2.9 VENEER ANCHORS

Anchor assemblies for the attachment of the masonry veneer to the cold-formed steel framing, structural steel and/or concrete beam and column members, and concrete floor slabs shall be designed for the design loadings shown. Anchors shall transfer the design loadings from the masonry veneer to the cold-formed steel framing system or other support without exceeding the allowable stresses and deflections in the anchors. Length of anchor wires shall be such that the outermost wires lie between 1-1/4 inch from each face of the masonry veneer. Anchors wires shall not have drips. Wires for veneer anchors shall be rectangular or triangular hoops formed from 3/16 inch diameter steel wire conforming to ASTM A 82. Anchor assemblies including wires and anchor plates shall be hot-dip galvanized conforming to ASTM A 153/A 153M, Class B-2. The veneer anchor shall have a minimum capacity of 200 pounds. The load-displacement capacity of each veneer anchor, both in direct pull-out for tension and compression, shall be not less than 2000 pounds per inch (or a deflection of 0.05 inch per 100 pounds of load in tension or compression). In the direction perpendicular to the masonry veneer, the anchor assembly shall have a maximum play of 1/16 inch.

2.9.1 Adjustable Pintle-Eye Type Wire Anchors

Adjustable pintle-eye type wall anchors shall be two pieces rectangular type double pintle anchors.

2.9.2 Dovetail Anchors

Dovetail slots shall be galvanized steel.

2.10 CONNECTIONS

Screws, bolts and anchors shall be hot-dip galvanized in accordance with ASTM A 123/A 123M or ASTM A 153/A 153M as appropriate.

2.10.1 Framing Screws, Bolts and Anchors

Screws, bolts and anchors used in the assembly of the cold-formed steel framing system shall be as required by design of the framing system for the specified loading. Screw, bolt and anchor sizes shall be shown on the detail drawings.

2.10.2 Welding

Welded connections shall be designed and all welding shall be performed in accordance with AWS D1.3, as modified by AISI Cold-Formed Mnl. Welders shall be qualified in accordance with AWS D1.3. All welds shall be cleaned and touched-up with zinc-rich paint.

2.10.3 Veneer Anchor Screws

Screws for attachment of the veneer anchors to the cold-formed steel framing members shall be as required by design to provide the needed pullout load capacity but not less than No. 12. Screws shall be shown on the detail drawings. The length of screws shall be such that the screws penetrate the holding member by not less than 5/8 inch.

2.10.4 Gypsum Sheathing Screws

Screws for attachment of gypsum sheathing to cold-formed steel framing shall conform to ASTM C 954.

2.11 SYNTHETIC RUBBER WASHERS

Synthetic rubber washers for placement between veneer anchors and the moisture barrier on the outside face of the exterior sheathing shall conform to ASTM D 1330, Grade I.

2.12 EXPANSION JOINT MATERIALS

Expansion joint materials shall be bellows or U-shaped type conforming to Section 07600 SHEET METALWORK, GENERAL. Premolded type shall be closed-cell cellular rubber conforming to ASTM D 1056 or closed-cell vinyl or polyvinyl chloride conforming to ASTM D 1667.

2.13 FLASHING

Copper or stainless steel flashing shall conform to the requirements in Section 07600 SHEET METALWORK, GENERAL. Flashing shall be supplied in a continuous sheet extending from the exterior sheathing across the cavity and through the masonry veneer as shown.

2.14 STEEL LINTELS AND SHELF ANGLES

Steel shapes used for lintels and shelf angles shall conform to ASTM A 36/A 36M. Lintels and shelf angles shall be provided as shown. These steel members shall be hot-dip galvanized in accordance with ASTM A 123/A 123M.

2.15 CAULKING AND SEALANTS

Caulking and sealants shall be as specified in Section 07900 JOINT SEALING.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Wall sections, types of construction and dimensions shall be as shown. Metal door and window frames and other special framing shall be built and anchored into the wall system as indicated.

3.2 STEEL STUD WALL FRAMING

The top track of the stud wall system shall be slip jointed to accommodate vertical deflections of the supporting members as shown on the drawings. Top and bottom tracks shall be anchored by one anchor at each stud location as shown on the drawings. Both flanges of all steel studs shall be securely fastened with screws to the flanges of the top and bottom tracks as shown on the drawings. All details for affixing steel studs to runners and all other sheet steel framing members along with all details necessary for anchorage of the steel stud wall system to the building structural systems shall be as shown on the drawings. Horizontal bridging shall be provided as necessary. Studs shall be spaced as indicated on the drawings. Coordinate stud spacing with sheathing and anchor requirements. At wall openings for doors, windows and other similar features, the framing system shall provide for the installation and anchorage of the required subframes or finish frames. Steel frames shall be securely attached through built-in anchors to the nearest stud on each side of the opening with self-drilling screws. Double studs shall be provided at both jambs of all door openings. Door frames and other built-in items shall be spot grouted at the jamb anchor locations.

3.3 STEEL SHELF ANGLES

Unless otherwise shown, steel shelf angles shall be provided in segments that do not exceed 10 feet in length. At building corners, shelf angle segments shall be mitered and securely attached together by welding with legs no less than 4 feet where possible. Shelf angle segments shall not be connected together but instead shall be installed with 1/4 inch wide gaps between the segments. Fabrication and erection tolerances shall be in accordance with the AISC Code of Standard Practice, as indicated in AISC ASD Manual.

3.4 INSULATION

The actual installed thickness of insulation shall provide a maximum thermal R as indicated for the completed exterior wall construction as determined in accordance with ASHRAE Hdbk-IP. Insulation thickness shall be as shown on the approved drawings. Installation, except as otherwise specified or shown, shall be in accordance with the manufacturer's instructions which shall be approved by the Contracting Officer.

Insulation shall be installed between wall framing members. Rigid insulation shall be installed in accordance with the manufacturer's instructions with proper connections through the insulation to prevent the insulation from carrying loads directly. Insulation with facings shall be secured to the sides of the framing members to provide a continuous seal so that the entire weight of the insulation is carried by the framing members. Where electrical outlets, ducts, pipes, vents or other utility items occur, insulation shall be placed on the dry side of the item away from excessive humidity.

3.5 GYPSUM WALLBOARD

Gypsum wallboard shall be installed on the interior face of the cold-formed steel framing system. Installation shall be as specified in Section 09250A GYPSUM BOARD except at vertical slip joints, the gypsum wallboard shall be connected to the vertical studs to prevent movement at the slip joint.

3.6 EXTERIOR SHEATHING

Sheathing shall be installed on the exterior face of the cold-formed steel framing system with self-drilling screws. Screws shall be located a minimum of 3/8 inch from the ends and edges of sheathing panels and shall be spaced not more than 8 inches on each supporting member except at vertical slip joints, the sheathing shall be connected to the vertical studs to prevent movement of the slip joint. Edges and ends of gypsum sheathing panels shall be butted snugly with vertical joints staggered to provide full and even support for the moisture barrier. Holes and gaps resulting from abandoned screw installations, from damage to panels, and from cutting and fitting of panels at junctures with doors, windows, foundation walls, floor slabs and other similar locations shall be filled with exterior rubber-base caulk.

3.7 MOISTURE PROTECTION

3.7.1 Moisture Barrier

The asphalt-saturated felt or other approved moisture barrier shall be installed on the outer face of the exterior sheathing. The moisture barrier shall be installed horizontally and shingled with each sheet lapped not less than 6 inches over the sheet below. Vertical end joints shall be lapped not less than 6 inches and shall be staggered. Attachment of the moisture barrier shall be with staples spaced not greater than 16 inches on center or as required by the manufacturer.

3.7.2 Vapor Retarder

A vapor retarder shall be installed between the steel studs and the gypsum wall board. The vapor retarder shall be installed in accordance with the manufacturer's recommendations to form a complete retarder to vapor infiltration. The joints shall be lapped and sealed with tape.

3.8 VENEER ANCHORS

Veneer anchors shall be attached with screws through the sheathing to the steel studs or other support members at the locations shown. Veneer anchors shall be installed with the outermost wires lying between 5/8 inch from each face of the masonry veneer. Synthetic rubber washers shall be used between the anchor connector plates and the moisture barrier. A clutch torque slip screw gun shall be used on screws attaching veneer

anchors to cold-formed steel members. Veneer anchors with corrugated sheet metal or wire mesh members extending across the wall cavity shall not be used. There shall be one veneer anchor for each 2 square feet of wall and shall be attached to steel studs and other supports with a maximum spacing of 24 inches on center. For pintle-eye anchors the vertical distance between the pintle section horizontal wires and the eye section horizontal wires shall not exceed 1/2 inch.

3.9 FLASHING

Continuous flashing shall be provided at the bottom of the wall cavity just above grade. Flashing shall also be provided above and below openings at lintels and sills, at shelf angles, and as indicated on the drawings. Flashing shall be as detailed and as specified in Section 07600 SHEET METALWORK, GENERAL. Flashing shall be lapped a minimum of 6 inches at joints and shall be sealed with a mastic as recommended by the flashing manufacturer. Ends over doors, windows and openings shall be turned up and secured. Flashing shall be lapped under the moisture barrier a minimum of 6 inches and securely attached to the gypsum sheathing. Flashing shall extend through the exterior face of the masonry veneer and shall be turned down to form a drip.

3.10 MASONRY VENEER

Exterior masonry wythes shall be constructed to the thickness indicated on the drawings. A cavity consisting of a 2-inch minimum width air space will be provided between the moisture barrier and the masonry veneer. Masonry veneer shall not be installed until the exterior sheathing, moisture barrier, veneer anchors and flashing have been installed on the cold-formed steel framing system. Extreme care shall be taken to avoid damage to the moisture barrier and flashing during construction of the masonry veneer. Any portion of the moisture barrier and flashing that is damaged shall be repaired or replaced prior to completion of the veneer. Masonry shall be placed in running bond pattern. Vertical joints on alternating courses shall be aligned and kept vertically plumb. Solid masonry units shall be laid in a non-furrowed full bed of mortar, beveled and sloped toward the center of the wythe on which the mortar is placed. Units shall be shoved into place so that the vertical mortar joints are completely full and tight. Units that have been disturbed after the mortar has stiffened shall be removed, cleaned and relaid. Mortar which protrudes more than 1/2 inch into the cavity space shall be removed. Means shall be provided to ensure that the cavity space is kept clean of mortar droppings and other loose debris. Chases and raked-out joints shall be kept free from mortar and debris. Faces of units used in finished exposed areas shall be free from chipped edges, material texture or color defects or other imperfections distracting from the appearance of the finished work.

3.10.1 Surface Preparation

Surfaces on which masonry is to be laid shall be cleaned of laitance or other foreign material. No units having a film of water shall be laid.

3.10.2 Hot Weather Construction

Temperatures of masonry units and mortar shall not be greater than 120 degrees F when laid. Masonry erected when the ambient air temperature is more than 99 degrees F in the shade and when the relative humidity is less than 50 percent shall be given protection from the direct exposure to wind and sun for 48 hours after the installation.

3.10.3 Cold Weather Construction

Temperatures of masonry units and mortar shall not be less than 40 degrees F when laid. When the ambient air temperature is 32 degrees F or less, masonry veneer under construction shall be protected and maintained at a temperature greater than 32 degrees F for a period of 48 hours after installation. The proposed method of maintaining the temperature within the specified range shall be submitted for approval prior to implementation. No units shall be laid on a surface having a film of frost or water.

3.10.4 Tolerances

Masonry shall be laid plumb, level and true to line within the tolerances specified in TABLE 1. All masonry corners shall be square unless otherwise indicated on the drawings.

TABLE 1

Variation From Plumb	
In adjacent units	1/8 inch
In 10 feet	1/4 inch
In 20 feet	3/8 inch
In 40 feet or more	1/2 inch

Variation From Level Or Grades	
In 10 feet	1/8 inch
In 20 feet	1/4 inch
In 40 feet or more	1/2 inch

Variation From Linear Building Lines	
In 20 feet	1/2 inch
In 40 feet or more	3/4 inch

Variation From Cross Sectional Dimensions Of Walls	
Plus	1/2 inch
Minus	1/4 inch

3.10.5 Mixing of Mortar

Mortar shall be mixed in a mechanically operated mortar mixer for at least 3 minutes but not more than 5 minutes. Measurement of ingredients for mortar shall be by volume. Measurement of sand shall be accomplished by the use of a container of known capacity or shovel count based on a container of known capacity. Water shall be mixed with the dry ingredients in sufficient amount to provide a workable mixture which will adhere to the vertical surfaces of the masonry units. Mortar that has stiffened because of loss of water through evaporation shall be retempered by adding water to restore the proper consistency and workability. Mortar that has reached

its initial set or that has not been used within 2-1/2 hours shall be discarded.

3.10.6 Cutting and Fitting

Wherever possible, full units shall be used in lieu of cut units. Where cut units are required to accommodate the design, cutting shall be done by masonry mechanics using power masonry saws. Wet-cut units shall be dried to the same surface-dry appearances of uncut units before being placed in the work. Cut edges shall be clean, true and sharp. Openings to accommodate pipes, conduits, and other accessories shall be neatly formed so that framing or escutcheons required will completely conceal the cut edges. Insofar as practicable, all cutting and fitting shall be accomplished while masonry work is being erected.

3.10.7 Masonry Units

When being laid, masonry units shall have suction sufficient to hold the mortar and to absorb water from the mortar, but shall be damp enough to allow the mortar to remain in a plastic state to permit the unit to be leveled and plumbed immediately after being laid without destroying bond. Masonry units with frogging shall be laid with the frog side down and better or face side exposed to view. Masonry units that are cored, recessed or otherwise deformed may be used in sills or in other areas except where deformations will be exposed to view.

3.10.8 Mortar Joints

Mortar joint widths shall be uniform and such that the specified widths are maintained throughout. Joints shall be of thickness equal to the difference between the actual and nominal dimensions of the masonry units in either height or length but in no case shall the joints be less than 1/4 inch nor more than 1/2 inch wide. Joints shall be tooled slightly concave. Tooling shall be accomplished when mortar is thumbprint hard and in a manner that will compress and seal the mortar joint and produce joints of straight and true lines free of tool marks.

3.10.9 Omitted

3.10.10 Veneer Joints

Brick expansion joints shall be provided at the locations shown on the drawings. Details of joints shall be as indicated on the drawings. Joints shall be clean and free of mortar and shall contain only backer rod and sealant, installed in accordance with Section 07900 JOINT SEALING. Horizontal reinforcement shall not extend through the joints.

3.10.11 Weep Holes

Weep holes shall be provided at all flashing locations at intervals of 24 inches. Weep holes shall be placed in head joints just above the flashing. Weep holes shall be formed by leaving head joints open or head joint vents may be used. Weep holes shall be kept free of mortar and other obstructions.

3.10.12 Head Joint Vents

Head joint vents shall be provided near the top of the veneer wythe at the same spacing as the weep holes.

3.10.13 Discontinuous Work

When necessary to temporarily discontinue the work, masonry shall be stepped back for joining when work resumes. Toothing may be used only when specifically approved. Before resuming work, loose mortar shall be removed and the exposed joint shall be thoroughly cleaned. Top of walls subjected to rain or snow shall be covered with nonstaining waterproof covering or membrane when work is not in process. Covering shall extend a minimum of 2 feet down on each side of the wall and shall be held securely in place.

3.10.14 Cleaning

Mortar daubs or splashings shall be completely removed from finished exposed masonry surfaces before they harden or set up. Before completion of the work, defects in mortar joints shall be raked out as necessary, filled with mortar, and tooled to match the adjacent existing mortar in the joints. The proposed cleaning method shall be done on the sample wall panel and the sample panel shall be examined for discoloration or stain. If the sample panel is discolored or stained, the method of cleaning shall be changed to ensure that the masonry surfaces in the structure will not be adversely affected. Masonry surfaces shall not be cleaned, other than removing excess surface mortar, until mortar in joints has hardened. Cleaning shall be accomplished with the use of stiff bristle fiber brushes, wooden paddles, wooden scrapers, or other suitable nonmetallic tools. The exposed brick surfaces shall be saturated with water and cleaned with a proprietary brick cleaning agent recommended by the clay products manufacturer. The cleaning agent shall not adversely affect the brick masonry surfaces. Proprietary cleaning agents shall be used in conformance with the cleaning product manufacturer's printed recommendations. Efflorescence or other stains shall be removed in conformance with the recommendations of the masonry unit manufacturer. After construction and cleaning, masonry surfaces shall be left clean, free of mortar daubs, stain, and discolorations, including scum from cleaning operations, and will have tight mortar joints throughout. Metallic tools and brushes shall not be used for cleaning.

3.11 BUILDING EXPANSION JOINTS

Expansion joints shall be located where indicated and shall be of the size and details shown.

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SECTION 04435

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SAVH-04435 (09/97)

SECTION 04435

ARCHITECTURAL CAST STONE
09/97

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 318	(1992) Building Code Requirements for Reinforced Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 82	(1990a) Steel Wire, Plain, for Concrete Reinforcement
ASTM A 185	1990a) Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 497	(1990b) Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 615	(1990) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 31	(1985) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(1986) Concrete Aggregates
ASTM C 39	(1986) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 91	(1991) Masonry Cement
ASTM C 97	(1990) Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone
ASTM C 144	(1991) Standard Specification for Aggregate or Masonry Mortar
ASTM C 150	(1989) Portland Cement
ASTM C 207	(1991; R 1992) Hydrated Lime for Masonry Purposes

ASTM C 494	(1986) Chemical Admixtures for Concrete
ASTM C 642	(1990) Standard Test Method for Specific Gravity, Absorption, and Voids in Hardened Concrete
ASTM C 979	(1982; R 1986) Pigments for Integrally Colored Concrete

CAST STONE INSTITUTE (CSI)

CSI 04435	(1990) Standard Specification for Cast Stone

PRECAST PRESTRESSED CONCRETE INSTITUTE (PCI)

PCI Mnl-117	(1977) Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products
PCI Mnl-122	(1989) Architectural Precast Concrete

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Calculations

Design calculations, prior to the manufacture of any cast stone units for the project.

Mix Design

A statement giving the maximum nominal fine or coarse aggregate size, the proportions of all ingredients and the type and amount of any admixtures that will be used in the manufacturing process, prior to commencing operations. The statement shall be accompanied by test results certifying that the proportions selected conform to the requirements of CSI 04435.

SD-04 Drawings

Cast Stone

Cast stone manufacturer shall prepare and submit complete properly marked setting drawings, showing details and sizes of stones and reinforcing; arrangement of joints; bonding; inserts; joints; connections to adjoining walls or materials; reinforcing; and method of installation and anchoring. Unless otherwise specified, shop drawings shall provide for the following:

a. Provide suitable wash on all exterior sills, copings, projecting courses and pieces with exposed top surfaces.

b. Window sills shall have raised fillets at the back.

c. All projecting pieces and soffit stones shall have drips under the outer edge.

d. The shop drawings shall show the setting mark of each stone and its location on the structure. The stone when delivered shall bear the same corresponding setting mark on an unexposed surface.

SD-09 Reports

Materials

Certified copies of test reports including all test data and all test results.

SD-14 Samples

Cast Stone Units

Two 12-inch by 12-inch by 2-inch samples of each type of cast stone unit finish required for the project. Samples shall show matrix color, surface color, surface texture, and panel back finish. A full-size mockup, maintained at the cast stone manufacturer's plant until approval by the Contracting Officer for removal or incorporating in the project. The mockup shall be used to establish quality and acceptance of stone units to be used on the project, and shall consist of three or more units, showing the exterior finish (matrix color, surface color, surface texture), panel back finish, edge treatment, joint treatment, reinforcement, anchorage insert, lifting inserts, and other accessories. Mockup shall also include doors and windows and typical joints, including exterior corner joints and joints between units.

SD-18 Records

Manufacturer's Qualifications

A statement giving the qualifications of the cast stone manufacturer and of the installers, prior to commencing operations.

1.3 GENERAL REQUIREMENTS

Cast stone units shall be designed and fabricated by an experienced and acceptable cast stone manufacturer. The manufacturer shall have been regularly and continuously engaged in the manufacture of cast stone work similar to that indicated on the drawings for at least 5 years. Cast stone work shall be coordinated with the work of other trades.

1.4 DESIGN

1.4.1 Properties of Mix

Cast stone units shall have a 28-day compressive strength of 5,000 psi. The average water absorption of cast stone shall not exceed 6 percent by dry weight.

1.4.2 Tolerances

Cast stone dimensions shall be the numerically greater of plus or minus 1/8 inch or length/360. Setting tolerances shall be not greater than plus or

minus 1/8 inch allowable out of plane from adjacent unit.

1.4.3 Reinforcement

Cast stone shall be reinforced with new billet steel reinforcing bars meeting ASTM A 615, grade 60, when necessary for safe handling, setting and structural stress, and the size of the reinforcing shall be specified. Reinforcement shall be galvanized or epoxy coated when covered with less than 2 inches of material for bars greater than 5/8 inch; 1-1/2 inches for bars 5/8 inch or smaller. The material covering in all cases shall be at least twice the diameter of the bars. Cast stone panels shall be reinforced as may be required for stripping, shipping and handling and to allow for temperature changes and structural stress. They shall be designed to carry the weight of materials above them. There shall be a minimum steel reinforcement equal to 1/4 percent of the sectional area of the panel. When panel is greater than 12 inches in any sectional dimension, the temperature steel shall be placed in both directions. Where applicable, cold-drawn steel wire reinforcement conforming to ASTM A 82, welded wire reinforcement conforming to ASTM A 185 or ASTM A 497, or steel bar or rod mat reinforcement conforming to ASTM A 184 may be used.

1.4.4 Testing

Testing shall be performed in accordance with ASTM C 31, ASTM C 39 and ASTM C 642 except that 2-inch cube specimens shall be used, oven dried in accordance with ASTM C 97. Test results shall be determined by the average of three specimens per test. The results of compression tests shall be divided by a factor of 0.8 when saw-cut or core-drilled specimens are used.

1.4.5 Standards and Loads

Cast stone unit design shall conform to ACI 318 and PCI Mnl-122. Design loads for precast concrete shall be as indicated on the drawings. A differential temperature of 60 degrees F, between interior and exterior faces of the units, shall be considered in the design. Stresses due to restrained volume change caused by shrinkage and temperature differential, handling, transportation and erection shall be accounted for in the design.

1.4.6 Connections

Connection of units to other members, or to other units shall be of the type and configuration indicated. The design and sizing of connections for all design loads shall be by the Contractor.

1.4.7 Calculations

Calculations for design of members and connections not shown shall be made by a currently registered professional engineer in the state of the project who is experienced in the design of precast architectural concrete. Calculation shall include the analysis of member for lifting stresses and the sizing of the lifting inserts.

1.5 STORAGE AND INSPECTION AT MANUFACTURER'S PLANT

Cast stone units temporarily stored at the manufacturer's plant shall be protected from damage in accordance with PCI Mnl-117. Immediately prior to shipment to the job site, all cast stone units shall be inspected for quality to ensure all cast stone units conform to the requirements specified. Inspection for quality will include but not necessarily be

limited to the following elements; color, texture, dimensional tolerances, chipping, cracking, and staining. All defective cast stone units shall be replaced or repaired as approved.

1.6 HANDLING AND STORAGE

Cast stone units shall be delivered to the site with delivery scheduled to avoid excessive build-up of units in storage at the site. Upon delivery to the job site all cast stone units shall be inspected for quality as specified in paragraph STORAGE AND INSPECTION AT MANUFACTURER'S PLANT. If the cast stone units cannot be unloaded and placed directly into the work, they shall be stored onsite, off the ground and protected from weather, marring, or overload. Cast stone units shall be handled in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Aggregates

2.1.1.1 Fine Aggregate

Fine aggregate shall be carefully graded and washed natural sands, or manufactured granite, quartz or limestone sands complying with ASTM C 33, except that gradation may vary to achieve desired finish and texture.

2.1.1.2 Coarse Aggregate

Coarse aggregate shall be carefully graded and washed natural gravels, or crushed, graded stone such as granite, quartz, limestone or other durable stone complying with ASTM C 33, except that gradation may vary to achieve desired finish and texture.

2.1.2 Reinforcement

Cast stone shall be reinforced with new billet steel reinforcing bars in accordance with ASTM A 615, grade 60, when necessary for safe handling, setting and structural stress. The size of the reinforcing shall be specified. If surfaces are to be exposed to the weather, reinforcement shall be galvanized or epoxy coated when covered with less than 2 inches of material for bars larger than 5/8 inch, and 1-1/2 inches for bars 5/8 inch or smaller. The material covering in all cases shall be at least twice the diameter of the bars. Cast stone panels shall be reinforced as may be required for handling, and to allow for temperature changes and structural stress. There shall be a minimum steel reinforcement amounting to 1/4 percent of the sectional area of the panel, and should the panel be greater than 12 inches in any sectional dimension, the temperature steel shall be placed in both directions. Where applicable, cold-drawn steel wire reinforcement in accordance with ASTM A 82, welded wire fabric reinforcement complying with ASTM A 185 or ASTM A 497, or steel bar or rod mat reinforcement meeting ASTM A 184 may be used.

2.1.3 Cement

Cement shall be portland Type I or Type III, white and/or gray conforming to ASTM C 150.

2.1.4 Color

All colors shall be inorganic (natural or synthetic) iron oxide pigments in accordance with ASTM C 979, excluding the use of a cement grade of carbon black pigment, and shall be guaranteed by the pigment manufacturer to be lime-proof. The amount of pigment shall not exceed 10 percent by weight of the cement used.

2.1.5 Inserts

Inserts shall be manufacturer's standard, suited for the application.

2.1.6 Plates, Angles, Anchors and Embedments

Steel items, other than stainless, shall be coated with a rust-inhibiting paint or shall be hot-dip galvanized. Steel items, including items embedded in cast stone, shall be either stainless steel or hot dip galvanized steel.

2.1.7 Water

Water shall be potable tap water free from impurities.

2.1.8 Admixtures

Admixtures shall conform to ASTM C 494.

2.1.9 Pointing Mortar

2.1.9.1 Nonstaining cement

ASTM C 91.

2.1.9.2 Hydrated Lime

ASTM C 207.

2.1.9.3 Sand

ASTM C 144.

2.2 CAST STONE UNITS

Cast stone units shall be manufactured and cured in accordance with the applicable provisions of PCI Mnl-117. Units shall be manufactured within the allowable tolerances given in CSI 04435 and PCI Mnl-117.

2.2.1 Reinforcement

Fabrication and placement of reinforcement shall conform to the details shown on the approved detail drawings and PCI Mnl-117.

2.2.2 Embedded Accessories

Anchors, inserts, lifting devices, dowels, and other accessories which are to be embedded in the cast stone units shall be furnished and installed in accordance with the approved detail drawings. Embedded items shall be accurately positioned in their designed location, and shall have sufficient anchorage and embedment to satisfy design requirements.

2.2.3 Identification

Each cast stone unit shall be marked to correspond to the identification marks for each different precast unit shown on the detail drawings.

2.2.4 Finish

Finish for cast stone shall be in accordance with the requirements of CSI 04435.

PART 3 EXECUTION

3.1 SETTING

All cast stone shall be set by experienced masons, accurately and in accordance with the shop and setting drawings. Cast stone vertical joints shall coincide with brick expansion joint locations. Unless otherwise noted, every stone shall be set in a full bed of mortar with all vertical joints flushed full. All anchors and dowels shall be firmly placed and all anchor holes and dowel holes and similar holes filled completely with mortar or nonshrink grout. All anchors, dowels, and other anchoring devices shall be furnished by the setting contractor as shown on approved shop drawings using, whenever possible, stainless steel-type 302 or 304 standard building stone anchors. When setting with mortar, all stones not thoroughly wet shall be drenched with clear water just prior to setting. After each stone has been set, all joints shall be raked to a depth of 3/4 inch from the face for pointing. The face of each stone shall then be sponged off to remove any splashed mortar or mortar smears. Only the ends of lugged sills and similar stones shall be embedded in mortar. The balance of joint to be left open until pointing of stone work. All cornices, copings, projecting belt courses, steps, platforms and in general, all stone areas either partially or totally horizontal, shall be set with unfilled vertical joints. After setting, insert properly sized back-up material or backer rod to proper depth, prime the ends of the stone, and gun in sealant. All stone shall be protected from splashing mortar or damage by other trades. Any foreign matter splashed on the stone should be removed immediately.

3.2 POINTING

When ready for pointing, the joints shall be dampened and carefully pointed to a slight concave unless otherwise specified. No pointing shall be done in freezing weather nor in locations exposed to hot sun, unless properly protected. Pointing mortar shall be composed of one part nonstaining cement (ASTM C 91), one part hydrate lime (ASTM C 207 - Type S) and four parts of clean, washed sand (ASTM C 144). Coloring pigments shall be added as required so that mortar is the same color as the stone. The Contracting Officer shall approve color of pointing mortar before proceeding with pointing.

3.3 JOINT SEALING

Head joints in copings and similar stones and joints as detailed shall be caulked with a joint sealant used in accordance with the manufacturer's instructions.

3.4 PATCHING AND CLEANING

The repair of chipped or damaged cast stone shall be done only by mechanics

skilled in this class of work, with materials furnished by the manufacturer and according to his direction. Before pointing, the face of all cast stone shall be scrubbed with a fibre brush, using soap powder and water, and shall then be thoroughly rinsed with clean running water. Any mortar on the face of the cast stone shall be removed. No acids or prepared cleaners shall be used without the approval of the cast stone manufacturer.

3.5 PROTECTION OF WORK

Cast stone units shall be protected against damage from subsequent operations.

3.6 DEFECTIVE WORK

Cast stone units damaged during erection shall be repaired as soon after occurrence as possible or replaced, as directed, using approved procedures. All repairs to cast stone units shall match the adjacent surfaces in color and texture and shall be as approved. Unless otherwise approved, repair procedures shall conform to PCI Mnl-117.

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SECTION 05090

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CEGS-05090 (September 1998)

Includes changes through Notice 1 (October 1999)

SECTION 05090

WELDING, STRUCTURAL
09/98

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC ASD Spec	(1989) Specification for Structural Steel Buildings - Allowable Stress Design, Plastic Design

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

ASNT RP SNT-TC-1A	(1996) Recommended Practice SNT-TC-1A

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(1998) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS A3.0	(1994) Standard Welding Terms and Definitions
AWS D1.1	(1998) Structural Welding Code - Steel
AWS Z49.1	(1999) Safety in Welding and Cutting and Allied Processes

1.2 DEFINITIONS

Definitions of welding terms shall be in accordance with AWS A3.0.

1.3 GENERAL REQUIREMENTS

The design of welded connections shall conform to AISC ASD Spec unless otherwise indicated or specified. Material with welds will not be accepted unless the welding is specified or indicated on the drawings or otherwise approved. Welding shall be as specified in this section, except where additional requirements are shown on the drawings or are specified in other sections. Welding shall not be started until welding procedures, inspectors, nondestructive testing personnel, welders, welding operators, and tackers have been qualified and the submittals approved by the Contracting Officer. Qualification testing shall be performed at or near the work site. Each Contractor performing welding shall maintain records

of the test results obtained in welding procedure, welder, welding operator, and tacker performance qualifications.

1.3.1 Pre-erection Conference

A pre-erection conference shall be held, prior to the start of the field welding, to bring all affected parties together and to gain a naturally clear understanding of the project and the Welding Procedure Specifications (WPS) (which the Contractor shall develop and submit for all welding, including welding done using prequalified procedures). Attendees shall include all Contractor's welding production and inspection personnel and appropriate Government personnel. Items for discussion could include: responsibilities of various parties; welding procedures and processes to be followed; welding sequence (both within a joint and joint sequence within the building); inspection requirements and procedures, both visual and ultrasonic; welding schedule; fabrication of mock-up model; and other items deemed necessary by the attendees.

1.3.2 Mock-up Model

The field-welded connection designated as the mock-up model on the drawings shall be the first connection made. All welders qualified and designated to perform field-welded groove joints shall be present during the welding of the mock-up model connections and each one shall perform a part of the welding. The mock-up test shall simulate the physical and environmental conditions that will be encountered during the welding of all groove joints. All inspection procedures required for groove welded joints, including NDE tests, shall be performed on the mock-up model. All Contractor inspection and testing personnel that will perform QC of groove welded joints shall be present during the welding of the mock-up model and each one shall perform the inspection procedures to be performed on production welding of these joints. This mock-up model connection shall be the standard of performance, both for the welding and inspection procedures used and the results to be achieved in the production welding for these groove welded joints.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Welding Procedure Qualifications; G, RE
Welder, Welding Operator, and Tacker Qualification
Inspector Qualification
Previous Qualifications
Prequalified Procedures

Copies of the welding procedure specifications; the procedure qualification test records; and the welder, welding operator, or tacker qualification test records.

SD-06 Test Reports

Quality Control

A quality assurance plan and records of tests and inspections.

1.5 WELDING PROCEDURE QUALIFICATIONS

Except for prequalified (per AWS D1.1) and previously qualified procedures, each Contractor performing welding shall record in detail and shall qualify the welding procedure specification for any welding procedure followed in the fabrication of weldments. Qualification of welding procedures shall conform to AWS D1.1 and to the specifications in this section. Copies of the welding procedure specification and the results of the procedure qualification test for each type of welding which requires procedure qualification shall be submitted for approval. Approval of any procedure, however, will not relieve the Contractor of the sole responsibility for producing a finished structure meeting all the requirements of these specifications. This information shall be submitted on the forms in Appendix E of AWS D1.1. Welding procedure specifications shall be individually identified and shall be referenced on the detail drawings and erection drawings, or shall be suitably keyed to the contract drawings. In case of conflict between this specification and AWS D1.1, this specification governs.

1.5.1 Previous Qualifications

Welding procedures previously qualified by test may be accepted for this contract without requalification if the following conditions are met:

a. Testing was performed by an approved testing laboratory, technical consultant, or the Contractor's approved quality control organization.

b. The qualified welding procedure conforms to the requirements of this specification and is applicable to welding conditions encountered under this contract.

c. The welder, welding operator, and tacker qualification tests conform to the requirements of this specification and are applicable to welding conditions encountered under this contract.

1.5.2 Prequalified Procedures

Welding procedures which are considered prequalified as specified in AWS D1.1 will be accepted without further qualification. The Contractor shall submit for approval a listing or an annotated drawing to indicate the joints not prequalified. Procedure qualification shall be required for these joints.

1.5.3 Retests

If welding procedure fails to meet the requirements of AWS D1.1, the procedure specification shall be revised and requalified, or at the Contractor's option, welding procedure may be retested in accordance with AWS D1.1. If the welding procedure is qualified through retesting, all test results, including those of test welds that failed to meet the requirements, shall be submitted with the welding procedure.

1.6 WELDER, WELDING OPERATOR, AND TACKER QUALIFICATION

Each welder, welding operator, and tacker assigned to work on this contract shall be qualified in accordance with the applicable requirements of AWS

D1.1 and as specified in this section. Welders, welding operators, and tackers who make acceptable procedure qualification test welds will be considered qualified for the welding procedure used.

1.6.1 Previous Personnel Qualifications

At the discretion of the Contracting Officer, welders, welding operators, and tackers qualified by test within the previous 6 months may be accepted for this contract without requalification if all the following conditions are met:

a. Copies of the welding procedure specifications, the procedure qualification test records, and the welder, welding operator, and tacker qualification test records are submitted and approved in accordance with the specified requirements for detail drawings.

b. Testing was performed by an approved testing laboratory, technical consultant, or the Contractor's approved quality control organization.

c. The previously qualified welding procedure conforms to the requirements of this specification and is applicable to welding conditions encountered under this contract.

d. The welder, welding operator, and tacker qualification tests conform to the requirements of this specification and are applicable to welding conditions encountered under this contract.

1.6.2 Certificates

Before assigning any welder, welding operator, or tacker to work under this contract, the Contractor shall submit the names of the welders, welding operators, and tackers to be employed, and certification that each individual is qualified as specified. The certification shall state the type of welding and positions for which the welder, welding operator, or tacker is qualified, the code and procedure under which the individual is qualified, the date qualified, and the name of the firm and person certifying the qualification tests. The certification shall be kept on file, and 3 copies shall be furnished. The certification shall be kept current for the duration of the contract.

1.6.3 Renewal of Qualification

Requalification of a welder or welding operator shall be required under any of the following conditions:

a. It has been more than 6 months since the welder or welding operator has used the specific welding process for which he is qualified.

b. There is specific reason to question the welder or welding operator's ability to make welds that meet the requirements of these specifications.

c. The welder or welding operator was qualified by an employer other than those firms performing work under this contract, and a qualification test has not been taken within the past 12 months. Records showing periods of employment, name of employer where welder, or welding operator, was last employed, and the process for which qualified shall be submitted as evidence of conformance.

d. A tacker who passes the qualification test shall be considered eligible to perform tack welding indefinitely in the positions and with the processes for which he is qualified, unless there is some specific reason to question the tacker's ability. In such a case, the tacker shall be required to pass the prescribed tack welding test.

1.7 INSPECTOR QUALIFICATION

Inspector qualifications shall be in accordance with AWS D1.1. Nondestructive testing personnel shall be qualified in accordance with the requirements of ASNT RP SNT-TC-1A for Levels I or II in the applicable nondestructive testing method. The inspector may be supported by assistant welding inspectors who are not qualified to ASNT RP SNT-TC-1A, and assistant inspectors may perform specific inspection functions under the supervision of the qualified inspector.

1.8 SYMBOLS

Symbols shall be in accordance with AWS A2.4, unless otherwise indicated.

1.9 SAFETY

Safety precautions during welding shall conform to AWS Z49.1.

PART 2 PRODUCTS

2.1 WELDING EQUIPMENT AND MATERIALS

All welding equipment, electrodes, welding wire, and fluxes shall be capable of producing satisfactory welds when used by a qualified welder or welding operator performing qualified welding procedures. All welding equipment and materials shall comply with the applicable requirements of AWS D1.1.

PART 3 EXECUTION

3.1 WELDING OPERATIONS

3.1.1 Requirements

Workmanship and techniques for welded construction shall conform to the requirements of AWS D1.1 and AISC ASD Spec. When AWS D1.1 and the AISC ASD Spec specification conflict, the requirements of AWS D1.1 shall govern.

3.1.2 Identification

Welds shall be identified in one of the following ways:

a. Written records shall be submitted to indicate the location of welds made by each welder, welding operator, or tacker.

b. Each welder, welding operator, or tacker shall be assigned a number, letter, or symbol to identify welds made by that individual. The Contracting Officer may require welders, welding operators, and tackers to apply their symbol next to the weld by means of rubber stamp, felt-tipped marker with waterproof ink, or other methods that do not cause an indentation in the metal. For seam welds, the identification mark shall be adjacent to the weld at 3-foot intervals. Identification with die stamps or electric etchers shall not be allowed.

3.2 QUALITY CONTROL

Testing shall be done by an approved inspection or testing laboratory or technical consultant; or if approved, the Contractor's inspection and testing personnel may be used instead of the commercial inspection or testing laboratory or technical consultant. The Contractor shall perform visual and ultrasonic inspection to determine conformance with paragraph STANDARDS OF ACCEPTANCE. Procedures and techniques for inspection shall be in accordance with applicable requirements of AWS D1.1, except that in radiographic inspection only film types designated as "fine grain," or "extra fine," shall be employed.

3.3 STANDARDS OF ACCEPTANCE

Dimensional tolerances for welded construction, details of welds, and quality of welds shall be in accordance with the applicable requirements of AWS D1.1 and the contract drawings. Nondestructive testing shall be by visual inspection or ultrasonic methods. The minimum extent of nondestructive testing shall be random 50 percent of welds or joints, as indicated on the drawings.

3.3.1 Nondestructive Examination

The welding shall be subject to inspection and tests in the mill, shop, and field. Inspection and tests in the mill or shop will not relieve the Contractor of the responsibility to furnish weldments of satisfactory quality. When materials or workmanship do not conform to the specification requirements, the Government reserves the right to reject material or workmanship or both at any time before final acceptance of the structure containing the weldment.

3.3.2 Destructive Tests

When metallographic specimens are removed from any part of a structure, the Contractor shall make repairs. The Contractor shall employ qualified welders or welding operators, and shall use the proper joints and welding procedures, including peening or heat treatment if required, to develop the full strength of the members and joints cut and to relieve residual stress.

3.4 GOVERNMENT INSPECTION AND TESTING

In addition to the inspection and tests performed by the Contractor for quality control, the Government will perform inspection and testing for acceptance to the extent determined by the Contracting Officer. The costs of such inspection and testing will be borne by the Contractor if unsatisfactory welds are discovered, or by the Government if the welds are satisfactory. The work may be performed by the Government's own forces or under a separate contract for inspection and testing. The Government reserves the right to perform supplemental nondestructive and destructive tests to determine compliance with paragraph STANDARDS OF ACCEPTANCE.

3.5 CORRECTIONS AND REPAIRS

When inspection or testing indicates defects in the weld joints, the welds shall be repaired using a qualified welder or welding operator as applicable. Corrections shall be in accordance with the requirements of AWS D1.1 and the specifications. Defects shall be repaired in accordance with the approved procedures. Defects discovered between passes shall be

repaired before additional weld material is deposited. Wherever a defect is removed and repair by welding is not required, the affected area shall be blended into the surrounding surface to eliminate sharp notches, crevices, or corners. After a defect is thought to have been removed, and before rewelding, the area shall be examined by suitable methods to ensure that the defect has been eliminated. Repair welds shall meet the inspection requirements for the original welds. Any indication of a defect shall be regarded as a defect, unless reevaluation by nondestructive methods or by surface conditioning shows that no unacceptable defect is present.

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Includes changes through Notice 1 (July 2000)

SECTION 05091

ULTRASONIC INSPECTION OF WELDMENTS
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PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

ASNT RP SNT-TC-1A	(1996) Recommended Practice SNT-TC-1A
ASNT Q&A Bk C	(1994) Question and Answer Book C: Ultrasonic Testing Method; Levels I, II, III (Supplement to RP SNT-TC-1A)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 165	(1995) Liquid Penetrant Examination
ASTM E 709	(1995) Magnetic Particle Examination

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(1998) Structural Welding Code - Steel

1.2 DEFINITIONS

1.2.1 A Scan

Method of data presentation on a cathode ray tube using rectangular coordinates in which a horizontal base line indicates elapsed time when reading from left to right. A vertical deflection in the base line indicates reflect signal amplitude.

1.2.2 Acoustically Similar Material

Material the same as that to be inspected; or another material proven to have acoustical velocity within plus or minus 3 percent and an attenuation within plus or minus 0.25 dB/inch of the inspected material for the inspection frequency and wave mode, using the same mode as that to be used for inspection.

1.2.3 Amplitude

When referring to an indication in A scan presentation, amplitude is the vertical height of the indication measured from peak-to-peak for radio

frequency indications and trace-to-peak for video indications.

1.2.4 Attenuation

Dissipation or loss of energy as ultrasonic vibrations travel through the material. Attenuation is caused almost entirely by scattering of the ultrasonic vibrations generated by the search unit.

1.2.5 Attenuation-Correction Controls

Circuitry to provide a continuous increase in amplification with respect to time. This circuitry compensates for the reduction in sensitivity with depth as a result of sound beam divergence and its attenuation in material.

1.2.6 Back Reflection or End Reflection

Reflection from the opposite side, end, or boundary of the material into which the ultrasonic energy was introduced.

1.2.7 Calibrated Gain Control (Attenuator)

Circuitry with which gain can be reduced finite amounts by switching electrical signal attenuation into the circuit.

1.2.8 Calibration

Process of comparing an instrument or device with a standard to determine accuracy or produce a scale.

1.2.9 Cathode Ray Tube (CRT)

An electron tube in which a controlled beam of electrons from the cathode is used to produce an image on a fluorescent screen at the end of the tube.

1.2.10 Couplant

Any material, usually a liquid or semiliquid, used between the search unit and the inspection surface to exclude air and to convey the ultrasonic vibrations between the search unit and the material being inspected.

1.2.11 Damping Control

Control that varies the duration of transducer ringing.

1.2.12 Decibel (dB)

Units for the logarithmic expression of the ratio of power levels. Power levels can be functions of voltage, current, or impedance, for example. Decibel units having no values of their own are only significant when a reference is stated, as 10 dB above one reference level or 6 dB below another reference level.

1.2.13 Delay Control

Means of delaying the pattern obtained on the CRT.

1.2.14 Discontinuity

Anything within a material that will cause a detectable interruption in an

ultrasonic beam.

1.2.15 Distance-Amplitude Correction Curve

Curve showing the relationship between signal amplitude and equal-sized reflecting surfaces at various distances from the transducer. Reference standards are used to obtain such curves.

1.2.16 Dynamic Range

Ratio of maximum to minimum size of reflective areas that can be adequately distinguished on the CRT at a constant gain setting.

1.2.17 Effective Depth of Penetration

Maximum depth at which the sensitivity is satisfactory for the quality of test desired.

1.2.18 Examination

Within the context of this specification, examination is equivalent to the word "inspection."

1.2.19 Gain Control

Circuitry designed into the ultrasonic system to vary reflection amplitude. This control is usually calibrated in decibels. It is also called the sensitivity control.

1.2.20 Gross

Background displacement of the trace on the CRT from the established baseline due to the gain setting, the characteristics of the test equipment, or the material under examination.

1.2.21 Hertz

One complete set of recurrent values of a periodic quantity comprises a cycle. In other words, any one set of periodic variations starting at one condition and returning once to the same condition is a cycle.

1.2.22 Immersion Techniques

Test methods in which the part to be tested and the search units are immersed in water or other suitable liquid couplant. A mechanical device is used to firmly hold and direct the wave angle of the search unit. The search unit does not contact the item being inspected.

1.2.23 Indication

Visual presentation on the cathode ray screen resulting from a sound beam reflection from a boundary surface or discontinuity.

1.2.24 Initial Pulse Indication

Usually called the "initial pulse". A signal on the CRT screen marking the instant at which a voltage impulse is applied to the transmitting crystal. Its rising edge is frequently invisible due to the time lag in the probe shoe and the consequent necessity to ensure coincidence between the time

base zero and the instant at which the transmitter pulse actually enters the material under test.

1.2.25 Linearity

Property of an instrument revealed by a linear change in reflected signal or displacement. The vertical linearity is determined by plotting the change in ratios of signal amplitude from two adjacent reflections from an area of known size. The horizontal linearity is determined by plotting the distance the signal is displaced along the sweep against the change in material thickness or by noting the spacing of multiple back reflections.

1.2.26 Longitudinal or Compressional Waves

Simple compression-rare-fraction waves in which particle motion within a material is linear and in the direction of wave propagation. Also called straight beams, or compressional or normal waves.

1.2.27 Longitudinal Wave Inspection

Ultrasonic technique, normally using straight beam methods, in which longitudinal waves are the dominant form.

1.2.28 Mid-Screen Reflection

Reflection whose amplitude is equal to one-half the useable screen height on the CRT.

1.2.29 Megahertz (MHz)

One million hertz per second frequency.

1.2.30 NDT Level I

An NDT Level I individual should be qualified to properly perform specific calibrations, specific NDT, and specific evaluations for acceptance or rejection determinations according to written instructions, and to record results.

1.2.31 NDT Level II

An NDT Level II individual should be qualified to set up and calibrate equipment and to interpret and evaluate results with respect to applicable codes, standards, and specifications.

1.2.32 NDT Level III

An NDT Level III individual should be capable of establishing techniques and procedures; interpreting codes, standards, specifications, and procedures; and designating the particular NDT methods, techniques, and procedures to be used.

1.2.33 Node

Distance a shear wave travels in a straight line from the inspection surface before being reflected by the opposite surface.

1.2.34 Pulse Repetition Rate

Number of spaced pulses of sound per second sent into the material being inspected.

1.2.35 Range Control

Means of expanding the pattern obtained on the CRT so that any portion of the total distance being tested can be presented.

1.2.36 Reference Reflector

Standard reflector 0.06 inch diameter reference hole in the IIW reference block. Other approved blocks may have a different diameter reflector.

1.2.37 Reflector

Boundary, consisting of an opposite side, crack, or separation, or a distinct change in material such as slag or porosity that reflects the ultrasonic energy the same as a mirror reflects light.

1.2.38 Refracted Waves

Waves that have undergone change of velocity and direction by passing from one material to another material with different acoustical properties. Refraction will occur wherever the angle of the incident wave to the interface is other than perpendicular.

1.2.39 Rejectable Discontinuity (Defect)

Reflector large enough to produce a signal (decibel rating) that exceeds the reject/repair line.

1.2.40 Resolution

Ability to clearly distinguish signals obtained from two reflective surfaces with a minimum separation distance. Near-surface resolution is the ability to clearly distinguish a signal from a reflector at a minimum distance under the contact or near surface without interference from the initial pulse signal. Far-surface resolution is the ability to clearly distinguish signals from reflectors displaced at minimum distances from the far or back surface when the sound beam is normal to that back surface.

1.2.41 Ringing

Excitation in a transducer due to the application of a short pulse of high voltage.

1.2.42 Scanning

Procedure of moving the search unit or units along a test surface to obtain complete inspection of the entire volume of a material being inspected. Preliminary scanning refers to a somewhat common practice of rapidly traversing a weld ultrasonically with a higher instrument gain or sensitivity level than will be used for the evaluation. It gives the operator an estimate of the welding quality and also makes all defects more prominent and less likely to be missed.

1.2.43 Search Unit

Device containing a piezoelectric material used for introducing vibrations

into a material to be inspected or for receiving the vibrations reflected from the material. The active element of the search unit is defined as the effective transmitting area. Search units are also called transducers or probes. They may be single or dual and contain one or two piezoelectric elements, respectively, for transmission and reception. The single search unit is sometimes enclosed in a transducer wheel or search unit wheel. The search unit may be manually handled and placed in direct contact with the material to be inspected or may be held in a fixture for immersion techniques.

1.2.44 Sensitivity

Measure of the ultrasonic equipment's ability to detect discontinuities. Quantitatively, it is the level of amplification of the receiver circuit in the ultrasonic instrument necessary to produce the required indication on the scope from the reference hole in the reference block. Also see "Standard Reference Level."

1.2.45 Shear Waves

Waves in which the particles within the material vibrate perpendicularly to the direction in which the wave travels or propagates. Also called transverse waves.

1.2.46 Shear Wave Inspection

Inspection technique using shear waves in a material. The search unit is placed at an angle to the contact surface of the material so the resultant refracted sound is a shear wave at an angle to the normal.

1.2.47 Standard Reference Level

Mid-screen height reflection when beaming at the 0.06 inch hole in the primary reference block or the reference hole in the secondary standard.

1.2.48 Surface Waves

Waves that propagate along the surface of the material and penetrate it to only about 1/2 wavelength. Also known as Rayleigh waves.

1.2.49 Test Frequency

Operating frequency in hertz per second of the search unit during period of activation. Frequency is usually expressed in megacycles per second or megahertz. The latter term has been adopted for international use and is preferred.

1.2.50 Video Form

Type of signal presentation on a CRT in which only the upper half of the signal appears.

1.3 GENERAL REQUIREMENTS

The procedures, methods, standards, and description of equipment specified herein shall be used for inspection of weldments. Ultrasonic inspections shall be made to detect the following defects:

a. Cracks or crack-like faults.

b. Root defects, including lack of penetration and fusion.

c. Lack of fusion between passes on the sidewall.

d. Porosity or inclusions and excessive undercutting.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Ultrasonic Inspection

Procedures and Methods. The pulse echo contact method with an A scan presentation shall be used for the ultrasonic inspection of welded joints, except that immersion techniques may be used for some applications when approved by the Contracting Officer. The Contractor shall provide a standard reference block and working standards as described in paragraph REFERENCE STANDARDS FOR EQUIPMENT, QUALIFICATIONS, AND CALIBRATION. The procedures to be used for personnel and equipment qualification, equipment calibration, and inspection, shall be submitted to the Contracting Officer at least 30 days prior to their intended use. Approval by the Government will in no way affect the obligation of the Contractor to employ qualified personnel, equipment, and procedures, and to perform the inspection as specified. The procedure description shall include the following:

a. Couplant.

b. Search unit characteristics including angle, size, shape, nominal frequency, type designation.

c. Method and type of wave.

d. Equipment and accessories including manufacturer, model number, date of manufacture, last date of calibration, and the manufacturer's electrical, physical, and performance specifications.

e. Decibel (dB) compensation system for distance-amplitude correction.

Ultrasonic Inspection

Reports containing the following information:

a. Identification and Location of Inspected Item: Name and place of the inspected item, the person performing the inspection, and the date of inspection.

b. Detail of Inspections: Details of methods, types of waves used, search units, frequencies, inspection equipment

identification, and calibration data with enough information to permit duplication of the inspection at a later date.

c. Response in Calibration: The response from the DSC or SC block used in calibration and for acceptance/rejection in terms of the response from the 0.06 inch reference hole in the standard IIW block (primary standard).

d. Identification of Unacceptable Areas: Locations, dimensions, types, and area of unacceptable defects and discontinuities giving reflections over 50 percent of the reject/repair line. These may be noted on a sketch or marked-up drawing.

e. Record of Repair Areas: A record of repaired areas shall be furnished as well as test results for the repaired areas.

1.5 WAVE TYPES

The types of waves and the conditions under which they shall be used are specified below:

1.5.1 Shear Waves

Unless conditions prohibit, shear waves shall be used. A longitudinal wave procedure may be used instead, if approved by the Contracting Officer. Refracted waves between 40 degrees and 70 degrees shall be used except where different angles are indicated in approved procedures, such as for materials less than 1/2 inch thick, for materials with sound velocities greater than in steel, when the weldments are not readily accessible, or when existing backing rings or backing strips are not removed. For inspection of weldments containing backing rings or backing strips, the instrument shall be adjusted and the refracted angles shall be selected in a way to separate the weldment and the backing ring reflections. The search unit angle and the resulting shear wave angle in the material to be inspected shall be established by the Contractor for each application and this information shall be included in the procedure submitted for approval.

1.5.2 Longitudinal Waves

When conditions prohibit the use of shear waves, longitudinal waves may be used. The procedure shall be specially developed to suit the application and shall have the prior approval of the Contracting Officer.

1.6 CHANGES IN PROCEDURE

Should application of an approved procedure not provide for good resolution or adequate ultrasonic penetration in the items to be inspected (see paragraph EQUIPMENT QUALIFICATION REQUIREMENTS), changes in procedure or equipment such as frequency, pulse repetition rate, angle of search unit, couplant, or oscilloscope shall be made by the Contractor. Adequacy of the new procedure shall be demonstrated to the Contracting Officer. The Government reserves the right to require a change in test equipment during these tests if any of the following test system characteristics fall below the levels listed in paragraph EQUIPMENT QUALIFICATION REQUIREMENTS: sensitivity, amplitude and distance linearity, signal-to-noise ratio, entry and back surface resolution and penetration.

1.7 ULTRASONIC EQUIPMENT

The ultrasonic equipment shall conform to the requirements listed in AWS D1.1 Section Inspection, subsection Ultrasonic Equipment, with the following exceptions:

a. The ultrasonic test instruments shall be able to generate, receive, and to present pulses in the frequency range from 1 to 10 megahertz (MHz).

b. The horizontal linearity of the ultrasonic instrument shall be measured in accordance with paragraph EQUIPMENT QUALIFICATION REQUIREMENTS.

c. In addition to the resolution test specified in AWS D1.1, subsection Ultrasonic Equipment, both near- and far-surface resolution tests shall be conducted in accordance with the tests specified for these characteristics in the paragraph EQUIPMENT QUALIFICATION REQUIREMENTS.

1.8 PERSONNEL QUALIFICATION AND REQUIREMENTS

1.8.1 Personnel Qualification

The three levels of responsibility associated with ultrasonic inspection are defined in ASNT RP SNT-TC-1A. For qualification to perform ultrasonic inspection, personnel shall be certified under ASNT RP SNT-TC-1A and ASNT Q&A Bk C within a period of 1 year before the date of contract. Other qualification or certification may be accepted at the Contracting Officer's discretion. Personnel with only an operator or inspector trainee certification will not be considered qualified to pass judgement on the acceptability of inspected items, but may work under the direct supervision of a qualified ultrasonic inspector. Qualified ultrasonic inspectors shall be able to judge the acceptability of the item in accordance with paragraph ACCEPTANCE/REJECTION LIMITS.

1.8.2 Examinations

If the Contracting Officer doubts an individual's ability as an operator, inspector, or supervisor, the individual shall be recertified in accordance with ASNT RP SNT-TC-1A. At the option of the Government, the Contracting Officer may participate in administering the examination and in evaluating the results.

1.9 REFERENCE STANDARDS FOR EQUIPMENT, QUALIFICATIONS, AND CALIBRATION

Reference standards shall be used to calibrate the inspection equipment, test its operating condition, and record the sensitivity or response of the equipment during the inspection in accordance with paragraph EQUIPMENT QUALIFICATION REQUIREMENTS. The standards shall comprise a standard reference block and reference specimens as noted below.

1.9.1 Standard Reference Block

The standard reference block or primary standard shall be provided by the Contractor and shall consist of the IIW block in AWS D1.1, Section Inspection, subsection Reference Standards. The standard reference block also shall be used in any reinspection on the same basis as the original inspection, even though the reinspection is to be performed by other ultrasonic instruments and accessories.

1.9.2 Working Standards

The Contractor may use other recognized working standards detailed with the IIW block in AWS D1.1 such as the Sensitivity Calibration (SC) block. However, such blocks shall be referenced to the IIW block as noted in paragraph SENSITIVITY CALIBRATION OF LONGITUDINAL AND ANGLE WAVE SYSTEMS. Details of their use shall be included in the procedure description submitted to the Contracting Officer. These blocks are the secondary standards. They shall be of acoustically similar material to the welds to be inspected. The secondary standards shall be suited for the applicable tests specified in paragraph EQUIPMENT QUALIFICATION REQUIREMENTS and shall be used as follows, except where the IIW block is specifically required:

a. To assure adequate penetration of the base material.

b. To provide a secondary field standard.

c. To calibrate the equipment and establish the standard reference level.

1.9.3 Resolution Test Block

The Contractor shall furnish a resolution test block in accordance with the details shown in AWS D1.1 Section Inspection, subsection Ultrasonic Equipment.

1.10 EQUIPMENT QUALIFICATION REQUIREMENTS

The ultrasonic instrument and accessories shall be evaluated on their arrival at the jobsite, immediately prior to the start of inspection. They shall be evaluated using the Contractor's furnished primary standard and shall meet or exceed the requirements listed in paragraphs below. Equipment that does not meet these requirements shall not be used in the inspection.

1.10.1 Requalifications

The equipment shall be requalified after normal use at intervals not to exceed 40 hours, except as noted. The equipment also shall be requalified immediately after maintenance or repair or when the Contracting Officer considers its operation questionable.

1.10.2 Longitudinal Wave System

1.10.2.1 Vertical Amplitude Linearity

Two adjacent reflections of different amplitudes obtained through the thickness of the primary or secondary standard shall vary in the same proportion as the amplitude of the first reflection is increased in discrete 2-dB increments between 20 percent and 80 percent to full screen height. For each gain setting, the amplitude of each reflection shall vary by the same factor, within plus or minus 5 percent. Requalification is required monthly or as otherwise stated.

1.10.2.2 Horizontal Linearity

The first three multiple reflections obtained through the thickness of the primary or secondary standard shall be equally spaced, within plus or minus 5 percent, when spread over 90 percent of the sweep length. Requalification is required monthly or as otherwise stated.

1.10.2.3 Near-Surface Resolution

Excessive ringing that appears on the CRT to the right of the sound entry point shall not exceed a 1/2 inch equivalent distance in steel with the search unit placed on the 4-inch edge of the IIW (primary) block and positioned for maximum amplitude reflection from the 0.06 inch reference hole of the primary standard. The reference reflector shall be set to mid-screen and the gain shall be increased 20 dB. The reference hole located at least 1/2 inch from one edge of the AW DSC or SC secondary standard shall be used similarly. Acceptability will be on the same basis as in the primary standard.

1.10.2.4 Far-Surface Resolution

This property of the equipment shall be verified by the method detailed in AWS D1.1, Section Inspection, subsection Calibration of the Ultrasonic Unit with the IIW or Other Approved Calibration Blocks. In addition, the trailing edge of the third reflection shall return to the sweep line and be clearly discernible.

1.10.3 Angle Wave System

1.10.3.1 Vertical (Amplitude) Linearity

Two adjacent multiple reflections from the 0.06 inch reference hole in the primary standard shall vary in the same proportion as the amplitude of the first reflection in discrete 2-dB increments between 20 percent and 80 percent of full screen height. For each gain setting, the amplitude of each adjacent reflection shall vary within plus or minus 5 percent. For testing with the AWS SC or AWS DSC secondary standard, the same criteria shall apply. For the SC block, the transducer shall be placed on the longitudinal surface contiguous with the sound entry point lines, whereas the 4-inch longitudinal surface of the DSC block shall be used for the same purpose. Requalification is required monthly, or as otherwise stated.

1.10.3.2 Horizontal Linearity (Angle Wave)

The first three multiple echoes, obtained from the 0.06 inch reference hole of the primary standard or from the reference hole in a secondary standard with the transducer positioned at a minimum of 1 inch sound path distance, shall be equally spaced plus or minus 5 percent when spread over 90 percent of the sweep length. The gain shall be adjusted to give a mid-screen height first reflection. Requalification is required monthly or as otherwise stated.

1.10.3.3 Near-Surface Resolution (Angle Wave)

The search unit shall be positioned for maximum amplitude using the primary or secondary standard as in the horizontal linearity test. The gain shall be adjusted to give a mid-screen height first reflection and then shall be increased 20 dB. Excessive ringing that appears on the CRT to the right of the sound entry point shall not exceed 1/2 inch equivalent distance in steel.

1.10.3.4 Far-Surface Resolution (Angle Wave)

The equipment shall delineate the three resolution holes in the resolution block appropriate for the angle of the transducer to be used in the

inspection.

1.10.3.5 Signal-to-Noise Ratio

With the search unit located as in the horizontal linearity test, the gain shall be set to obtain an 80 percent full screen height first reflection. The reference reflection-to-noise-amplitude ratio shall not be less than 10 to 1.

1.10.3.6 Exit Point

The search unit shall be placed on the graduated scale on the 12-inch edge of the primary standard and the ultrasound shall be beamed toward the curved edge of the block. The gain shall be set for a mid-screen first reflection. The search unit shall be moved back and forth until the first reflection is maximized. The index line on the side of the search unit shall be within 1/16 inch of the mid-point of the graduated scale in either direction. Requalification is required after 40 hours or as otherwise stated.

1.10.3.7 Transducer Angle

The established exit point of the probe shall be set over the applicable angle index line scribed on the 8-inch or 12-inch edge, as appropriate, of the primary standard. The gain shall be set to obtain a mid-screen first reflection from the 50 mm plexiglass-lined hole for search units up to 70 percent with the search unit placed on the 8-inch edge. Search units of large angles that have been approved specifically by the Contracting Officer shall be tested from the 12-inch edge using the 0.06 inch reference hole. The search unit shall be moved back and forth to maximize the first reflection. When the material to be inspected is not acoustically similar to the primary standard, the inspection angle shall be within plus or minus 2 degrees of the angle specified in the approved procedure. Requalification is required after 40 hours or as otherwise stated.

1.11 SENSITIVITY CALIBRATION OF LONGITUDINAL AND ANGLE WAVE SYSTEMS

Sensitivity calibration shall be done immediately after a change of operators and at least every 30 minutes thereafter as testing proceeds. Recalibration will be required after any power interruption, including a change of source, when the equipment is suspected of being in error, or after relocation of the jobsite. The 30-minute and relocation calibrations may coincide. The instrument shall be allowed to warm up before calibration is attempted. The instrument range and delay controls shall be adjusted to display signals from the reference hole in the primary (IIW block) or secondary standard (DSC or SC block or both) on the viewing screen for the range of distances to be inspected.

1.11.1 Calibration Procedure

The test instrument shall be calibrated as described below.

1.11.1.1 Longitudinal Wave

In calibrating with the primary standard, the transducer shall be positioned on the 4-inch edge for maximum reflection from the 0.06 inch reference hole. The gain shall be adjusted so that the first reflection is at 50 percent full scale. The top of that indication shall be marked on the CRT with a wax pencil or by other means. This establishes the standard

reference level. A point at 80 percent of the standard reference level shall be calculated and marked. This locates the reject/repair line. If a secondary standard is to be used in the inspection, the reject/repair line shall be established similarly. For the DSC block, the transducer shall be positioned on the 4-inch long surface and with the SC degrees sound entry point lines. Adjustment for loss of signal due to distance shall be compensated for as noted above.

1.11.1.2 Angle Wave

In calibrating with either the primary or secondary standard, the transducer shall be positioned on the same surfaces as in the case of the longitudinal wave system but over the sound entry point lines appropriate for the angle of the transducer to be used in the inspection. The gain shall be adjusted to give a first reflection that is 50 percent of full-scale response. The top of that indication shall be marked with a wax pencil or by other means. This establishes the standard reference level. A point at 80 percent of the standard reference level shall be calculated and marked. This locates the reject/repair line. Loss of signal shall be compensated as noted.

1.11.2 Calibration of the Secondary Standards

After adjusting the first reflection from the reference hole in the secondary standard to 50 percent full-scale response for a sheer or longitudinal wave inspection, a maximized reflection from the 0.06 inch reference hole in the primary standard shall be obtained without changing the gain setting. The gain setting shall be readjusted to obtain a 50 percent full-scale reflection and the readjusted setting shall be recorded as required by paragraph SUBMITTALS, SD-18, Records, to provide a basis for recalibration when the secondary standard is unavailable.

1.11.3 Equipment With a Calibrated Gain Control (Attenuator)

When a calibrated gain control attenuator is used, the transducer shall be positioned for a maximum reflection from the reference hole in the secondary standard representing approximately 1/2 the longest inspection distance. This reflection shall be adjusted to mid-scale by varying the gain control accordingly. The difference in decibels between this amplitude and the signal obtained from the first, second, and longest distance reflection obtainable on the secondary standard shall be measured. The differences shall be recorded and plotted on a curve to determine the necessary correction to the amplitude at the various inspection distances. A level of 80 percent of the primary level obtained from the corrected signal heights, is equivalent to the reject/repair line.

1.11.4 Equipment With Electronic Distance Compensation Circuitry

If the difference in amplitude between the first reflection and the reflection obtained from the maximum inspection distance is 1 dB or less, the instrument may be used as is. If not, the procedure used for equipment with a calibrated decibel control shall be used to determine the necessary correction to the reflections obtained at the various inspection distances. This characteristic of the equipment shall be re-examined on a monthly basis or as otherwise stated in paragraph EQUIPMENT QUALIFICATION REQUIREMENTS, and correction factors shall be modified accordingly.

1.11.5 Longitudinal Wave Distance-Amplitude Correction Curve

A distance-amplitude correction curve may be used instead of the calibrated gain control or the electronic circuitry for either the shear or longitudinal wave system as described below:

a. A shear wave distance-amplitude correction curve shall be constructed and drawn on the face of the cathode ray tube (CRT) for inspection of weldments in excess of 1-1/2 inch thick when the design of the test equipment permits. The reference hole in the secondary standard SC or DSC shall be used to construct the distance-amplitude correction curve for a minimum of three node points, 1, 2, and 3. The sensitivity of the instrument shall be adjusted to produce 50 percent full-scale response for the maximized primary reflection and the reject/repair line shall be constructed at 80 percent of the established distance-amplitude curve.

b. A longitudinal wave distance-amplitude correction curve shall be constructed and drawn on the face of the CRT when longitudinal waves are to be used in the inspection for material thicknesses exceeding 1 inch, if design of the test equipment permits. The reference hole in the secondary standard shall be used. Instrument sensitivity shall be adjusted to 50 percent full-scale of the maximized response from the reference hole at 1/2 maximum inspection distance. A reject/repair line shall be constructed at 80 percent of the established distance-amplitude curve. The reflection amplitudes to define this curve shall be taken from the faces of the secondary sensitivity standards which are 1 inch, 2-inch, and 1/2 maximum inspection distance, and the longest distance obtainable from the secondary standard, respectively, from the reference hole. When a correction curve cannot be drawn on the face of the CRT, one of the distance-amplitude correction methods noted above and submitted under the procedure description shall be applied in accordance with paragraph GENERAL REQUIREMENTS.

1.11.6 Longitudinal Wave Inspections Using Immersion Technique

The reference hole in a secondary standard shall be used for each different inspection distance. Repair/reject limits shall be established by immersing both the search unit and secondary standard in the liquid bath in which the inspection is to be conducted. The procedure noted below shall be used:

a. The longitudinal waves from the search unit shall be directed toward the face of the secondary standard closest to the reference hole.

b. The search unit shall be positioned for maximum response. The amplitude of reflection shall be adjusted to 50 percent full-scale. The top of that indication shall be marked on the CRT with a wax pencil or by other means. This establishes the standard reference level. A point at 80 percent of the standard reference level shall be calculated and marked. This locates the reject/repair point. The above shall be repeated for each different surface-to-hole distance to establish the reject/repair line.

c. With the gain at the same setting and the primary standard and search unit in air, a maximized reflection shall be obtained from the 0.06 inch reference hole in the primary standard (IIW). Then, this gain setting shall be readjusted to obtain a 50 percent full-scale reflection. The readjusted setting shall be recorded as required by paragraph SUBMITTALS, SD-18 Records, to provide a basis for recalibration when the secondary standard is unavailable.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 PREPARATION OF MATERIALS FOR INSPECTION

Surfaces shall be free from the following:

3.1.1 Weld Spatter

Spattering or any roughness that interferes with free movement of the search unit or impairs transmission of the ultrasonic vibrations.

3.1.2 Irregularities

Those which could mask or be confused with defect indications.

3.1.3 Weld Backing Strips

Strips that are not to remain in place shall be removed and all sharp edges and valleys shall be eliminated by grinding or other mechanical means.

3.1.4 Dirt

All loose scale, rust, paint, and dirt shall be removed from the coupling surface.

3.2 INSPECTION PROCEDURE

When possible, all welds shall be examined from both sides of the weld and from one surface. If complete inspection cannot be accomplished from one surface, inspection shall be made from another surface that is part of the same joint. Preliminary scanning techniques using an increased instrument gain shall be used to locate possible defects. When possible, gain shall be increased to a minimum of twice (6 dB) the reference level setting. Final acceptance or rejection shall be evaluated with the equipment properly calibrated and the gain control set at the reference level. The reject/repair line shall be used to evaluate quality of the weld. If a periodic calibration check shows that the equipment is not operating properly or that the system's sensitivity has decreased more than 20 percent (2 dB) from the established sensitivity level, all welds inspected since the prior calibration shall be reexamined. If penetration of the shear waves is questionable, the angle search unit shall be placed in position on one side of the weldment with the waves directed through the weldment. A disconnected angle search unit, plastic or metal wedge or disk, or any good reflector shall be placed in the wave path of the search unit on the far side of the weld to reflect the sound. When good reflections cannot be obtained by either shear or longitudinal waves, the Contractor shall modify the procedures in accordance with paragraph GENERAL REQUIREMENTS.

3.2.1 Test Frequency

The test frequency for ferrous materials shall be as specified in AWS D1.1, Section Inspection, subsection Ultrasonic Equipment, except for thicknesses below 1/2 inch, frequencies between 2.25 and 5 MHz may be used to obtain increased sensitivity. For materials that are difficult to penetrate, any frequency within the operating range of the equipment may be used. The effective depth of penetration and sound beam divergency shall be demonstrated to the Contracting Officer.

3.2.2 Couplants

The choice of couplant is optional with the Contractor, except as follows:

a. The couplant shall be the same as that used for equipment qualification and calibration.

b. Couplants that may corrode the reference standards and material being tested or leave objectionable residues shall not be used.

c. Oils shall not be used in systems intended to handle liquid oxygen.

d. Couplants shall be of the proper viscosity to give good coupling for the surface roughness.

3.2.3 Shear Wave Inspection

Shear wave inspection shall be performed as follows: The search unit shall be placed on the contact surface at a distance from the weld equal to that used when calibrating the equipment.

3.2.4 Longitudinal Flaws

To detect longitudinal flaws, the search unit shall be slowly moved toward and away from the weld far enough to cover its entire cross section, approximately 90 degrees to the weld centerline. The search unit shall be radially oscillated to the left and right, covering an angle of approximately 30 degrees. During the foregoing movement, the search unit shall be continually advanced parallel to the weld centerline. The rate of movement shall depend on the operator's ability to clearly see and identify all reflections. The amount of movement shall be calculated to ensure that the inspection distance will be great enough to traverse the weld.

3.2.5 Transverse Flaws

To detect transverse flaws when the welded surface is ground flush, the search unit shall be moved along the welded surface in each direction parallel to the centerline of the weld metal with the wave radiating parallel to the weld centerline. To detect transverse flaws when the welded surface is not ground flush, the search unit shall be moved parallel to the weld in each direction, on the adjacent base metal at the top of the weld, with the wave directed at an angle of 30 degrees to the weld centerline.

3.2.6 Longitudinal Wave Inspection

This inspection shall be made as follows:

a. The search unit shall be placed on the contact surface with the wave directed in a straight line through any intervening base metal and through the weldment.

b. The search unit shall then be moved slowly in a direction parallel to the weld centerline and zigzagged across an area equivalent to the welded thickness to make sure that waves penetrate the entire welded cross section.

c. The rate of movement shall be dependent on the operator's ability

to clearly see and identify all reflections.

3.3 GENERAL ACCEPTANCE/REJECTION REQUIREMENTS

Discontinuities shall be evaluated only when the ultrasonic equipment is calibrated properly. If discontinuities are detected, the sound beam shall be directed to maximize the signal amplitude. To determine the length of a discontinuity, the search unit shall be moved parallel to the discontinuity axis in both directions from the position of maximum signal amplitude. One-half the amplitude or a 6-dB increase in sensitivity from a point at which the discontinuity signal drops rapidly to the baseline shall be defined as the extremity of the discontinuity. At this point, the scanning surface shall be marked at the position indicated by the center of the transducer. This shall be repeated to determine the other extremity. The length of the discontinuity shall be defined as the distance between these two marks. For discontinuities with signal amplitudes exceeding full screen height, 50 percent of full screen shall be considered half-peak amplitude. At this point, the scanning surface shall be marked at the position indicated by the center of the transducer. This shall be repeated to determine the other extremity. The length of the discontinuity shall be defined as the distance between these two marks. The maximum signal amplitude, length, depth, and position within the inspection zone shall be determined and reported for discontinuities yielding a signal amplitude equal to or exceeding the reject/repair line. The minimum recordable length of a discontinuity shall be 1/8 inch. When evaluating welds joining two members with different thicknesses at the weld, the thickness T shall be the lesser of the two thicknesses. The criteria for acceptance or rejection based on ultrasonic inspection will supplement a visual inspection. The sizes and surface conditions of the welds shall conform to the requirements indicated on the applicable plans and drawings and other sections of the specification. When ultrasonic inspection is used along with radiography, the limits specified under paragraph REFERENCE STANDARDS FOR EQUIPMENT, QUALIFICATIONS, AND CALIBRATION shall supplement the radiographic standards.

3.3.1 Investigation of Questionable Indications

An indication considered doubtful shall be brought to the attention of the Contracting Officer and, at the Contractor's option, the weld shall be repaired or investigated further. Indications detected within 3/8 inch of accessible surfaces shall be investigated further using liquid penetrant in accordance with ASTM E 165 or magnetic particle methods in accordance with ASTM E 709, as applicable, to determine if the surface is penetrated. Failure to locate the flaws by one of these methods shall necessitate further investigation by the other. For nonmagnetic materials, only dye penetrant inspection is required. Other questionable defects shall be further investigated using modifications of the inspection procedure in accordance with paragraph GENERAL REQUIREMENTS.

3.3.2 Inspection of Repairs

All repairs shall undergo the same inspection procedure that originally revealed the discontinuities. Before acceptance, the welds shall meet the standards required for the original weld.

3.4 ACCEPTANCE/REJECTION LIMITS

Welds shall be accepted or rejected by ultrasonic indication in accordance with the following:

3.4.1 Full Penetration Butt Joints and Corner Joints

3.4.1.1 Class I

Welds shall be rejected on the basis of the following:

a. Any evidence of a crack, including any revealed by dye penetrant or magnetic particle in accordance with paragraph GENERAL ACCEPTANCE/ REJECTION REQUIREMENTS.

b. Any indication of a discontinuity such as excessive undercutting, lack of fusion, incomplete penetration, inclusions, or porosity which individually or collectively produce reflections equal to or greater than the established reject/repair line.

c. Any discontinuity with a reflection equal to or exceeding 25 percent of the reject/repair line, up to and including the reject/repair line, shall be rejected where the discontinuity length exceeds 1/2 T or 1 inch.

d. Adjacent discontinuities separated by sound metal with the dimension less than twice the length of the longest discontinuity shall be considered a single discontinuity. The maximum distance between the outer extremities of any two such discontinuities or the sum of their lengths, whichever is greater, shall not exceed the limits specified.

e. If the total cumulative length of the discontinuities in any 12 inches of weld length exceeds T, that weld length shall be rejected.

3.4.1.2 Class II

Welds shall be rejected on the basis of the following:

a. Any evidence of a crack, including those revealed by dye penetrant or magnetic particle inspection in accordance with paragraph GENERAL ACCEPTANCE/REJECTION REQUIREMENTS.

b. Any discontinuity with a reflection exceeding the established reject/repair line and with a length exceeding 1/4 inch. Adjacent discontinuities separated by sound metal with the dimension less than twice the length of the longest discontinuity shall be considered a single discontinuity.

c. Any discontinuity with a reflection greater than or equal to or 50 percent of the reject/repair line, up to and including the reject/repair line, shall be rejected if the discontinuity length exceeds T. In no case shall any single discontinuity length exceed 1-1/2 inches.

d. Adjacent discontinuities separated by sound metal with the dimension less than twice the length of the longest discontinuity shall be considered a single discontinuity. The maximum distance between the outer extremities of any two adjacent discontinuities or the sum of their lengths, whichever is greater, shall not exceed the length as specified above.

e. If the total cumulative length of discontinuities in any 12 inches of weld length exceeds 2 T, that weld length shall be rejected.

3.4.1.3 Class III

Welds shall be rejected on the basis of the following:

a. Any discontinuity with a reflection exceeding the established reject/repair line and with a length exceeding 1/2 inch. Adjacent discontinuities separated by sound metal with a dimension less than twice the length of the longest discontinuity shall be considered a single discontinuity.

b. Any discontinuity with a reflection greater than or equal to 50 percent of the reject/repair line, or with the level 8 dB more than the reject/repair line, and with a length (L) exceeding 2 inches or LT, whichever is greater.

c. If the total cumulative length of discontinuities in any 12 inches of weld length exceeds 3 inches or 2 T, whichever is greater, that weld length shall be rejected.

3.4.2 Full Penetration Tee Joints

Full Penetration Tee Joints (for Incomplete Root Penetration): Any discontinuity with the reflection exceeding the established reject/repair line of the applicable class shall be rejected. Any discontinuity with a reflection exceeding 25 percent of the established reject/repair line, up to and including the reject/repair line, shall be rejected if its length exceeds 1/2 T in a direction transverse to the axis of the weld or LT parallel to the axis for all classes. If the total cumulative length of discontinuities in any 12 inches of weld length exceeds the limits of the applicable class, that weld length shall be rejected.

3.4.3 Partial and Full Penetration Tee Joints

Partial and Full Penetration Tee Joint Boundaries: The depth of weld penetration and weld cross section width at the through member surface shall be as indicated by applicable plans or drawings. Limits of discontinuities shall be as specified in preceding paragraphs.

3.4.4 Tee Joint Discontinuities

Tee joint discontinuities extending into the through member shall be rejected if reflection exceeds the established reject/repair line.

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SECTION 05093A

WELDING PRESSURE PIPING
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PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

ASNT RP SNT-TC-1A	(1996) Recommended Practice SNT-TC-1A
ASNT Q&A Bk A	(1996) Question and Answer Book A: Radiographic Test Method; Levels I, II, III (Supplement to Recommended Practice SNT-TC-1A)

ASME INTERNATIONAL (ASME)

ASME B31.1	(1998) Power Piping
ASME BPVC SEC I	(1998) Boiler and Pressure Vessel Code; Section I, Power Boilers
ASME BPVC SEC II-C	(1998) Boiler and Pressure Vessel Code; Section II, Materials, Part C - Specifications for Welding Rods, Electrodes and Filler Metals
ASME BPVC SEC V	(1998) Boiler and Pressure Vessel Code; Section V, Nondestructive Examination
ASME BPVC SEC IX	(1998) Boiler and Pressure Vessel Code; Section IX, Welding and Brazing Qualifications

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(1998) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS A3.0	(1994) Standard Welding Terms and Definitions
AWS B2.1	(1998) Welding Procedure and Performance Qualification
AWS QC1	(1996) AWS Certification of Welding Inspectors

AWS Z49.1 (1999) Safety in Welding and Cutting and Allied Processes

1.2 DEFINITIONS

Definitions shall be in accordance with AWS A3.0.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Pressure Piping; G, ED

Detail drawings showing location, length, and type of welds; and indicating postweld heat treatment and NDE as required.

SD-03 Product Data

Qualifications; G, RE

Welding procedure qualification.

Welding Operations; G, RE

Detailed procedures which define methods of compliance to contract drawings and specifications. Inspection and material procurement records. System and material testing and certification records. Written records and drawings indicating location of welds made by each welder or welding operator.

SD-07 Certificates

Qualifications; G, RE

Welder and welding operator performance qualification certificates. Welding inspectors and NDE personnel certificates. Qualifications of testing laboratory or the Contractor's quality assurance organization.

1.4 GENERAL REQUIREMENTS

This section covers the welding of pressure piping systems. Deviations from applicable codes, approved procedures, and approved detail drawings will not be permitted without prior written approval. Materials or components with welds made offsite will not be accepted if the welding does not conform to the requirements of this specification, unless otherwise specified. Procedures shall be developed by the Contractor for welding all metals included in the work. Welding shall not be started until welding procedures, welders, and welding operators have been qualified. Qualification testing shall be performed by an approved testing laboratory, or by the Contractor if approved by the Contracting Officer. Costs of such testing shall be borne by the Contractor. The Contracting Officer shall be

notified at least 24 hours in advance of the time and place of the tests. When practicable, the qualification tests shall be performed at or near the worksite. The Contractor shall maintain current records of the test results obtained in the welding procedure, welding operator, welder performance qualifications, and nondestructive examination (NDE) procedures readily available at the site for examination by the Contracting Officer. The procedures for making transition welds between different materials or between plates or pipes of different wall thicknesses shall be qualified. ASME B31.1 requirements for branch connections may be used in lieu of detailed designs. Unless otherwise specified, the choice of welding process shall be the responsibility of the Contractor.

1.5 PERFORMANCE

The Contractor shall be responsible for the quality of all joint preparation, welding, and examination. All materials used in the welding operations shall be clearly identified and recorded. The inspection and testing defined in this specification are minimum requirements. Additional inspection and testing shall be the responsibility of the Contractor when he deems it necessary to achieve the quality required.

1.6 QUALIFICATIONS

Welding procedures, welders, and welding operators previously qualified by test may be accepted for the work without requalification, provided that all of the following conditions are fulfilled:

a. Copies of the welding procedures, the procedure qualification test records, and the welder and welding operator performance qualification test records are submitted and approved in accordance with paragraph SUBMITTALS.

b. Testing was performed by an approved testing laboratory or technical consultant or by the Contractor's approved quality assurance organization.

c. The welding procedures, welders, and welding operators were qualified in accordance with ASME BPVC SEC IX, or AWS B2.1, AR-2 level; and base materials, filler materials, electrodes, equipment, and processes conformed to the applicable requirements of this specification.

d. The requirements of paragraph "Renewal of Qualification" below are met and records showing name of employer and period of employment using the process for which qualified are submitted as evidence of conformance.

1.6.1 Welding Procedures Qualification

The Contractor shall record in detail and shall qualify the Welding Procedure Specifications for every proposed welding procedure. Qualification for each welding procedure shall conform to the requirements of ASME B31.1 and to this specification. The welding procedures shall specify end preparation for butt welds including cleaning, alignment, and root openings. Preheat, interpass temperature control, and postheat treatment of welds shall be as required by approved welding procedures, unless otherwise indicated or specified. The type of backing rings or consumable inserts, if used, shall be described and if they are to be removed, the removal process shall be described. Copies of the welding

procedure specifications and procedure qualification test results for each type of welding required shall be submitted in accordance with paragraph SUBMITTALS. Approval of any procedure does not relieve the Contractor of the sole responsibility for producing acceptable welds. Welding procedures shall be identified individually and shall be referenced on the detail drawings or keyed to the contract drawings.

1.6.2 Welder and Welding Operator Performance

Each welder and welding operator assigned to work shall be qualified in accordance with ASME B31.1.

1.6.2.1 Certification

Before assigning welders or welding operators to the work, the Contractor shall provide the Contracting Officer with their names together with certification that each individual is performance-qualified as specified. The certification shall state the type of welding and positions for which each is qualified, the code and procedure under which each is qualified, date qualified, and the firm and individual certifying the qualification tests.

1.6.2.2 Identification

Each particular weld shall be identified with the personal number, letter, or symbol assigned to each welder or welding operator. To identify welds, written records indicating the location of welds made by each welder or welding operator shall be submitted, and each welder or welding operator shall apply the personal mark adjacent to the welds using a rubber stamp or felt-tipped marker with permanent, weatherproof ink or other methods approved by the Contracting Officer that do not deform the metal. For seam welds, identification marks shall be placed adjacent to the welds at 3 foot intervals. Identification by die stamps or electric etchers will not be allowed.

1.6.2.3 Renewal of Qualification

Requalification of a welder or welding operator shall be required under any of the following conditions:

a. When a welder or welding operator has not used the specific welding process for a period of 3 months; the period may be extended to 6 months if the welder or welding operator has been employed on some other welding process.

b. When a welder or welding operator has not welded with any process during a period of 3 months, all the personal qualifications shall be considered expired, including any extended by virtue of a., above.

c. There is specific reason to question the person's ability to make welds that will meet the requirements of the specifications.

d. The welder or welding operator was qualified by an employer, other than those firms performing work under this contract, and a qualification test has not been taken within the preceding 12 months.

e. Renewal of qualification for a specific welding process under

conditions a., b., and d., above, needs to be made on only a single test joint or pipe of any thickness, position, or material to reestablish the welder's or welding operator's qualification for any thickness, position, or material covered under previous qualification.

1.6.3 Inspection and NDE Personnel

All inspection and NDE personnel shall be qualified in accordance with the following requirements.

1.6.3.1 Inspector Certification

Welding inspectors shall be qualified in accordance with AWS QC1.

1.6.3.2 NDE Personnel

NDE personnel shall be certified, and a written procedure for the control and administration of NDE personnel training, examination, and certification shall be established. The procedures shall be based on appropriate specific and general guidelines of training and experience recommended by ASNT RP SNT-TC-1A and ASNT Q&A Bk A.

1.7 DELIVERY, STORAGE, AND HANDLING

All filler metals, electrodes, fluxes, and other welding materials shall be delivered to the site in manufacturers' original packages and stored in a dry space until used. Packages shall be properly labeled and designed to give maximum protection from moisture and to insure safe handling.

1.7.1 Material Control

Materials shall be stored in a controlled access and clean, dry area that is weathertight and is maintained at a temperature recommended by the manufacturer. The materials shall not be in contact with the floor and shall be stored on wooden pallets or cribbing.

1.7.1.1 Damaged Containers

Low-hydrogen steel electrodes shall be stored in their sealed shipping container. If the seal is damaged during shipment or storage, and the damage is not immediately detected, the covered electrodes in that container shall be rebaked in accordance with the manufacturer's instructions prior to issuance or shall be discarded. If a container is damaged in storage and the damage is witnessed, the electrodes from that container shall be immediately placed in a storage oven. The storage oven temperature shall be as recommended by the manufacturer or the welding material specification.

1.7.1.2 Partial Issues

When a container of covered electrodes is opened and only a portion of the content is issued, the remaining portion shall, within 1/2 hour, be placed in a storage oven.

1.7.2 Damaged Materials

Materials which are damaged shall be discarded. Covered electrodes which are oil or water-soaked, dirty, or on which the flux has separated from the

wire shall be discarded.

1.8 SYMBOLS

Symbols shall be in accordance with AWS A2.4.

1.9 SAFETY

Safety precautions shall conform to AWS Z49.1.

PART 2 PRODUCTS

2.1 WELDING MATERIALS

Welding materials shall comply with ASME BPVC SEC II-C. Welding equipment, electrodes, welding wire, and fluxes shall be capable of producing satisfactory welds when used by a qualified welder or welding operator using qualified welding procedures.

PART 3 EXECUTION

3.1 WELDING OPERATIONS

Welding shall be performed in accordance with qualified procedures using qualified welders and welding operators. Welding shall not be done when the quality of the completed weld could be impaired by the prevailing working or weather conditions. The Contracting Officer shall determine when weather or working conditions are unsuitable for welding. Welding of hangers, supports, and plates to structural members shall conform to Section 05090 WELDING, STRUCTURAL.

3.1.1 Base Metal Preparation

Oxy-fuel cutting shall not be used on austenitic stainless steel or nonferrous materials.

3.1.2 Weld Joint Fit-Up

Parts that are to be joined by welding shall be fitted, aligned, and retained in position during the welding operation by the use of bars, jacks, clamps, or other mechanical fixtures. Welded temporary attachments shall not be used except when it is impractical to use mechanical fixtures. When temporary attachments are used, they shall be the same material as the base metal, and shall be completely removed by grinding or thermal cutting after the welding operation is completed. If thermal cutting is used, the attachment shall be cut to not less than 1/4 inch from the member and the balance removed by grinding. After the temporary attachment has been removed, the area shall be visually examined.

3.1.3 Preheat and Interpass Temperatures

Preheat temperatures shall meet the requirements specified by ASME B31.1. However, in no case shall the preheat be below 50 degrees F for ferritic steel or austenitic stainless steel, or 32 degrees F for nonferrous alloys. The maximum interpass temperatures shall not exceed 300 degrees F for austenitic stainless steels, nickel alloys, and copper alloys; and 500 degrees F for carbon steels. Preheat techniques shall be such as to ensure that the full thickness of the weld joint preparation and/or adjacent base material, at least 3 inches in all directions, is at the specified

temperature. Preheating by induction or resistance methods is preferred. When flame heating is used, only a neutral flame shall be employed. Oxy-fuel heating shall not be used on austenitic stainless steel or nickel-alloy materials; however, air-fuel heating is acceptable if controlled to insure that the surface temperature does not exceed 150 degrees F. Interpass temperatures shall be checked on the surface of the component within 1 inch of the weld groove and at the starting location of the next weld pass, and for a distance of about 6 inches ahead of the weld, but not on the area to be welded.

3.1.4 Production Welding Instructions

a. Welding shall not be done when the ambient temperature is lower than 0 degree F.

b. Welding is not permitted on surfaces that are wet or covered with ice, when snow or rain is falling on the surfaces to be welded, or during periods of high winds, unless the welders and the work are properly protected.

c. Gases for purging and shielding shall be welding grade and shall have a dew point of minus 40 degrees F or lower.

d. Back purges are required for austenitic stainless steels and nonferrous alloys welded from one side and shall be set up such that the flow of gas from the inlet to the outlet orifice passes across the area to be welded. The oxygen content of the gas exiting from the purge vent shall be less than 2 percent prior to welding.

e. The purge on groove welds shall be maintained for at least three layers or 3/16 inch.

f. Removable purge dam materials shall be made of expandable or flexible plugs, such as plexiglass, plywood (which shall be dry when used), etc. Wood dams shall be kiln-dried quality. Nonremovable purge dams and purge dam adhesives shall be made of water soluble materials. Purge dams shall not be made of polyvinyl alcohol.

g. Any welding process which requires the use of external gas shielding shall not be done in a draft or wind unless the weld area is protected by a shelter. This shelter shall be of material and shape appropriate to reduce wind velocity in the vicinity of the weld to a maximum of 5 mph (440 fpm).

h. Welding of low-alloy and hardenable high-alloy steels may be interrupted provided a minimum of at least 3/8 inch thickness of weld deposit or 25 percent of the weld groove is filled, whichever is greater, and the preheat temperature is maintained during the time that welding is interrupted. If the temperature falls below the minimum preheat temperature before all welding has been completed on a joint, or, where required, before post weld heat treatment, a liquid penetrant or magnetic particle examination shall be performed to insure sound deposited metal before reheating. Welding of other materials may be interrupted without restriction provided a visual inspection is performed before welding is resumed.

i. Tack welds to be incorporated in the final welds shall have their ends tapered by grinding or welding technique. Tack welds that are cracked or defective shall be removed and the groove shall be retacked prior to welding. Temporary tack welds shall be removed, the surface ground smooth, and visually inspected. For low-alloy and hardenable high-alloy steels, the area shall be magnetic particle examination inspected.

j. When joining ferritic steel pressure piping components to austenitic stainless steel pressure piping components and postweld heat treatment is required, the following requirements apply:

(1) The weld-end preps of ferritic steel components, which are to be welded to austenitic stainless steel, shall be buttered with one of the following weld filler metals and shall conform to the specified requirements:

ASME BPVC SEC II-C, SFA 5.14, Classification ERNiCr-3.

ASME BPVC SEC II-C, SFA 5.11, Classification ENiCrFe-2.

(2) The ferritic steel weld-end prep shall be buttered, receive a postweld heat treatment as required by ASME B31.1 and then be machined with the applicable weld-end preparation. After machining, the buttered layer shall be a minimum of 1/4 inch thick.

(3) Pressure piping transition joints shall be completed using ERNiCr-3 or ENiCrFe-2 weld filler metals. No further postweld heat treatment shall be performed.

k. When joining ferritic steel pressure piping components to austenitic stainless steel pressure piping components and postweld heat treatment is not required, prepare and weld the joint using either ERNiCr-3 or ENiCrFe-2 filler metals. For service temperatures of 200 degrees F or less, stainless filler metal 309 ASME BPVC SEC II-C, SFA 5.4 or 5.9 is permissible in lieu of the nickel-based alloys.

l. Grinding of completed welds is to be performed only to the extent required for NDE, including any inservice examination, and to provide weld reinforcement within the requirements of ASME B31.1. If the surface of the weld requires grinding, reducing the weld or base material below the minimum required thickness shall be avoided. Minimum weld external reinforcement shall be flush between external surfaces.

3.1.5 Postweld Heat Treatment

Postweld heat treatment shall be performed in accordance with ASME B31.1. Temperatures for local postweld heat treatment shall be measured continuously by thermocouples in contact with the weldment.

Postweld heat treatment of low-alloy steels, when required, shall be performed immediately upon completion of welding and prior to the temperature of the weld falling below the preheat temperature. However, postweld heat treatment may be postponed after the completion of the weld, if, immediately after the weld is completed, it is maintained at a minimum temperature of 300 degrees F or the preheat temperature, whichever is greater, for 2 hours per inch of weld thickness.

For low-alloy steels, the cooling rates shall be such that temper embrittlement is avoided.

3.2 EXAMINATIONS, INSPECTIONS, AND TESTS

The services of a qualified commercial inspection or testing laboratory or technical consultant, approved by the Contracting Officer, shall be employed by the Contractor. All tack welds, weld passes, and completed welds shall be visually inspected. When inspection and testing indicates defects in a weld joint, the weld shall be repaired by a qualified welder in accordance with paragraph CORRECTIONS AND REPAIRS.

TABLE I. MANDATORY MINIMUM NONDESTRUCTIVE EXAMINATIONS

Type Weld	Piping Service Conditions and Nondestructive Test
	All others.
Butt Welds (Girth and Longitudinal)	Visual for all sizes and thicknesses.
Welded Branch Connections (Size indicated is branch size) (See Note 7)	Visual for all sizes and thicknesses.
Fillet, Socket Attachment and Seal Welds	Visual for all sizes and thicknesses.

NOTES TO TABLE I

(1) All welds must be given a visual examination in addition to type of specific nondestructive examination specified.

(2) NPS - nominal pipe size.

(3) RT - Radiographic examination; MT - magnetic particle examination; PT - liquid penetrant examination.

(4) RT of branch welds shall be performed before any nonintegral reinforcing material is applied.

(5) The thickness of butt welds is defined as the thicker of the two abutting ends after end preparation.

(6) Temperatures and pressures shown are design.

(7) In lieu of radiography of welded branch connections when required above, liquid penetrant or magnetic particle examination

is acceptable and, when used, shall be performed at the lesser of one half of the weld thickness or each 1/2 inch of weld thickness and all accessible final weld surfaces.

(8) For nondestructive examination of the pressure retaining component, refer to the standards listed in applicable code or the manufacturing specifications.

(9) Fillet welds not exceeding 1/4 inch throat thickness which are used for the permanent attachment of nonpressure retaining parts are exempt from the PT or MT requirements of the above table.

3.2.1 Random NDE Testing

When random radiographic or ultrasonic examination is required, the Contractor shall test a minimum of 10 percent of the total length or number of piping welds. The welds inspected shall be selected randomly, but the selection shall include an examination of welds made by each welding operator or welder. If the random testing reveals that any welds fail to meet minimum quality requirements, an additional 10 percent of the welds in that same group shall be inspected. If all of the additional welds inspected meet the quality requirements, the entire group of welds represented shall be accepted and the defective welds shall be repaired. If any of the additional welds inspected also fail to meet the quality requirements, that entire group of welds shall be rejected. The rejected welds shall be removed and rewelded, or the rejected welds shall be 100 percent inspected and all defective weld areas removed and rewelded.

3.2.2 Visual Inspection

Weld joints shall be inspected visually as follows:

a. Before welding - for compliance with requirements for joint preparation, placement of backing rings or consumable inserts, alignment and fit-up, and cleanliness.

b. During welding - for cracks and conformance to the qualified welding procedure.

c. After welding - for cracks, contour and finish, bead reinforcement, undercutting, overlap, and size of fillet welds.

3.2.3 NDE Testing

NDE shall be in accordance with written procedures. Procedures for radiographic or ultrasonic tests and methods shall conform to ASME BPVC SEC V. The approved procedure shall be demonstrated to the satisfaction of the Contracting Officer. In addition to the information required in ASME BPVC SEC V, the written procedures shall include the timing of the NDE in relation to the welding operations and safety precautions.

3.3 ACCEPTANCE STANDARDS

3.3.1 Visual

The following indications are unacceptable:

a. Cracks.

b. Undercut on surface which is greater than 1/32 inchdeep.

c. Weld reinforcement greater than 3/16 inch.

d. Lack of fusion on surface.

e. Incomplete penetration (applies only when inside surface is readily accessible).

f. Convexity of fillet weld surface greater than 10 percent of longest leg plus 0.03 inch.

g. Concavity in groove welds.

h. Concavity in fillet welds greater than 1/16 inch.

i. Fillet weld size less than indicated or greater than 1-1/4 times the minimum indicated fillet leg length.

3.3.2 Magnetic Particle Examination

The following relevant indications are unacceptable:

a. Any cracks and linear indications.

b. Rounded indications with dimensions greater than 3/16 inch.

c. Four or more rounded indications in a line separated by 1/16 inch or less edge-to-edge.

d. Ten or more rounded indications in any 6 square inches of surface with the major dimension of this area not to exceed 6 inches with the area taken in the most unfavorable location relative to the indications being evaluated.

3.3.3 Omitted

3.3.4 Radiography

Welds that are shown by radiography to have any of the following discontinuities are unacceptable:

a. Porosity in excess of that shown as acceptable in ASME BPVC SEC I, Appendix A-250.

b. Any type of crack or zone of incomplete fusion or penetration.

c. Any other elongated indication which has a length greater than:

(1) 1/4 inch for t up to 3/4 inchinclusive, where t is the thickness of the thinner portion of the weld.

(2) 1/3 t for t from 3/4 inch to 2-1/4 inch, inclusive.

(3) 3/4 inch for t over 2-1/4 inch.

d. Any group of indications in line that have an aggregate length greater than t in a length of 12t, except where the distance between the successive indications exceeds 6L where L is the

longest indication in the group.

Where t pertains to the thickness of the weld being examined; if a weld joins two members having different thickness at the weld, t is the thinner of these two thicknesses.

3.3.5 Ultrasonic Examination

Linear-type discontinuities are unacceptable if the amplitude exceeds the reference level and discontinuities have lengths which exceed the following:

a. 1/4 inch for t up to 3/4 inch.

b. 1/3 inch for t from3/4 to 2-1/4 inch.

c. 3/4 inch for t over 2-1/4 inch.

Where t is the thickness of the weld being examined; if the weld joins two members having different thicknesses at the weld, t is the thinner of these two thicknesses. Where discontinuities are interpreted to be cracks, lack of fusion, and incomplete penetration, they are unacceptable regardless of length.

3.4 CORRECTIONS AND REPAIRS

Defects shall be removed and repaired as specified in ASME B31.1, unless otherwise specified. Disqualifying defects discovered between weld passes shall be repaired before additional weld material is deposited. Wherever a defect is removed, and repair by welding is not required, the affected area shall be blended into the surrounding surface eliminating sharp notches, crevices, or corners. After defect removal is complete and before rewelding, the area shall be examined by the same test method which first revealed the defect to ensure that the defect has been eliminated. After rewelding, the repaired area shall be reexamined by the same test method originally used for that area. Any indication of a defect shall be regarded as a defect unless reevaluation by NDE or by surface conditioning shows that no disqualifying defects are present. The use of any foreign material to mask, fill in, seal, or disguise welding defects will not be permitted.

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SECTION 05120A

STRUCTURAL STEEL
01/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC ASD Manual	(1989) Manual of Steel Construction Allowable Stress Design
AISC ASD/LRFD Vol II	(1992) Manual of Steel Construction Vol II: Connections
AISC Design Guide No. 10	(1989) Erection Bracing of Low-Rise Structural Steel Frames
AISC FCD	(1995a) Quality Certification Program
AISC LRFD Vol II	(1995) Manual of Steel Construction Load & Resistance Factor Design, Vol II: Structural Members, Specifications & Codes
AISC S303	(2000) Code of Standard Practice for Steel Buildings and Bridges

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 242/A 242M	(2000) High-Strength Low-Alloy Structural Steel
ASTM A 307	(2000) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 325	(2000) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 36/A 36M	(2000a) Carbon Structural Steel
ASTM A 490	(2000) Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength
ASTM A 500	(1999) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 514/A 514M	(2000) High-Yield-Strength, Quenched and

	Tempered Alloy Steel Plate, Suitable for Welding
ASTM A 529/A 529M	(2000) High-Strength Carbon-Manganese Steel of Structural Quality
ASTM A 563	(2000) Carbon and Alloy Steel Nuts
ASTM A 572/A 572M	(2000a) High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 588/A 588M	(2000a) High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4 in. (100 mm) Thick
ASTM A 6/A 6M	(2001) General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A 709/A 709M	(2000) Carbon and High-Strength Low-Alloy Structural Steel Shapes, Plates, and Bars and Quenched-and-Tempered Alloy Structural Steel Plates for Bridges
ASTM A 852/A 852M	(2000) Quenched and Tempered Low-Alloy Structural Steel Plate with 70 ksi (485 MPa) Minimum Yield Strength to 4 in. (100 mm) Thick
ASTM A 992/A 992M	(2000) Steel for Structural Shapes For Use in Building Framing
ASTM F 844	(2000) Washers, Steel, Plain (Flat), Unhardened for General Use

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(1998) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS D1.1	(2000) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME B18.21.1	(1999) Lock Washers (Inch Series)
ASME B46.1	(1995) Surface Texture (Surface Roughness, Waviness, and Lay)

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 25	(1991) Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments)

1.2 GENERAL REQUIREMENTS

Structural steel fabrication and erection shall be performed by an

organization experienced in structural steel work of equivalent magnitude. The Contractor shall be responsible for correctness of detailing, fabrication, and for the correct fitting of structural members. Connections, for any part of the structure not shown on the contract drawings, shall be considered simple shear connections and shall be designed and detailed in accordance with pertinent provisions of AISC ASD Manual and AISC LRFD Vol II. Substitution of sections or modification of connection details will not be accepted unless approved by the Contracting Officer. AISC ASD Manual and AISC ASD/LRFD Vol II shall govern the work. Welding shall be in accordance with AWS D1.1; except that welding for critical applications shall be in accordance with Section 05090 WELDING, STRUCTURAL or paragraph WELDING. High-strength bolting shall be in accordance with AISC ASD Manual.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Structural Steel System; G, ED
Structural Connections; G, ED

Shop and erection details including members (with their connections) not shown on the contract drawings. Welds shall be indicated by standard welding symbols in accordance with AWS A2.4.

SD-03 Product Data

Erection; G, RE

Prior to erection, erection plan of the structural steel framing describing all necessary temporary supports, including the sequence of installation and removal.

Welding; G, RE

WPS not prequalified.

SD-04 Samples

High Strength Bolts and Nuts
Carbon Steel Bolts and Nuts
Nuts Dimensional Style
Washers

Random samples of bolts, nuts, and washers as delivered to the job site if requested, taken in the presence of the Contracting Officer and provided to the Contracting Officer for testing to establish compliance with specified requirements.

SD-07 Certificates

Mill Test Reports

Certified copies of mill test reports for structural steel, structural bolts, nuts, washers and other related structural steel items, including attesting that the structural steel furnished contains no less than 25 percent recycled scrap steel and meets the requirements specified, prior to the installation.

Welder Qualifications

Certified copies of welder qualifications test records showing qualification in accordance with AWS D1.1.

Welding Inspector

Welding Inspector qualifications.

Fabrication; G, RE

A copy of the AISC certificate indicating that the fabrication plant meets the specified structural steelwork category.

1.4 STORAGE

Material shall be stored out of contact with the ground in such manner and location as will minimize deterioration.

1.5 WELDING INSPECTOR

Welding Inspector qualifications shall be in accordance with AWS D1.1

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL

2.1.1 Carbon Grade Steel

Carbon grade steel shall conform to ASTM A 36/A 36M or ASTM A 529/A 529M.

2.1.2 High-Strength Low-Alloy Steel

High-strength low-alloy steel shall conform to ASTM A 572/A 572M, Grade 50.

2.1.3 Corrosion-Resistant High-Strength Low-Alloy Steel

Corrosion-resistant steel shall conform to ASTM A 242/A 242M or ASTM A 588/A 588M.

2.1.4 Quenched and Tempered Alloy Steel

Tempered alloy steel shall conform to ASTM A 514/A 514M.

2.1.5 Carbon and High-Strength Low-Alloy Steel

Carbon and high-strength low-alloy steel shall conform to ASTM A 709/A 709M.

2.1.6 Quenched and Tempered Low-Alloy Steel

Quenched and tempered low-alloy steel shall conform to ASTM A 852/A 852M, 70 ksi.

2.1.7 Structural Shapes for Use in Building Framing

Wide flange shapes in accordance with ASTM A 992/A 992M shall be used where indicated on the drawings.

2.2 STRUCTURAL TUBING

Structural tubing shall conform to ASTM A 500, Grade B.

2.3 OMITTED
2.4 OMITTED

2.5 HIGH STRENGTH BOLTS AND NUTS

High strength bolts shall conform to ASTM A 325, Type 1 with carbon steel nuts conforming to ASTM A 563, Grade C.

2.6 CARBON STEEL BOLTS AND NUTS

Carbon steel bolts shall conform to ASTM A 307, Grade A with carbon steel nuts conforming to ASTM A 563, Grade A.

2.7 NUTS DIMENSIONAL STYLE

Carbon steel nuts shall be Heavy Hex style when used with ASTM A 307 bolts or Heavy Hex style when used with ASTM A 325 or ASTM A 490 bolts.

2.8 WASHERS

Plain washers shall conform to ASTM F 844. Other types, when required, shall conform to ASME B18.21.1.

2.9 PAINT

Paint shall conform to SSPC Paint 25.

PART 3 EXECUTION

3.1 FABRICATION

Fabrication shall be in accordance with the applicable provisions of AISC ASD Manual. Fabrication and assembly shall be done in the shop to the greatest extent possible. The fabricating plant shall be certified under the AISC FCD for Category I structural steelwork. Compression joints depending on contact bearing shall have a surface roughness not in excess of 500 micro inches as determined by ASME B46.1, and ends shall be square within the tolerances for milled ends specified in ASTM A 6/A 6M. Structural steelwork, except surfaces of steel to be encased in concrete, surfaces to be field welded, surfaces to be fireproofed, and contact surfaces of friction-type high-strength bolted connections shall be prepared for painting in accordance with endorsement "P" of AISC FCD and primed with the specified paint.

3.2 ERECTION

a: Erection of structural steel, except as indicated in item b. below, shall be in accordance with the applicable provisions of AISC ASD Manual. Erection plan shall be reviewed, stamped and sealed by a structural engineer licensed by the state in which the

project is located.

b. For low-rise structural steel buildings (60 feet tall or less and a maximum of two stories), the erection plan shall conform to AISC S303 and the structure shall be erected in accordance withAISC Design Guide No. 10.

3.2.1 Structural Connections

Anchor bolts and other connections between the structural steel and foundations shall be provided and shall be properly located and built into connecting work. Field welded structural connections shall be completed before load is applied.

3.2.2 Base Plates and Bearing Plates

Column base plates for columns and bearing plates for beams, girders, and similar members shall be provided. Base plates and bearing plates shall be provided with full bearing after the supported members have been plumbed and properly positioned, but prior to placing superimposed loads. Separate setting plates under column base plates will not be permitted. The area under the plate shall be damp-packed solidly with bedding mortar, except where nonshrink grout is indicated on the drawings. Bedding mortar and grout shall be as specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

3.2.3 Field Priming

After erection, the field bolt heads and nuts, field welds, and any abrasions in the shop coat shall be cleaned and primed with paint of the same quality as that used for the shop coat.

3.3 WELDING

The Contractor shall develop and submit the Welding Procedure Specifications (WPS) for all welding, including wleding done using prequalified procedures. Prequaliried procedures may be submitted for information only; however, procedures that are not prequalified shall be submitted for approval.

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SECTION 05210A

STEEL JOISTS
01/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

STEEL JOIST INSTITUTE (SJI)

SJI Specs & Tables	(1994) Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Steel Joists; G, ED

Detail drawings shall include fabrication and erection details, specifications for shop painting, and identification markings of joists and joist girders.

SD-07 Certificates

Steel Joists; G, RE

Certificates stating that the steel joists and joist girders have been designed and manufactured in accordance with SJI Specs & Tables. Complete engineering design computations may be submitted in lieu of the certification.

1.3 GENERAL REQUIREMENTS

Steel joists are designated on the drawings in accordance with the standard designations of the Steel Joist Institute. Joists of other standard designations or joists with properties other than those shown may be substituted for the joists designated provided the structural properties are equal to or greater than those of the joists shown and provided all other specified requirements are met.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the site in undamaged condition and stored off the ground in a well drained location, protected from damage, and easily accessible for inspection and handling.

PART 2 PRODUCTS

2.1 OPEN WEB STEEL JOISTS

Open web steel joists shall conform to SJI Specs & Tables, K-Series. Joists shall be designed to support the loads given in the standard load tables of SJI Specs & Tables.

2.2 LONGSPAN STEEL JOISTS

Longspan steel joists shall conform to SJI Specs & Tables, LH-Series. Joists designated LH shall be designed to support the loads given in the applicable standard load tables of SJI Specs & Tables.

2.3 JOIST GIRDERS

Joist girders shall conform to SJI Specs & Tables.

2.4 ACCESSORIES AND FITTINGS

Accessories and fittings, including end supports and bridging, shall be in accordance with the standard specifications under which the members were designed.

2.5 SHOP PAINTING

Joists, joist girders and accessories shall be shop painted with a rust-inhibiting primer paint. For joists and joist girders which will be finish painted under Section 09900 PAINTS AND COATINGS, the primer paint shall be limited to a primer which is compatible with the specified finish paint.

PART 3 EXECUTION

3.1 ERECTION

Installation of joists and joist girders shall be in accordance with the standard specification under which the member was produced. Joists and joist girders shall be handled in a manner to avoid damage. Damaged joists and joist girders shall be removed from the site, except when field repair is approved and such repairs are satisfactorily made in accordance with the manufacturer's recommendations. Joists and joist girders shall be accurately set, and end anchorage shall be in accordance with the standard specification under which the joists and joist girders were produced. For spans over 40 feet through 60 feet one row of bridging nearest midspan shall be bolted diagonal bridging; for spans over 60 feet bolted diagonal bridging shall be used instead of welded horizontal bridging. Joist bridging and anchoring shall be secured in place prior to the application of any construction loads. Any temporary loads shall be distributed so that the carrying capacity of any joist is not exceeded. Loads shall not be applied to bridging during construction or in the completed work. Abraded, corroded, and field welded areas shall be cleaned and touched up with the same type of paint used in the shop painting.

3.2 BEARING PLATES

Bearing plates shall be provided with full bearing after the supporting members have been plumbed and properly positioned, but prior to placing superimposed loads. The area under the plate shall be damp-packed solidly with bedding mortar, except where nonshrink grout is indicated on the drawings. Bedding mortar and grout shall be as specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

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SECTION 05300A

STEEL DECKING
01/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 318/318M	(1995) Building Code Requirements for Structural Concrete

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI Cold-Formed Mnl	(1996) Cold-Formed Steel Design Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 611	(1997) Structural Steel (SS), Sheet, Carbon, Cold-Rolled
ASTM A 653/A 653M	(2000) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 780	(2000) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM A 792/A 792M	(1999) Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

AMERICAN WELDING SOCIETY (AWS)

AWS D1.3	(1998) Structural Welding Code - Sheet Steel

STEEL DECK INSTITUTE (SDI)

SDI Diaphragm Mnl	(1991) Diaphragm Design Manual
SDI Pub No. 29	(1995) Design Manual for Composite Decks, Form Decks, Roof Decks, and Cellular Metal Floor Deck with Electrical Distribution

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 20	(1991) Zinc-Rich Primers (Type I - "Inorganic" and Type II - "Organic")

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Deck Units; G, ED
Accessories; G, ED
Attachments; G, ED
Holes and Openings; G, ED

Drawings shall include type, configuration, structural properties, location, and necessary details of deck units, accessories, and supporting members; size and location of holes to be cut and reinforcement to be provided; location and sequence of welded or fastener connections; and the manufacturer's erection instructions.

SD-03 Product Data

Deck Units; G, ED

Design computations for the structural properties of the deck units or SDI certification that the units are designed in accordance with SDI specifications.

Attachments; G, RE

Prior to welding operations, copies of qualified procedures and lists of names and identification symbols of qualified welders and welding operators.

SD-04 Samples

Deck Units
Accessories

A 2 square foot sample of the decking material to be used, along with a sample of each of the accessories used. A sample of acoustical material to be used shall be included.

SD-07 Certificates

Deck Units
Attachments

Manufacturer's certificates attesting that the decking material meets the specified requirements. Manufacturer's certificate attesting that the operators are authorized to use the low-velocity piston tool.

1.3 DELIVERY, STORAGE, AND HANDLING

Deck units shall be delivered to the site in a dry and undamaged condition, stored off the ground with one end elevated, and stored under a weathertight covering permitting good air circulation. Finish of deck

units shall be maintained at all times by using touchup paint whenever necessary to prevent the formation of rust.

PART 2 PRODUCTS

2.1 DECK UNITS

Deck units shall conform to SDI Pub No. 29. Panels of maximum possible lengths shall be used to minimize end laps. Deck units shall be fabricated in lengths to span 3 or more supports with flush, telescoped, or nested 2 inchlaps at ends, and interlocking, or nested side laps, unless otherwise indicated. Deck with cross-sectional configuration differing from the units indicated may be used, provided that the properties of the proposed units, determined in accordance with AISI Cold-Formed Mnl, are equal to or greater than the properties of the units indicated and that the material will fit the space provided without requiring revisions to adjacent materials or systems.

2.1.1 Roof Deck

Steel deck used in conjunction with insulation and built-up roofing shall conform to ASTM A 792/A 792M, ASTM A 611 or ASTM A 792/A 792M. Roof deck units shall be fabricated of the steel design thickness required by the design drawings and shall be galvanized.

2.1.2 Acoustical Deck Units

Deck shall serve as a visible ceiling surface only and are not required to meet acoustic properties. Sound absorbing materials are not required. Perforated or non-perforated panels are acceptable and may or may not act compositely with floor units. Perforated panels shall have a maximum perforation size of 1/16 inch to prevent insect infestation. Composite sections must meet minimum section properties shown on the structural drawings. Non-composite units must be part of a standard manufacutrer's system and shall meet minimum section properties for spans shown. Units shall be shop primed.

2.1.3 Composite Deck

Deck to receive concrete as a filler or for composite deck assembly shall conform to ASTM A 653/A 653M or ASTM A 611. Deck used as the tension reinforcing in composite deck shall be fabricated of the steel design thickness required by the design drawings, and shall be zinc-coated in conformance with ASTM A 653/A 653M, G60 coating class. Deck units used in composite deck shall have adequate embossment to develop mechanical shear bond to provide composite action between the deck and the concrete.

2.1.4 Form Deck

Deck used as a permanent form for concrete shall conform to ASTM A 653/A 653M or ASTM A 611. Deck used as a form for concrete shall be fabricated of the steel design thickness required by the design drawings, and shall be zinc-coated in conformance with ASTM A 653/A 653M, G60 coating class.

2.2 TOUCH-UP PAINT

Touch-up paint for shop-painted units shall be an approved galvanizing repair paint with a high-zinc dust content. Welds shall be touched-up with paint conforming to SSPC Paint 20 in accordance with ASTM A 780. Finish of

deck units and accessories shall be maintained by using touchup paint whenever necessary to prevent the formation of rust.

2.3 ADJUSTING PLATES

Adjusting plates or segments of deck units shall be provided in locations too narrow to accommodate full-size units. As far as practical, the plates shall be the same thickness and configuration as the deck units.

2.4 CLOSURE PLATES

2.4.1 Closure Plates for Roof Deck

Voids above interior walls shall be closed with sheet metal where shown. Open deck cells at parapets, end walls, eaves, and openings through roofs shall be closed with sheet metal. Sheet metal shall be same thickness as deck units.

2.4.2 Closure Plates for Composite Deck

The concrete shall be supported and retained at each floor level. Provide edge closures at all edges of the slab of sufficient strength and stiffness to support the wet concrete. Metal closures shall be provided for all openings in composite steel deck 1/4 inch and over, including but not limited to:

2.4.2.1 Cover Plates to Close Panels

Cover plates to close panel edge and end conditions and where panels change direction or abut. Butt joints in composite steel deck may receive a tape joint cover.

2.4.2.2 Column Closures to Close Openings

Column closures to close openings between steel deck and structural steel columns.

2.4.2.3 Sheet Metal

Where deck is cut for passage of pipes, ducts, columns, etc., and deck is to remain exposed, provide a neatly cut sheet metal collar to cover edges of deck. Do not cut deck until after installation of supplemental supports.

2.5 ACCESSORIES

The manufacturer's standard accessories shall be furnished as necessary to complete the deck installation. Metal accessories shall be of the same material as the deck and have minimum design thickness as follows: saddles, 0.0474 inch; welding washers, 0.0598 inch; cant strip, 0.0295 inch; other metal accessories, 0.0358 inch; unless otherwise indicated. Accessories shall include but not be limited to saddles, welding washers, cant strips, butt cover plates, underlapping sleeves, and ridge and valley plates.

PART 3 EXECUTION

3.1 ERECTION

Erection of deck and accessories shall be in accordance with SDI Diaphragm Mnl and the approved detail drawings. Damaged deck and accessories

including material which is permanently stained or contaminated, with burned holes or deformed shall not be installed. The deck units shall be placed on secure supports, properly adjusted, and aligned at right angles to supports before being permanently secured in place. The deck shall not be filled with concrete, used for storage or as a working platform until the units have been secured in position. Shoring shall be in position before concrete placement begins in composite or form deck. Loads shall be distributed by appropriate means to prevent damage during construction and to the completed assembly. The maximum uniform distributed storage load shall not exceed the design live load. There shall be no loads suspended directly from the steel deck.

3.2 SHORING

Shoring requirements for placing and curing of concrete in the composite floor deck assemblies shall be as noted on the drawings.

3.3 ATTACHMENTS

All fasteners shall be installed in accordance with the manufacturer's recommended procedure, except as otherwise specified. The deck units shall be welded with nominal 5/8 inch diameter puddle welds or fastened with screws, powder-actuated fasteners or pneumatically driven fasteners to supports as indicated on the design drawings and in accordance with requirements of SDI Pub No. 29. All welding of steel deck shall be in accordance with AWS D1.3 using methods and electrodes as recommended by the manufacturer of the steel deck being used. Welds shall be made only by operators previously qualified by tests prescribed in AWS D1.3 to perform the type of work required. Welding washers shall not be used at the connections of the deck to supports. Welding washers shall not be used at sidelaps. Holes and similar defects will not be acceptable. Deck ends shall be lapped 2 inches. All partial or segments of deck units shall be attached to structural supports in accordance with Section 2.5 of SDI Diaphragm Mnl.

3.4 HOLES AND OPENINGS

All holes and openings required shall be coordinated with the drawings, specifications, and other trades. Holes and openings shall be drilled or cut, reinforced and framed as indicated on the drawings or described in the specifications and as required for rigidity and load capacity. Holes and openings less than 6 inches across require no reinforcement. Holes and openings 6 to 12 inches across shall be reinforced by 0.0474 inch thick steel sheet at least 12 inches wider and longer than the opening and be fastened to the steel deck at each corner of the sheet and at a maximum of 6 inches on center. Holes and openings larger than 12 inches shall be reinforced by steel angles installed perpendicular to the steel joists and supported by the adjacent steel joists. Steel angles shall be installed perpendicular to the deck ribs and shall be fastened to the angles perpendicular to the steel joists. Openings must not interfere with seismic members such as chords and drag struts.

3.5 PREPARATION OF FIRE-PROOFED SURFACES

Deck surfaces, both composite and noncomposite, which are to receive sprayed-on fireproofing, shall be galvanized and shall be free of all grease, mill oil, paraffin, dirt, salt, and other contaminants which impair adhesion of the fireproofing. Any required cleaning shall be done prior to steel deck installation using a cleaning method that is compatible with the

sprayed-on fireproofing.

3.6 EMBEDDED CONDUIT AND PIPING

Embedded electrical conduit and piping may not be placed and run laterally in the concrete topping of the U.L. rated floor assembly of the barracks building. Embedded electrical conduit and piping may be run laterally in the concrete topping of non U.L. rated floor assemblies of other buildings only with the consent of the Structural Engineer of Record and provided the provisions of ACI 318/318M, paragraph 6.3.5, regarding conduit or piping material, spacing, reinforcing, etc. are met.

-- End of Section --

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SECTION 05400A

COLD-FORMED STEEL FRAMING

01/02

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UFGS-05400A (January 2002)

SECTION 05400A

COLD-FORMED STEEL FRAMING
01/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI Cold-Formed Spec	(1996) Specification & Commentary for the Design of Cold-Formed Steel Structural Members (Part V of the Cold-Formed Steel Design Manual)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123/A 123M	(2001) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2001) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 370	(1997a) Mechanical Testing of Steel Products
ASTM A 653/A 653M	(2000) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B 633	(1985; R 1998) Electrodeposited Coatings of Zinc on Iron and Steel
ASTM C 1007	(2000) Installatiion of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories
ASTM C 955	(2000a) Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases
ASTM E 329	(2000b) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

AMERICAN WELDING SOCIETY (AWS)

AWS D1.3	(1998) Structural Welding Code - Sheet Steel

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)

SAE J 78 (1998) Steel Self Drilling Tapping Screws

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Framing Components; G, ED

a. Cross sections, plans, and/or elevations showing component types and locations for each framing application; including shop coatings and material thicknesses for each framing component.

b. Connection details showing fastener type, quantity, location, and other information to assure proper installation.

c. Drawings depicting panel configuration, dimensions, components, locations, and construction sequence if the Contractor elects to install prefabricated/prefinished frames.

SD-07 Certificates

Mill Certificates

Mill certificates or test reports from independent testing agency, qualified in accordance with ASTM E 329, showing that the steel sheet used in the manufacture of each cold-formed component complies with the minimum yield strengths and uncoated steel thickness specified. Test reports shall be based on the results of three coupon tests in accordance with ASTM A 370.

Welds; G, RE

Certified copies of welder qualifications test records showing qualification in accordance with AWS D1.3.

1.3 DELIVERY, HANDLING AND STORAGE

Materials shall be delivered and handled preventing bending or other damage, and avoiding contact with soil or other contaminating materials. Finish of the framing members shall be maintained at all times, using an approved high zinc dust content, galvanizing repair paint whenever necessary to prevent the formation of rust.

PART 2 PRODUCTS

2.1 STEEL STUDS, TRACKS, BRACING, BRIDGING, AND ACCESSORIES

Framing components shall comply with ASTM C 955 and the following:

a. Material shall be corrosion-resistant steel complying with ASTM A

653/A 653M, Grade 33 or higher, having a minimum yield of 33,000 psi and a G 60 minimum zinc coating.

b. Minimum uncoated steel thickness (design thickness times 0.95):

(1) Studs and tracks: 0.0329 inch.

(2) Bracing and bridging: Thickness as shown on the drawings.

(3) Accessories: Standard thickness as provided by the manufacturer.

c. Stud and track web depth: As noted on the drawings.

d. Stud flange width: As noted on the drawings.

e. Stud effective section properties as shown on the drawings or performance information provided.

2.2 MARKINGS

Studs and track shall have product markings on the web of the section. The markings shall be repeated throughout the length of the member at a maximum spacing of 4 feet on center and shall be legible and easily read. The product marking shall include the following:

a. Manufacturer's identification.

b. Minimum delivered uncoated steel thickness.

c. Protective coating designator.

d. Minimum yield strength.

2.3 CONNECTIONS

Screws for steel-to-steel connections shall be self-drilling tapping in compliance with SAE J 78 of the type, size, and location as shown on the drawings. Electroplated screws shall have a Type II coating in accordance with ASTM B 633. Screws, bolts, and anchors shall be hot-dipped galvanized in accordance with ASTM A 123/A 123M or ASTM A 153/A 153M as appropriate. Screws bolts, and anchors shall be hot dipped galvanized in accordance with ASTM A 123/A 123Mor ASTM A 153/A 153M as appropriate.

PART 3 EXECUTION

3.1 Delivery, Handling and Storage

a. Materials shall be delivered and handled in a manner to avoid bending or other damage and to avoid contact with the soil or other contaminating materials.

b. Finish of the framing members shall be maintained at all times, using an approved high zinc dust content galvanizing repair paint whenever necessary to prevent the formation of rust.

3.2 CONNECTIONS

3.2.1 Welds

All welding shall be performed in accordance with AWS D1.3, as modified by AISI Cold-Formed Spec. All welders, welding operations, and welding procedures shall be qualified according to AWS D1.3. All welds shall be cleaned and coated with rust inhibitive galvanizing paint.

3.2.2 Screws

Screws shall be of the self-drilling self-tapping type, size, and location shown on the drawings. Screw penetration through joined materials shall not be less than three exposed threads. Minimum spacings and edge distances for screws shall be as specified in AISI Cold-Formed Spec. Screws covered by sheathing materials shall have low profile heads.

3.2.3 Anchors

Anchors shall be of the type, size, and location shown on the drawings.

3.3 INSTALLATION

3.3.1 General Requirements

a. Prefabricated frames shall be square, with components attached to prevent racking during fabrication, transportation, and lifting. Design and construction of frames shall include provisions for lifting.

b. Cutting of steel framing shall be by saw, shear, or plasma cutting equipment. Oxyacetylene torch cutting is not permitted.

c. Temporary bracing shall be provided and remain in place until work is permanently stabilized.

d. Abutting lengths of track shall be butt-welded, spliced, or each length securely anchored to a common structural element. Track shall be securely anchored to the supporting structure as shown on the drawings.

e. Splicing of framing components, other than track and tension members, is not permitted.

f. Wire tying of framing members is not permitted.

3.3.2 Non-Load Bearing Walls (Curtain walls)

a. Studs shall be spaced as shown on the drawings.

b. Studs shall be plumbed, aligned, and secured to the continuous runner tracks at each end, unless the stud end terminates at a deflection track.

c. Tracks shall be securely anchored to the supporting structure as shown on the drawings.

d. Bridging spaced as shown on the drawings or 48-inch minimum and shall be installed prior to the installation of facing materials.

e. Framed wall openings shall include headers and supporting components as shown on the drawings. Headers shall be installed

in all openings that are larger than the stud spacing in a wall.

f. At wall openings for doors, windows and other similar features, the framing system shall provide for the installation and anchorage of the required subframes or finish frames. Steel frames shall be securely attached through built-in anchors to the nearest stud on each side of the opening with self-drilling screws. Double studs shall be provided at both jambs of all door openings.

g. Installation of sheathing, wallboards, or any other collateral material shall be performed in accordance with the product manufacturer's specifications.

h. Components (Deflection Track and/or Slide Clips) shall be provided at locations shown on the drawings to accommodate potential movements of Primary Frames. Construction shall accommodate a vertical movement of 1 inch.

3.3.3 Load Bearing Walls

3.3.3.1 Axial Load

Installation shall comply with ASTM C 1007 and the following:

a. Studs shall be spaced as shown on the drawings.

b. Studs shall be installed seated squarely against the web of the top and bottom track to assure transfer of axial load. Studs shall be plumbed, aligned, and secured to the continuous runner tracks at each end before the installation of components which induce axial load.

c. Studs, other than at framed openings, shall align vertically to allow for full transfer of the loads to the foundation. Vertical alignment shall be maintained at floor/wall intersections.

d. Foundation bearing bottom track shall rest on a continuous, uniform, and level beating surface.

e. Tracks shall be securely anchored to the supporting structure as shown on the drawings.

f. Bridging spaced at 48 inches minimum or as shown on the drawings shall be installed prior to loading and the installation of facing materials.

g. Framed wall openings shall include headers and supporting components as shown on the drawings. Headers shall be installed in all openings which are larger than the stud spacing in a wall.

h. At wall openings for doors, windows and other similar features, the framing system shall provide for the installation and anchorage of the required subframes or finish frames. Steel frames shall be securely attached through built-in anchors to the nearest stud on each side of the opening with self-drilling screws. Double studs shall be provided at both jambs of all door openings.

i. Installation of sheathing, wallboards, or any other collateral material shall be performed in accordance with the product manufacturer's specifications.

3.3.3.2 Lateral Load (Shear Wall Panels)

Shear wall panels shall be installed at the locations shown; stud spacing and arrangement shall be as shown; diagonal bracing shall be placed across studs, pulled tight, and attached to each stud within the shear panel as shown on the drawings.

3.3.4 Joists

a. Joists shall be spaced as shown on the drawings.

b. Uniform and level joist bearing at the foundation wall shall be provided by means of shims and/or nonshrink grout.

c. Web stiffeners at support locations and at points of concentrated loads shall be provided as shown on the drawings.

d. Joists shall align vertically with load bearing studs. Where vertical alignment is not possible, a continuous load distribution member at the top track shall be provided.

e. Bridging, of the type and spacing shown on the drawings, shall be installed prior to loading.

f. Additional framing around openings shall be provided as shown on the drawings when the width of the opening exceeds the typical joist spacing.

3.3.5 Trusses

a. Trusses shall be spaced as shown on the drawings.

b. Trusses shall align vertically with load bearing studs. Where vertical alignment is not possible, a continuous load distribution member at the top track shall be provided as noted on the drawings.

c. Trusses shall be bridged and braced before the installation of collateral materials.

d. Temporary bracing shall be provided and remain in place until work is permanently stabilized.

3.4 TOLERANCES

Vertical alignment (plumbness) of studs shall be within 1/960th of the span. Horizontal alignment (levelness) of walls shall be within 1/960th of their respective lengths. Spacing of studs shall not be more than plus 1/8 inch from the designed spacing providing the the cumulative error does not exceed the requirements of the finishing material.

-- End of Section --

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MISCELLANEOUS METAL

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3.5 OMITTED
3.6 INSTALLATION OF DOWNSPOUT BOOTS
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3.7.1 Installation of Steel Handrails
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3.11 RECESSED FLOOR MATS
3.12 MOUNTING OF SAFETY CHAINS
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3.14 OMITTED
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3.18 DIAMOND MESH WINDOW GUARDS
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UFGS-05500A (January 2002)

SECTION 05500A

MISCELLANEOUS METAL
01/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF-45	(1997) Designation System for Aluminum Finishes

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A14.3	(1992) Ladders - Fixed - Safety Requirements

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123/A 123M	(2001) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 36/A 36M	(2000a) Carbon Structural Steel
ASTM A 467/A 467M	(1998) Machine and Coil Chain
ASTM A 500	(1999) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 53/A 53M	(2001) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 653/A 653M	(2000) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 924/A 924M	(1999) General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM F 1267	(1991; R 1997) Metal, Expanded, Steel

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM MBG 532 (1994) Heavy Duty Metal Bar Grating Manual

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10 (1998; Errata 10-98-1) Portable Fire Extinguishers

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-344 (Rev B) Lacquer, Clear Gloss, Exterior, Interior

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Miscellaneous Metal Items

Detail drawings indicating material thickness, type, grade, and class; dimensions; and construction details. Drawings shall include catalog cuts, erection details, manufacturer's descriptive data and installation instructions, and templates. Detail drawings for the following items: access doors and panels, downspout boots, expansion joint covers, floor grating and frames, handrails, ladders, diamond mesh type partitions, roll-up entry mats, roof scuttles, safety nosings and steel stairs.

SD-04 Samples

Miscellaneous Metal Items

Samples of the following items: expansion joint covers, access doors and panels. Samples shall be full size, taken from manufacturer's stock, and shall be complete as required for installation in the structure. Samples may be installed in the work, provided each sample is clearly identified and its location recorded.

1.3 GENERAL REQUIREMENTS

The Contractor shall verify all measurements and shall take all field measurements necessary before fabrication. Welding to or on structural steel shall be in accordance with AWS D1.1. Items specified to be galvanized, when practicable and not indicated otherwise, shall be hot-dip galvanized after fabrication. Galvanizing shall be in accordance with ASTM A 123/A 123M, ASTM A 653/A 653M, or ASTM A 924/A 924M, as applicable. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and shall harmonize with the material to which fastenings are applied. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Poor matching of holes for fasteners shall be cause for rejection. Fastenings shall be concealed where practicable. Thickness of metal and

details of assembly and supports shall provide strength and stiffness. Joints exposed to the weather shall be formed to exclude water.

1.4 DISSIMILAR MATERIALS

Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of bituminous paint or asphalt varnish.

1.5 WORKMANSHIP

Miscellaneous metalwork shall be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching shall produce clean true lines and surfaces. Welding shall be continuous along the entire area of contact except where tack welding is permitted. Exposed connections of work in place shall not be tack welded. Exposed welds shall be ground smooth. Exposed surfaces of work in place shall have a smooth finish, and unless otherwise approved, exposed riveting shall be flush. Where tight fits are required, joints shall be milled. Corner joints shall be coped or mitered, well formed, and in true alignment. Work shall be accurately set to established lines and elevations and securely fastened in place. Installation shall be in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

1.6 ANCHORAGE

Anchorage shall be provided where necessary for fastening miscellaneous metal items securely in place. Anchorage not otherwise specified or indicated shall include slotted inserts made to engage with the anchors, expansion shields, and power-driven fasteners when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; and lag bolts and screws for wood.

1.7 ALUMINUM FINISHES

Unless otherwise specified, aluminum items shall have anodized finish. The thickness of the coating shall be not less than that specified for protective and decorative type finishes for items used in interior locations or architectural Class I type finish for items used in exterior locations in AA DAF-45. Items to be anodized shall receive a polished satin finish. Aluminum surfaces to be in contact with concrete during construction shall be protected with a field coat conforming to CID A-A-344.

1.8 SHOP PAINTING

Surfaces of ferrous metal except galvanized surfaces, shall be cleaned and shop coated with the manufacturer's standard protective coating unless otherwise specified. Surfaces of items to be embedded in concrete shall not be painted. Items to be finish painted shall be prepared according to manufacturer's recommendations or as specified.

PART 2 PRODUCTS

2.1 ACCESS DOORS AND PANELS

Doors and panels shall be flush type unless otherwise indicated. Frames for access doors shall be fabricated of not lighter than 16 gauge steel with welded joints and finished with anchorage for securing into

construction. Access doors shall be a minimum of 14 by 20 inches and of not lighter than 14 gauge steel, with stiffened edges, complete with attachments. Access doors shall be hinged to frame and provided with a flush face, screw driver operated latch, except that doors at fire sprinkler system locations shall have keyed interchangeable core lock cylinders. Exposed metal surfaces shall have a baked enamel finish except that panels and frames located in toilet and shower areas shall be constructed of stainless steel with a #4 satin finish.

2.2 OMITTED
2.3 OMITTED
2.4 OMITTED
2.5 OMITTED
2.6 OMITTED
2.7 OMITTED

2.8 DOWNSPOUT BOOTS

Downspout boots shall be cast iron with receiving bells sized to fit downspouts.

2.9 EXPANSION JOINT COVERS

Expansion joint covers shall be constructed of extruded aluminum with anodized satin finish for walls and ceilings and with standard mill finish for floor covers and exterior covers. Plates, backup angles, expansion filler strip and anchors shall be designed as indicated. Expansion joint system shall provide a 1-hour fire rating and 1-1/2 inch movement. Where indicated floor expansion joints shall be watertight.

2.10 OMITTED

2.11 FLOOR GRATINGS AND FRAMES

Carbon steel grating shall be designed in accordance with NAAMM MBG 532 to meet the indicated load requirements. Edges shall be banded with bars 1/4 inch less in height than bearing bars for grating sizes above 3/4 inch. Banding bars shall be flush with the top of bearing grating. Frames shall be of welded steel construction finished to match the grating. Floor gratings and frames shall be galvanized after fabrication.

2.12 OMITTED
2.13 OMITTED

2.14 HANDRAILS

Handrails shall be designed to resist a concentrated load of 200 pounds in any direction at any point of the top of the rail or 20 pounds per foot applied horizontally to top of the rail, whichever is more severe.

2.14.1 Steel Handrails, Including Carbon Steel Inserts

Steel handrails, including inserts in concrete, shall be steel pipe conforming to ASTM A 53/A 53M or structural tubing conforming to ASTM A 500, Grade A or B of equivalent strength. Steel railings shall be sizes and shapes as indicated. Railings shall be hot-dip galvanized and shop painted. Pipe collars shall be steel or hot-dip galvanized steel.

a. Joint posts, rail, and corners shall be fabricated by one of the

following methods:

(1) Flush type rail fittings of commercial standard, welded and ground smooth with railing splice locks secured with 3/8 inch hexagonal recessed-head setscrews.

(2) Mitered and welded joints by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth. Railing splices shall be butted and reinforced by a tight fitting interior sleeve not less than 6 inches long.

(3) Railings may be bent at corners in lieu of jointing, provided bends are made in suitable jigs and the pipe is not crushed.

b. Removable sections, toe-boards, and brackets shall be provided as indicated.

2.15 OMITTED

2.16 LADDERS

Ladders shall be galvanized steel or aluminum, fixed rail type in accordance with ANSI A14.3.

2.17 OMITTED

2.18 MIRROR FRAMES

Frames for plate glass mirrors larger than 18 by 30 inches shall be fabricated from corrosion-resisting steel with satin finish. Frames shall be provided with concealed fittings and tamperproof mountings.

2.19 MISCELLANEOUS

Miscellaneous plates and shapes for items that do not form a part of the structural steel framework, such as lintels, sill angles, miscellaneous mountings, and frames, shall be provided to complete the work.

2.20 PARTITIONS, DIAMOND MESH TYPE

Partitions shall be constructed of metal fabric attached to structural steel framing members. Fabric shall be 10 gauge steel wires woven into 1-1/2 inch diamond mesh with wire secured through weaving channels. Framing members shall be channels 1-1/2 by 1/8 inch minimum size. Channel frames shall be mortised and tenoned at intersections. Steel frames, posts, and intermediate members shall be of the sizes and shapes indicated. Cast-iron floor shoes and caps shall have setscrew adjustment. Doors and grilles shall be provided as indicated, complete with hardware and accessories including sliding mechanisms, locks, guard plates, sill shelves and brackets, and fixed pin butts. Doors and grilles shall have cover plates as indicated. Dutch doors shall have a lock for each leaf. A continuous rubber bumper shall be provided at bottom of grille frame. Locks shall be bronze, cylinder, mortise type. Keying shall be coordinated with Section 08702 BUILDERS' HARDWARE. Ferrous metal portions of partitions and accessories shall be galvanized.

2.21 ROLL-UP FLOOR MATS

Roll-up mats shall be of aluminum construction with carpet surface. Roll-up mats shall be for use in recessed area. Construction details of recessed areas shall be shown on the drawings.

2.22 OMITTED

2.23 SAFETY CHAINS

Safety chains shall be galvanized welded steel, proof coil chain tested in accordance with ASTM A 467/A 467M, Class CS. Safety chains shall be straight link style, 3/16 inch diameter, minimum 12 links per foot and with bolt type snap hooks on each end. Eye bolts for attachment of chains shall be galvanized 3/8 inch bolt with 3/4 inch eye, anchored as indicated. Two chains shall be furnished for each guarded opening.

2.24 SAFETY NOSING

Safety nosings shall be of cast aluminum with cross-hatched, abrasive surface. Nosing shall be 3 inches wide and terminating at not more than 6 inches from the ends of treads, except nosing for metal pan cement-filled treads shall extend the full length of the tread. Safety nosings shall be provided with anchors not less than 3/4 inch long. Integrally cast mushroom anchors are not acceptable.

2.25 OMITTED

2.26 STEEL STAIRS

Steel stairs shall be complete with structural or formed channel stringers, metal pan cement-filled treads, landings, columns, handrails, and necessary bolts and other fastenings as indicated. Structural steel shall conform to ASTM A 36/A 36M. Stairs and accessories shall be galvanized. Risers on stairs with metal pan treads shall be deformed to form a sanitary cove to retain the tread concrete. Integral nosings shall have braces extended into the concrete fill.

2.27 OMITTED
2.28 OMITTED
2.29 OMITTED
2.30 OMITTED

2.31 WINDOW GUARDS, DIAMOND MESH TYPE

Diamond mesh window guards shall be constructed of woven steel wire or expanded metal frames with hot-rolled or cold-formed steel shapes. Expanded metal conforming to ASTM F 1267 shall be of 1-1/2 inch, No. 10 mesh, welded to 1 by 1 by 1/8 inch angle frame. Woven-wire panels shall be of 10 gauge, 1-1/2 inch mesh secured through weaving bar to 3/8 inch round or 1 inch channel frame. Corners of frames shall be mitered and welded or mortised and tenoned. One tamperproof hasp and padlock, with access from the interior, shall be provided for each butt used.

2.32 WINDOW SUB-SILL

Window sub-sill shall be of extruded aluminum alloy of size and design indicated. Not less than two anchors per window section shall be provided for securing into mortar joints of masonry sill course. Sills for banks of windows shall have standard mill finish with a protective coating, prior to shipment, of two coats of a clear, colorless, methacrylate lacquer applied

to all surfaces of the sills.

2.33 OMITTED
2.34 OMITTED

2.35 ALTERNATING TREAD STEEL STAIRS

Stair treads shall be minimum 13 gauge and be capable of withstanding a concentrated 1,000-pound load without deformation. Handrails shall be 1-1/2 inch outside diameter by 0.083 inch and be capable of withstanding a load of 200 pounds applied in any direction at any point on the rail. Landings and floor stampings shall be 11 gauge minimum. Stringers shall be minimum 2-inch by 1-3/4 inch. Landings, treads and mounting base shall be stamped and formed from single piece material. Stock shapes, hand forming or welded remnants shall not be permitted. All stamped parts shall have integrally formed rigidizing bends and shall be spot welded to stringers of like material. There shall be a minimum of six welds per tread and eleven welds each on the landing and mounting base. All pedestrian surfaces shall be punched through with upset non-skid openings. Risers shall be equally spaced to within 3/16 inch of adjacent risers and to within 3/8 inch for any two non-adjacent risers on stair. Handrails shall be contoured for body guidance and underarm support and shall be attached to the outside stringers and landings by bolting. A rubber bumper strip shall be attached to the central stringer. The stair angle shall be 68 degrees from the horizontal with vertical elevation as indicated on drawings. Stair and railing finish shall be safety yellow powder coat.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

All items shall be installed at the locations shown and according to the manufacturer's recommendations. Items listed below require additional procedures as specified.

3.2 REMOVABLE ACCESS PANELS

A removable access panel not less than 12 by 12 inches shall be installed directly below each valve, flow indicator, damper, or air splitter that is located above the ceiling, other than an acoustical ceiling, and that would otherwise not be accessible.

3.3 OMITTED
3.4 OMITTED
3.5 OMITTED

3.6 INSTALLATION OF DOWNSPOUT BOOTS

Downspouts shall be secured to building through integral lips with appropriate fasteners.

3.7 ATTACHMENT OF HANDRAILS

Toeboards and brackets shall be installed where indicated. Splices, where required, shall be made at expansion joints. Removable sections shall be installed as indicated.

3.7.1 Installation of Steel Handrails

Installation shall be in pipe sleeves embedded in concrete and filled with molten lead or sulphur with anchorage covered with standard pipe collar pinned to post, by means of pipe sleeves secured to masonry with expansion shields and bolts or toggle bolts or base plates bolted to stringers or structural steel framework as indicated. Rail ends shall be secured by steel pipe flanges anchored by expansion shields and bolts.

3.8 OMITTED
3.9 OMITTED

3.10 PARTITION POSTS AND OPENINGS

Posts shall be set in shoes bolted to the floor and in caps tap-screwed to clip angles in overhead construction, as indicated. Openings shall be formed using channels similar to the partition frames at ducts, pipes, and other obstructions.

3.11 RECESSED FLOOR MATS

Contractor shall verify field measurements prior to releasing materials for fabrication by the manufacturer. A mat frame shall be used to ensure recess accuracy in size, shape and depth. Drain pit shall be formed by blocking out concrete when frames are installed. Pit shall be dampproofed after concrete has set. Frames shall be assembled onsite and installed so that upper edge will be level with finished floor surface. A cement base shall be screeded inside the mat recess frame area using the edge provided by the frame as a guide. The frame shall be anchored into the cement with anchor pins a minimum of 24 inches on centers.

3.12 MOUNTING OF SAFETY CHAINS

Safety chains shall be mounted 3 feet 6 inches and 2 feet above the floor.

3.13 INSTALLATION OF SAFETY NOSINGS

Nosing shall be completely embedded in concrete before the initial set of the concrete occurs and shall finish flush with the top of the concrete surface.

3.14 OMITTED
3.15 OMITTED
3.16 OMITTED
3.17 OMITTED

3.18 DIAMOND MESH WINDOW GUARDS

Diamond mesh window guards shall be mounted on exterior of window frame with not less than two tamperproof hinged butts mounted on 1 by 12 by 1/8 inch jamb channel attached as indicated to 2 by 1/4 inch plate anchored to wood jamb with 1/4 inch lag bolt, to masonry jamb with toggle bolts, or to concrete jambs and solid masonry jambs with expansion shields and bolts. One additional butt shall be provided for each 3-foot internal length of guard over 5 feet. Hasp and padlock shall be installed on the jamb opposite to that hinged.

3.19 OMITTED

3.20 INSTALLATION OF FIRE EXTINGUISHER CABINETS

Metal fire extinguisher cabinets shall be furnished and installed in accordance with NFPA 10 where shown on the drawings or specified.

-- End of Section --

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DIVISION 06 - WOODS & PLASTICS

SECTION 06100A

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10/01

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UFGS-06100A (October 2001)

SECTION 06100A

ROUGH CARPENTRY
10/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN FOREST & PAPER ASSOCIATION (AF&PA)

AF&PA T01	(1991; Supple 1993; Addenda Apr 1997; Supple T02) National Design Specification for Wood Construction
AF&PA T11	(1988) Manual for Wood Frame Construction

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)

AITC 111	(1979) Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 307	(2000) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM C 518	(1998) Steady-State Heat Flux Measurements and Thermal Transmission Properties By Means of the Heat Flow Meter Apparatus
ASTM C 553	(1999) Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
ASTM C 665	(1998) Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
ASTM C 1136	(1995) Flexible, Low Permeance Vapor Retarders for Thermal Insulation
ASTM F 547	(1977; R 1995) Definitions of Terms Relating to Nails for Use with Wood and Wood-Base Materials

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C2	(2000) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by

Pressure Processes

AWPA C9 (1997) Plywood - Preservative Treatment by Pressure Processes

AWPA M4 (1999) Standard for the Care of Preservative-Treated Wood Products

AWPA P5 (2000) Standards for Waterborne Preservatives

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA EWS R540C (1996) Builder Tips Proper Storage and Handling of Glulam Beams

APA PRP-108 (1980; Rev Jan 1996) Performance Standards and Policies for Structural-Use Panels

CALIFORNIA REDWOOD ASSOCIATION (CRA)

CRA RIS-01-SS (1997) Standard Specifications for Grades of California Redwood Lumber

U.S. DEPARTMENT OF COMMERCE (DOC)

DOC PS 1 (1996) Voluntary Product Standard - Construction and Industrial Plywood

DOC PS 2 (1992) Performance Standards for Wood-Based Structural-Use Panels

NATIONAL HARDWOOD LUMBER ASSOCIATION (NHLA)

NHLA Rules (1994) Rules for the Measurement & Inspection of Hardwood & Cypress

NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION (NELMA)

NELMA Grading Rules (1997) Standard Grading Rules for Northeastern Lumber

SOUTHERN CYPRESS MANUFACTURERS ASSOCIATION (SCMA)

SCMA Specs (1986; Supple No. 1, Aug 1993) Standard Specifications for Grades of Southern Cypress

SOUTHERN PINE INSPECTION BUREAU (SPIB)

SPIB Rules (1994; Supple 8 thru 11) Standard Grading Rules for Southern Pine Lumber

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB Std 17 (1996; Supples VII(A-E), VIII(A-C)) Grading Rules for West Coast Lumber

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA Grading Rules (1999) Western Lumber Grading Rules 95

1.2 SUBMITTALS

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SD-07 Certificates

Grading and Marking

Manufacturer's certificates (approved by an American Lumber Standards approved agency) attesting that lumber and material not normally grade marked meet the specified requirements. Certificate of Inspection for grade marked material by an American Lumber Standards Committee (ALSC) recognized inspection agency prior to shipment.

Insulation

Certificate attesting that the glass and mineral fiber insulation furnished for the project contains recovered material, and showing an estimated percent of such recovered material.

1.3 DELIVERY AND STORAGE

Materials shall be delivered to the site in undamaged condition, stored off ground in fully covered, well ventilated areas, and protected from extreme changes in temperature and humidity. Laminated timber shall be handled and stored in accordance with AITC 111 or APA EWS R540C.

PART 2 PRODUCTS

2.1 LUMBER AND SHEATHING

2.1.1 Grading and Marking

2.1.1.1 Lumber Products

Solid sawn and finger-jointed lumber shall bear an authorized gradestamp or grademark recognized by ALSC, or an ALSC recognized certification stamp, mark, or hammerbrand. Surfaces that are to be exposed to view shall not bear grademarks, stamps, or any type of identifying mark. Hammer marking will be permitted on timbers when all surfaces will be exposed to view.

2.1.1.2 Omitted

2.1.1.3 Plywood and Other Sheathing Products

Materials shall bear the grademark or other identifying marks indicating grades of material and rules or standards under which produced, including requirements for qualifications and authority of the inspection organization. Except for plywood, bundle marking will be permitted in lieu of marking each individual piece. Surfaces that are to be exposed to view shall not bear grademarks or other types of identifying marks.

2.1.2 Sizes

Lumber and material sizes shall conform to requirements of the rules or standards under which produced. Unless otherwise specified, lumber shall be surfaced on four sides. Unless otherwise specified, sizes indicated are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced.

2.1.3 Treatment

Exposed areas of treated wood that are cut or drilled after treatment shall receive a field treatment in accordance with AWPA M4. Items of all-heart material of cedar, cypress, or redwood will not require preservative treatment, except when in direct contact with soil. Except as specified for all-heart material of the previously mentioned species, the following items shall be treated:

a. Wood members in contact with or within 18 inches of soil.

b. Wood members in contact with water.

c. Wood members exposed to the weather including those used in roofing systems.

2.1.3.1 Lumber and Timbers

Lumber and timbers shall be treated in accordance with AWPA C2 with waterborne preservatives listed in AWPA P5 to a retention level as follows:

a. 0.25 pcf intended for above ground use.

b. 0.40 pcf intended for ground contact and fresh water use.

2.1.3.2 Plywood

Plywood shall be treated in accordance with AWPA C9 with waterborne preservatives listed in AWPA P5 to a retention level as follows:

a. 0.25 pcf intended for above ground use.

b. 0.40 pcf intended for ground contact and fresh water use.

2.1.4 Moisture Content

At the time lumber and other materials are delivered and when installed in the work their moisture content shall be as follows:

a. Treated and Untreated Lumber Except Roof Planking: 4 inches or less, nominal thickness, 19 percent maximum. 5 inches or more, nominal thickness, 23 percent maximum in a 3 inch perimeter of the timber cross-section.

b. Omitted.

c. Materials Other Than Lumber: In accordance with standard under which product is produced.

2.1.5 Omitted

2.1.6 Omitted

2.1.7 Sheathing

Sheathing shall be plywood for roof sheathing.

2.1.7.1 Omitted
2.1.7.2 Omitted

2.1.7.3 Plywood

Plywood shall conform to DOC PS 1, APA PRP-108 or DOC PS 2, Grade C-D or sheathing grade with exterior glue. Sheathing for roof without corner bracing of framing shall have a span rating of 16/0 or greater for supports 16 inches on center and a span rating of 24/0 or greater for supports 24 inches on center.

2.1.8 Omitted
2.1.9 Omitted
2.1.10 Omitted
2.1.11 Omitted

2.1.12 Miscellaneous Wood Members

2.1.12.1 Nonstress Graded Members

Members shall include bridging, corner bracing, furring, grounds, and nailing strips. Members shall be in accordance with TABLE I for the species used. Sizes shall be as follows unless otherwise shown:

Member	Size (inch)
Furring	1 x 2.
Nailing strips	1 x 3 or 1 x 4 when used as shingle base or interior finish, otherwise 2 inch stock.

2.1.12.2 Omitted
2.1.12.3 Omitted

2.1.12.4 Blocking

Blocking shall be standard or number 2 grade.

2.2 ACCESSORIES AND NAILS

Markings shall identify both the strength grade and the manufacturer. Accessories and nails shall conform to the following:

2.2.1 Anchor Bolts

ASTM A 307, size as indicated, complete with nuts and washers.

2.2.2 Bolts: Lag, Toggle, and Miscellaneous Bolts and Screws

Type, size, and finish best suited for intended use. Finish options

include zinc compounds, cadmium, and aluminum paint impregnated finishes.

2.2.3 Omitted

2.2.4 Expansion Shields

Type and size best suited for intended use.

2.2.5 Omitted
2.2.6 Omitted

2.2.7 Nails and Staples

ASTM F 547, size and type best suited for purpose; staples shall be as recommended by the manufacturer of the materials to be joined. For sheathing and subflooring, length of nails shall be sufficient to extend 1 inch into supports. In general, 8-penny or larger nails shall be used for nailing through 1 inch thick lumber and for toe nailing 2 inch thick lumber; 16-penny or larger nails shall be used for nailing through 2 inch thick lumber. Nails used with treated lumber and sheathing shall be galvanized. Nailing shall be in accordance with the recommended nailing schedule contained in AF&PA T11. Where detailed nailing requirements are not specified, nail size and spacing shall be sufficient to develop an adequate strength for the connection. The connection's strength shall be verified against the nail capacity tables in AF&PA T01. Reasonable judgement backed by experience shall ensure that the designed connection will not cause the wood to split. If a load situation exceeds a reasonable limit for nails, a specialized connector shall be used.

2.3 INSULATION

Thermal resistance of insulation shall be not less than the R-values shown. R-values shall be determined at 75 degrees F in accordance with ASTM C 518. Contractor shall comply with EPA requirements in conformance with Section 01670 RECYCLED / RECOVERED MATERIALS. Insulation shall be the standard product of a manufacturer and factory marked or identified with manufacturer's name or trademark and R-value. Identification shall be on individual pieces or individual packages. Materials containing more than one percent asbestos will not be allowed.

2.3.1 Batt or Blanket

2.3.1.1 Glass Fiber Batts and Rolls

Glass fiber batts and rolls shall conform to ASTM C 665, Type II kraft faced insulation. Insulation shall have a 10 mil thick, white, puncture resistant woven-glass cloth with vinyl facing on one side. Width and length shall suit construction conditions.

2.3.1.2 Mineral Fiber Batt

Mineral fiber batt shall conform to ASTM C 665, Type II kraft faced insulation, Class C.

2.3.1.3 Mineral Fiber Blanket

Mineral fiber blanket shall conform to ASTM C 553, Type I, Class 6. Blankets shall be sized to suit construction conditions, resilient type for use below and above ambient temperature to 350 degrees F. Blankets shall

have a factory applied vapor-barrrier facing on one side with 2 inch nailing tabs on both edges. Vapor barriers shall be fire retardant, high vapor transmission, and aluminum foil laminated to crepe paper type conforming to ASTM C 1136, Type II. Nominal density shall be 0.75 pcf.

PART 3 EXECUTION

3.1 OMITTED

3.2 INSTALLATION OF SHEATHING

3.2.1 Omitted
3.2.2 Omitted

3.2.3 Plywood

Sheathing shall be applied with edges 1/8 inch apart at side and end joints, and nailed at supported edges at 6 inches on center and at intermediate supports 12 inches on center unless otherwise shown. Nailing of edges shall be 3/8 inch from the edges. Roof sheathing shall be applied with long dimension at right angles to supports, end joints made over supports, and end joints staggered.

3.3 OMITTED
3.4 OMITTED
3.5 OMITTED

3.6 INSTALLATION OF MISCELLANEOUS WOOD MEMBERS

3.6.1 Omitted
3.6.2 Omitted

3.6.3 Blocking

Blocking shall be provided as necessary for application of wall mounted building items. Blocking shall be cut to fit between framing members and rigidly attached thereto.

3.6.4 Nailers and Nailing Strips

Nailers and nailing strips shall be provided as necessary for the attachment of finish materials.

3.6.5 Omitted

3.6.6 Furring Strips

Furring strips shall be provided at the locations shown. Furring strips shall be installed at 16 inches on center unless otherwise shown, run in lengths as long as practicable, butt jointed and rigidly secured in place.

3.7 OMITTED

3.8 INSTALLATION OF INSULATION

Insulation shall be installed after construction has advanced to a point that the installed insulation will not be damaged by remaining work. For thermal insulation the actual installed thickness shall provide the R-values shown. For acoustical insulation the installed thickness shall be as

shown. Insulation shall be installed on the weather side of such items as electrical boxes and water lines. Unless otherwise specified, installation shall be in accordance with the manufacturer's recommendation.

3.9 OMITTED
3.10 OMITTED
3.11 OMITTED

3.12 TABLES

TABLE I. SPECIES AND GRADE

Roof Sheathing, Furring

Grading Rules	Species	Const Standard	No. 2 Comm	No. 2 Board Comm	No. 3 Comm
NHLA Rules					
	Cypress			X	
NELMA Grading Rules					
	Northern White Cedar				X
	Eastern White Pine	X			
	Northern Pine	X			
	Balsam Fir				X
	Eastern Hemlock-Tamarack				X
CRA RIS-01-SS					
	Redwood		X		
SCMA Specs					
	Cypress			X	
SPIB Rules					
	Southern Pine		X		
WCLIB Std 17					
	Douglas Fir-Larch	X			
	Hem-Fir	X			
	Sitka Spruce	X			
	Mountain Hemlock	X			
	Western Cedar	X			
WWPA Grading Rules					
	Douglas Fir-Larch	X			
	Hem-Fir	X			
	Idaho White Pine	X			
	Lodgepole Pine			X	
	Ponderosa Pine			X	
	Sugar Pine			X	
	Englemann Spruce			X	
	Douglas Fir South			X	
	Mountain Hemlock			X	
	Subalpine Fir			X	
	Western Cedar			X	

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SECTION 06200A

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04/01

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3.2 OMITTED
3.3 OMITTED
3.4 MOLDING AND INTERIOR TRIM
3.5 OMITTED
3.6 OMITTED
3.7 WOODWORK ITEMS
3.7.1 Omitted
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UFGS-06200A (April 2001)

SECTION 06200A

FINISH CARPENTRY
04/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM F 547	(1977; R 1995) Definitions of Terms Relating to Nails for Use with Wood and Wood-Base Materials

CALIFORNIA REDWOOD ASSOCIATION (CRA)

RIS-01	(1997) Standard Specifications for Grades of California Redwood Lumber

NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION (NELMA)

NELMA Grading Rules	(1997) Standard Grading Rules for Northeastern Lumber

SOUTHERN CYPRESS MANUFACTURERS ASSOCIATION (SCMA)

SCMA Specs	(1986; Supple No. 1, Aug 1993) Standard Specifications for Grades of Southern Cypress

SOUTHERN PINE INSPECTION BUREAU (SPIB)

SPIB Rules	(1994; Supple 8 thru 11) Standard Grading Rules for Southern Pine Lumber

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB Std 17	(1996; Supples VII(A-E), VIII(A-C)) Grading Rules For West Coast Lumber

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA Grading Rules	(1999)Western Lumber Grading Rules 95

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When

used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Wood Items, Siding, and Trim

Manufacturer's printed data indicating the usage of engineered or recycled wood products, and environmentally safe preservatives.

SD-04 Samples

Moldings
Trim

Samples shall be of sufficient size to show patterns, color ranges, and types, as applicable, of the material proposed to be used.

1.3 DELIVERY AND STORAGE

Materials shall be delivered to the site in undamaged condition, stored off ground in fully covered, well-ventilated areas, and protected from extreme changes in temperature and humidity.

PART 2 PRODUCTS

2.1 WOOD ITEMS AND TRIM

The Contractor shall furnish products which optimize design by reducing the amount of wood used (engineered wood), by using recycled wood products and preservatives without arsenic or chromium when the products and methods are competitive in price or directed by the Contracting Officer. Recyclable products shall conform to EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS.

2.1.1 Grading and Marking

Materials shall bear the grademark, stamp or other identifying marks indicating grades of material and rules or standards under which produced. Such identifying marks on a material shall be in accordance with the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification. The inspection agency for lumber shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used. Except for plywood and lumber, bundle marking will be permitted in lieu of marking each individual piece. Surfaces that are to be architecturally exposed to view shall not bear grademarks, stamps, or other types of identifying marks.

2.1.2 Sizes and Patterns

Lumber sizes and patterns shall conform to rules or standards under which produced. Unless otherwise specified, lumber shall be surfaced on four sides. Sizes and patterns for materials other than lumber shall conform to requirements of the rules or standards under which produced. Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under

which the product is produced.

2.1.3 Moisture Content

The maximum moisture content of untreated trim and wood siding shall be 15 percent at the time of delivery to the jobsite and when installed. Moisture content of all other material shall be in accordance with the standard under which the product is produced.

2.1.4 Omitted
2.1.5 Omitted
2.1.6 Omitted
2.1.7 Omitted
2.1.8 Omitted

2.1.9 Trim

2.1.9.1 Wood

Trim shall be species and grade listed in TABLE I at the end of this section. Sizes shall be as indicated.

2.1.10 Moldings

Moldings shall be of the pattern indicated and shall be of a grade compatible with the finish specified.

2.1.11 Omitted

2.1.12 Woodwork Items

2.1.12.1 Omitted
2.1.12.2 Omitted

2.1.12.3 Utility Shelving

Utility shelving shall be a suitable species equal to or exceeding requirements of No. 3 Common white fir under WWPA Grading Rules, 1 inch thick; or plywood, interior type, Grade A-B, 1/2 inch thick, any species group.

2.2 NAILS

Nails shall be the size and type best suited for the purpose and shall conform to ASTM F 547. Screws for use where nailing is impractical shall be size best suited for purpose.

PART 3 EXECUTION

3.1 OMITTED
3.2 OMITTED
3.3 OMITTED

3.4 MOLDING AND INTERIOR TRIM

Molding and interior trim shall be installed straight, plumb, level and with closely fitted joints. Exposed surfaces shall be machine sanded at the mill. Molded work shall be coped at returns and interior angles and mitered at external corners. Intersections of flatwork shall be shouldered

to ease any inherent changes in plane. Window and door trim shall be provided in single lengths. Blind nailing shall be used to the extent practicable, and face nailing shall be set and stopped with a nonstaining putty to match the finish applied. Screws shall be used for attachment to metal; setting and stopping of screws shall be of the same quality as required where nails are used.

3.5 OMITTED
3.6 OMITTED

3.7 WOODWORK ITEMS

3.7.1 Omitted

3.7.2 Shelving

Shelving shall be anchored to supporting construction. Unless otherwise indicated, shelves shall be supported by wall-supported brackets not more than 24 inches on center or as required to limit deflection to 1/4 inch between supports with a load of 35 pounds per lineal foot. Adjustable shelf hardware shall be steel standards, channel shaped, with 1 inch adjustment slots and brackets designed for attachment to standards.

3.7.3 Clothes Hanger Rods

Rods shall be provided where indicated and in all closets having hook strips. Rods shall be zinc-coated steel pipe 1 inch in diameter. Rods shall be set parallel with the front edges of the shelving, and shall be supported at each end by suitable sockets, and by intermediate brackets spaced at not more than 4-foot centers.

3.8 TABLES

TABLE I. SPECIES AND GRADE TABLES

Grading Rules	Species	Choice	Clear	C Select	C & Better
NELMA Grading Rules					
	Eastern Cedar				X
	Eastern Hemlock		X		
	Tamarack				X
	Eastern W. Pine				X
	Northern Pine				X
	Eastern Spruce			X	
	Balsam Fir		X		
RIS-01	Redwood		X		
SCMA Specs	Cypress			X	
SPIB Rules	Southern Pine				X
WCLIB Std 17	Douglas Fir				X
	Larch				X
	Hemlock Fir				X
	Mountain Hemlock				X
	Sitka Spruce				X
WWPA Grading Rules					
	Douglas Fir				X
	Larch				X
	Hemlock Fir		X		

TABLE I. SPECIES AND GRADE TABLES

Grading Rules	Species	Choice	Clear	C Select	C & Better
	Mountain Hemlock				X
	Western Larch		X		
	Idaho White Pine	X			
	Lodgepole Pine		X		
	Ponderosa Pine		X		
	Sugar Pine		X		
	Englemann Spruce		X		
	Douglas Fir South		X		
	Subalpine Fir		X		

NOTE 1: Western Cedar under WCLIB Std 17 shall be Grade B; and under WWPA Grading Rules, Western Cedar shall be Grade B bevel for siding and Grade A for trim.

NOTE 2: Except as specified in NOTE 3 below, siding and exterior trim shall be any of the species listed above. Interior trim shall be any one of the species listed above and the highest grade of the species for stain or natural finish and one grade below highest grade of species for paint finish.

NOTE 3: Southern Yellow Pine, Douglas Fir, Larch, Western Larch, and Tamarack shall not be used where painting is required and may be used on exterior work only when approved and stained with a preservative type stain.

-- End of Section --

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DIVISION 06 - WOODS & PLASTICS

SECTION 06650

SOLID POLYMER (SOLID SURFACING) FABRICATIONS

10/00

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2.3.8 Omitted
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CEGS-06650 (October 2000)

SECTION 06650

SOLID POLYMER (SOLID SURFACING) FABRICATIONS
10/00

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A136.1	(1992) Organic Adhesives for Installation of Ceramic Tile
ANSI Z124.3	(1995) Plastic Lavatories
ANSI Z124.6	(1997) Plastic Sinks

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 570	(1998) Water Absorption of Plastics
ASTM D 638	(1999) Tensile Properties of Plastics
ASTM D 696	(1998) Coefficient of Linear Thermal Expansion of Plastics Between Minus 30 degrees C and 30 degrees C
ASTM D 2583	(1995) Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
ASTM E 84	(1999) Surface Burning Characteristics of Building Materials
ASTM G 21	(1996) Determining Resistance of Synthetic Polymeric Materials to Fungi
ASTM G 22	(1976; R 1996) Determining Resistance of Plastics to Bacteria

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA LD 3	(1995) High Pressure Decorative Laminates

1.2 GENERAL DESCRIPTION

Work in this section includes vanity tops and tub/shower wall panel systems and other items utilizing solid polymer (solid surfacing) fabrication as shown on the drawings and as described in this specification.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings
Installation

Shop Drawings indicating locations, dimensions, component sizes, fabrication and joint details, attachment provisions, installation details, and coordination requirements with adjacent work.

SD-03 Product Data

Solid polymer material
Qualifications
Fabrications

Product data indicating product description, fabrication information, and compliance with specified performance requirements for solid polymer, joint adhesive, sealants, and heat reflective tape. Both the manufacturer of materials and the fabricator shall submit a detailed description of operations and processes in place that support efficient use of natural resources, energy efficiency, emissions of ozone depleting chemicals, management of water and operational waste, indoor environmental quality, and other production techniques supporting sustainable design and products.

SD-04 Samples

Material

A minimum 4- by 4-inch sample of each color and pattern for approval. Samples shall indicate full range of color and pattern variation. Approved samples shall be retained as a standard for this work.

Counter and Vanity Tops

A minimum 1 foot wide by 6-inch deep full size sample for each type of counter top shown on the project drawings. The sample shall include the edge profile and backsplash as detailed on the project drawings. Solid polymer material shall be of a pattern and color as indicated on the drawings. Sample shall include at least one seam. Approved sample shall be retained as standard for this work.

SD-06 Test Reports

Solid polymer material

Test report results from an independent testing laboratory attesting that the submitted solid polymer material meets or

exceeds each of the specified performance requirements.

SD-07 Certificates

Fabrications
Qualifications

Solid polymer manufacturer's certification attesting to fabricator qualification approval.

SD-10 Operations and Maintenance Data

Solid polymer material
Clean-up

A minimum of six copies of maintenance data indicating manufacturer's care, repair and cleaning instructions. Maintenance video shall be provided,if available. Maintenance kit for matte finishes shall be submitted.

1.4 DELIVERY, STORAGE AND HANDLING

Materials shall not be delivered to project site until areas are ready for installation. Materials shall be stored indoors and adequate precautions taken to prevent damage to finished surfaces. Protective coverings shall be provided to prevent physical damage or staining following installation, for duration of project.

1.5 WARRANTY

Manufacturer's warranty of ten years against defects in materials, excluding damages caused by physical or chemical abuse or excessive heat, shall be provided. Warranty shall provide for material and labor for replacement or repair of defective material for a period of ten years after component installation.

1.6 QUALIFICATIONS

To insure warranty coverage, solid polymer fabricators shall be certified to fabricate by the solid polymer material manufacturer being utilized. All fabrications shall be marked with the fabricator's certification label affixed in an inconspicuous location. Fabricators shall have a minimum of 5 years of experience working with solid polymer materials.

1.7 MOCK-UP

Prior to final approval of shop drawings, a full-size mock-up shall be provided of a typical vanity top where multiple units are required. The mock-up shall include all solid polymer components required to provide a completed unit. The mock-up shall utilize finishes in patterns and colors indicated on the drawings. Should the mock-up not be approved, the Contractor shall re-work or remake it until approval is secured. Rejected units shall be removed from the jobsite. Approved mock-up may remain as part of the finished work.

PART 2 PRODUCTS

2.1 MATERIAL

Solid polymer material shall be a homogeneous filled solid polymer; not coated, laminated or of a composite construction; meeting ANSI Z124.3 and ANSI Z124.6 requirements. Material shall have minimum physical and performance properties specified. Superficial damage to a depth of 0.01 inch shall be repairable by sanding or polishing. Material thickness shall be as indicated on the drawings. In no case shall material be less than 1/4 inch in thickness.

2.1.1 Cast, 100 Percent Acrylic Polymer Solid Surfacing Material

Cast, 100 percent acrylic solid polymer material shall be composed of acrylic polymer, mineral fillers, and pigments and shall meet the following minimum performance requirements:

PROPERTY	REQUIREMENT (min. or max.)	TEST PROCEDURE
Tensile Strength	5800 psi (min.)	ASTM D 638
Hardness	55-Barcol Impressor (min.)	ASTM D 2583
Thermal Expansion	.000023 in/in/F (max.)	ASTM D 696
Boiling water Surface Resistance	No Change	NEMA LD 3-3.05
High Temperature Resistance	No Change	NEMA LD 3-3.06
Impact Resistance (Ball drop)		NEMA LD 3-303
1/4" sheet	36", 1/2 lb ball, no failure	
1/2" sheet	140", 1/2 lb ball, no failure	
3/4" sheet	200", 1/2 lb ball, no failure	
Mold & Mildew Growth	No growth	ASTM G 21
Bacteria Growth	No Growth	ASTM G 22
Liquid Absorption (Weight in 24 hrs.)	0.1% max.	ASTM D 570
Flammability		ASTM E 84
Flame Spread	25 max.	
Smoke Developed	30 max	

2.1.2 Acrylic-modified Polymer Solid Surfacing Material

Cast, solid polymer material shall be composed of a formulation containing acrylic and polyester polymers, mineral fillers, and pigments. Acrylic polymer content shall be not less than 5 percent and not more than 10 percent in order to meet the following minimum performance requirements:

PROPERTY	REQUIREMENT (min. or max.)	TEST PROCEDURE
Tensile Strength	4100 psi (min.)	ASTM D 638
Hardness	50-Barcol Impressor (min.)	ASTM D 2583
Thermal Expansion	.000023 in/in/F (max.)	ASTM D 696
Boiling water Surface Resistance	No Change	NEMA LD 3-3.05
High Temperature Resistance	No Change	NEMA LD 3-3.06
Impact Resistance (Ball drop)		NEMA LD 3-303
1/4" sheet	36", 1/2 lb ball, no failure	
1/2" sheet	140", 1/2 lb ball, no failure	
3/4" sheet	200", 1/2 lb ball, no failure	
Mold & Mildew Growth	No growth	ASTM G 21
Bacteria Growth	No Growth	ASTM G 22
Liquid Absorption (Weight in 24 hrs.)	0.6% max.	ASTM D 570
Flammability		ASTM E 84
Flame Spread	25 max.	
Smoke Developed	100 max	

2.1.3 Material Patterns and Colors

Patterns and colors for all solid polymer components and fabrications shall be those indicated in Section 09000 BUILDING COLOR AND FINISH SCHEDULE. Pattern and color shall occur, and shall be consistent in appearance, throughout the entire depth (thickness) of the solid polymer material.

2.1.4 Surface Finish

Exposed finished surfaces and edges shall receive a uniform appearance. Exposed surface finish shall be matte; gloss rating of 5-20 as indicated on the drawings.

2.2 ACCESSORY PRODUCTS

Accessory products, as specified below, shall be manufactured by the solid polymer manufacturer or shall be products approved by the solid polymer manufacturer for use with the solid polymer materials being specified.

2.2.1 Seam Adhesive

Seam adhesive shall be a two-part adhesive kit to create permanent, inconspicuous, non-porous, hard seams and joints by chemical bond between solid polymer materials and components to create a monolithic appearance of the fabrication. Adhesive shall be approved by the solid polymer manufacturer. Adhesive shall be color-matched to the surfaces being bonded where solid-colored, solid polymer materials are being bonded together. The seam adhesive shall be clear or color matched where particulate patterned, solid polymer materials are being bonded together.

2.2.2 Panel Adhesive

Panel adhesive shall be neoprene based panel adhesive meeting ANSI A136.1, Underwriter's Laboratories (UL) listed. This adhesive shall be used to bond solid polymer components to adjacent and underlying substrates.

2.2.3 Silicone Sealant

Sealant shall be a mildew-resistant, FDA and UL listed silicone sealant or caulk in a clear formulation. The silicone sealant shall be approved for use by the solid polymer manufacturer. Sealant shall be used to seal all expansion joints between solid polymer components and all joints between solid polymer components and other adjacent surfaces such as walls, floors, ceiling, and plumbing fixtures.

2.3 FABRICATIONS

Components shall be factory or shop fabricated to the greatest extent practical to sizes and shapes indicated, in accordance with approved Shop Drawings and manufacturer's requirements. Factory cutouts shall be provided for sinks, lavatories, and plumbing fixtures where indicated on the drawings. Contours and radii shall be routed to template, with edges smooth. Defective and inaccurate work will be rejected.

2.3.1 Joints and Seams

Joints and seams shall be formed between solid polymer components using manufacturer's approved seam adhesive. Joints shall be inconspicuous in appearance and without voids to create a monolithic appearance.

2.3.2 Edge Finishing

Rout and finish component edges to a smooth, uniform appearance and finish. Edge shapes and treatments, including any inserts, shall be as detailed on the drawings. Rout all cutouts, then sand all edges smooth. Repair or reject defective or inaccurate work.

2.3.3 Vanity Top Splashes

Backsplashes and end splashes shall be fabricated from 1/8 inch thick solid surfacing material bonded to a wood substrate and shall be 4 inches high.

Backsplashes and end splashes shall be provided for all vanity tops. Backsplashes shall be shop fabricated and be permanently attached.

2.3.3.1 Permanently Attached Backsplash

Permanently attached backsplashes shall be attached straight with seam adhesive to form a 90-degree transition.

2.3.3.2 End Splashes

End splashes shall be provided loose for installation at the jobsite after horizontal surfaces to which they are to be attached have been installed.

2.3.4 Omitted
2.3.5 Omitted

2.3.6 Vanity Tops

All solid surfacing, solid polymer vanity top components shall be fabricated from 1/8 inch thick material bonded to a wood substrate. Edge details, dimensions, locations, and quantities shall be as indicated on the Drawings. Counter tops shall be complete with 4 inch permanently attached, 90 degree transition and loose endsplashes at all locations. Vanity tops are located in COF's.

2.3.6.1 Omitted

2.3.6.2 Vitreous China Bowl

Countertops with vitreous china bowls shall include cutouts to template as furnished by the sink manufacturer. Manufacturer's standard sink mounting hardware for vitreous china installation shall be provided. Seam between sink and counter top shall be sealed with silicone sealant. Sink, faucet, and plumbing requirements shall be in accordance with Section 15400 PLUMBING,GENERAL PURPOSE.

2.3.7 Omitted
2.3.8 Omitted

2.3.9 Tub/Shower Wall Panel System

Tub/shower wall enclosures shall provide a system of solid polymer components to include: panels, corner trim, soap dish, shampoo shelf, and panel edge trim. Dimensions of all components shall be standard manufacturer's dimensions to be field cut to fit. Panels shall be formed from manufacturer's standard 1/4 inch thick sheet product. Panels shall be full width and height with seams occurring only at the inside corners of the enclosure. Soap dish and shampoo shelf shall be of a configuration, shape, and location as standard with the manufacturer's system.

PART 3 EXECUTION

3.1 COORDINATION

In most instances, installation of solid polymer fabricated components and assemblies will require strong, correctly located structural support provided by other trades. To provide a stable, sound, secure installation, close coordination is required between the solid polymer fabricator/installer and other trades to insure that necessary structural

wall support, cabinet counter top structural support, proper clearances, and other supporting components are provided for the installation of wall panels, countertops, shelving, and all other solid polymer fabrications to the degree and extent recommended by the solid polymer manufacturer. Contractor shall appropriate staging areas for solid polymer fabrications.

3.2 INSTALLATION

3.2.1 Components

All components and fabricated units shall be installed plumb, level, and rigid. Field joints between solid polymer components to provide a monolithic appearance shall be made using solid polymer manufacturer's approved seam adhesives, with joints inconspicuous in the finished work. Metal or vitreous china sinks and lavatory bowls shall be attached to counter tops using solid polymer manufacturer's recommended clear silicone sealant and mounting hardware. Plumbing connections to sinks and lavatories shall be made in accordance with Section 15400 PLUMBING, GENERAL PURPOSE.

3.2.1.1 Loose Counter Top Splashes

Loose splashes shall be adhered to the counter top with a color matched silicone sealant when the solid polymer components are solid colors. Adhesion of particulate patterned solid polymer splashes to counter tops shall utilize a clear silicone sealant.

3.2.1.2 Wall Panels and Panel Systems

Installation of wall panels and system components to substrates shall include the use of a neoprene-based panel adhesive. Seam adhesive shall be used to adhere all solid polymer components to each other with the exception of expansion joints and inside corners. All inside corners and expansion joints between solid polymer components shall be joined with silicone sealant. All joints between solid polymer components and non-solid polymer surfaces shall be sealed with a clear silicone sealant.

3.2.2 Silicone Sealant

A clear, silicone sealant or caulk shall be used to seal all expansion joints between solid polymer components and all joints between solid polymer components and other adjacent surfaces such as walls, floors, ceiling, and plumbing fixtures. Sealant bead shall be smooth and uniform in appearance and shall be the minimum size necessary to bridge any gaps between the solid surfacing material and the adjacent surface. Bead shall be continuous and run the entire length of the joint being sealed.

3.2.3 Plumbing

Plumbing connections to sinks and lavatories shall be made in accordance with Section 15400 PLUMBING, GENERAL PURPOSE.

3.3 CLEAN-UP

Components shall be cleaned after installation and covered to protect against damage during completion of the remaining project items. Components damaged after installation by other trades will be repaired or replaced at the General Contractor's cost. Component supplier will provide a repair/replace cost estimate to the General Contractor who shall approve

estimate before repairs are made.

-- End of Section --

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DIVISION 07 - THERMAL & MOISTURE PROTECTION

SECTION 07131

ELASTOMERIC MEMBRANE WATERPROOFING

09/98

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CEGS-07131 (September 1998)

SECTION 07131

ELASTOMERIC MEMBRANE WATERPROOFING
09/98

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 297	(1993) Rubber Products - Chemical Analysis
ASTM D 412	(1997a) Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D 471	(1996) Rubber Property - Effect of Liquids
ASTM D 624	(1998) Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D 1004	(1994a) Initial Tear Resistance of Plastic Film and Sheeting
ASTM D 1171	(1994) Rubber Deterioration-Surface Ozone Cracking Outdoors or Chamber (Triangular Specimen)
ASTM D 4637	(1996) EPDM Sheet Used in Single-Ply Roof Membrane
ASTM E 96	(1995) Water Vapor Transmission of Materials
ASTM E 154	(1988; R 1993) Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
ASTM G 21	(1990) Determining Resistance of Synthetic Polymeric Materials to Fungi

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Waterproofing

Detail drawings showing size of sheets, position of sheets and splices, flashing and termination details, and expansion joint details.

SD-03 Product Data

Installation

Manufacturer's instructions for installation of the elastomeric membrane, including procedures for preparing the membrane for use, flashing, and splicing. Instructions shall include recommended or required protective covering and procedures for safe handling and use of cleaners, adhesives, and sealants.

SD-07 Certificates

Materials

Certificates of compliance attesting that the materials meet specification requirements. Certificates may show qualification of the identical compound in the specified test.

1.3 DELIVERY, STORAGE, AND HANDLING

Materials shall be delivered to the job site in unopened containers bearing the manufacturer's name, brand name, and description of contents. Membrane, flashing, and adhesives shall be stored in clean, dry areas. Storage temperature for adhesives shall be between 60 and 80 degrees F. Protection board shall be stored flat and off the ground.

PART 2 PRODUCTS

2.1 MATERIALS

Adhesives, mastics, cements, tapes, and primers shall be as recommended by the membrane manufacturer and shall be compatible with the material to which they are to be bonded.

2.1.1 Performance Requirements

All membranes shall meet the following requirements when tested by the referenced ASTM standards:

ASTM E 154 Puncture Resistance	40 pounds, (min.)
ASTM E 96, Procedure B Water Vapor Transmission at 80 degrees F Permeance	0.25 perm (max.)
ASTM G 21 or ASTM E 154 Resistance to Soil Bacteria or Fungi	No sustained growth or discoloration after 21 days

2.1.1.1 Butyl Rubber

Thickness, plus or minus 10 percent	60 mils
ASTM D 297 Specific Gravity	1.2 plus or minus 0.05
ASTM D 412 Tensile Strength	1200 psi (min.)
ASTM D 624 Elongation	300 percent (min.)
ASTM D 624 Tear Resistance	125 pounds/inch (min.)
ASTM D 471 Water Absorption 168 hours @ 158 degrees F	plus 2 percent (max.)
ASTM D 1171 Ozone Resistance 50 pphm in air 100 hours @ 104 degrees F	20 percent

2.1.1.2 Plastic Elastomeric Sheeting

Membrane shall be a minimum of 56 mils thick and shall meet the following requirements:

ASTM D 412, Die C Textile Strength	220 psi (min.)
ASTM D 412, Die C Elongation	250 percent (min.)
ASTM D 1004 Tear Resistance	350 pounds/inch (min.)

2.1.1.3 Composite Self-Adhering Membrane

Membrane shall be a polymeric sheeting integrally bonded to rubberized asphalt with a minimum thickness of 60 mils.

2.1.1.4 Chlorinated Polyethylene (CPE) Sheeting

Membrane shall be uncured chlorinated polyethylene, synthetic elastomeric sheeting of 30 mils nominal thickness.

2.1.1.5 Chloroprene

Chloroprene membrane shall conform to ASTM D 4637, Type II, Grade 1, Class U, 60 mils minimum thickness.

2.1.1.6 Ethylene Propylene Diene Monomer (EPDM) Membrane

EPDM membrane shall conform to ASTM D 4637, Type I, Grade I, Class U, 60 mils minimum thickness.

2.1.2 Protection Board

Protection board for waterproofing membrane shall be 1/2 inch minimum asphalt plank, 1/2 inch fiberboard, 1 inch thick polystyrene foam insulation or premolded bituminous protection board; 1/8 inch thick for vertical surfaces, and 1/4 inch thick for horizontal surfaces. The protection board used must be compatible with the membrane used.

2.2 ACCESSORIES

Flashing, counterflashing, expansion joint covers and corner fillets shall be as recommended by the membrane manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

Surfaces to which waterproofing is to be applied shall be clean, smooth, and free from deleterious materials and projections. Holes, honeycomb, cracks, or cavities shall be pointed or filled and finished flush with Portland cement mortar. Top surfaces of projecting masonry or concrete ledges below grade, except footings, shall be beveled. Before waterproofing is applied, the surfaces to be covered shall be swept to remove all dust and foreign matter. Concrete surfaces shall be cured 30 days prior to receiving elastomeric waterproofing and shall not be cured with compounds containing wax or oil. Masonry surfaces to be waterproofed shall have joints struck flush.

3.2 APPLICATION

Waterproofing shall not be applied to wet surfaces. The ambient and surface temperatures shall be above 40 degrees F during application. Membrane under slabs shall be carried up abutting vertical surfaces to the level of finish of floor or to within 1/2 inch of the top edge of base where base is shown and cemented solid to the substrate. Membrane shall not be continuous through walls, floors, piers, and columns unless otherwise shown. Concrete surfaces shall be primed to receive the membrane. Membranes shall be handled and installed in accordance with the approved installation instructions. Primers, adhesives, and mastics shall be applied in accordance with the membrane manufacturer's printed instructions. Laps shall be oriented so that water will flow over the lap, and not into them. As soon as the mastic is fully set and dry, joints shall be checked. Where any openings or fishmouths appear, joints shall be resealed and rerolled. Wrinkles and buckles shall be avoided in applying membrane and joint reinforcement. Nonadhering membranes shall be unrolled and allowed to remain flat for at least 2 hours before application. Membranes shall be drawn tight during installation without stretching. Self-adhering membrane shall be installed by removing the release sheets on the back of the membrane and applying the tacky surface onto the primed surface. Laps and splices shall be sealed prior to completion of a day's work.

3.2.1 Butyl Rubber Installation

Each sheet shall be lapped at sides and ends a minimum of 6 inches over the preceding sheet. Lap and splice areas of membrane shall be cleaned with heptane, hexane, or white gasoline. Unvulcanized compounded butyl tape, 6 inches wide shall be applied between lapped splices so that the tape extends approximately 1/4 inch beyond the exposed sheeting edge. The tape

shall be rolled firmly into place as it is applied. Tape backing shall be removed and the lapped sheeting rolled or pressed into place. Splicing adhesive shall be applied to the lapped area 3-1/2 inches on either side of the lapped edge. The splice adhesive shall be allowed to dry thoroughly and the lap reinforced with 6 inch wide unvulcanized compounded butyl tape. Full contact shall be made for all lap areas. Corner splices and flashing overlaps shall be reinforced with a 12 inch wide strip of membrane over one layer of butyl tape or with a prefabricated corner of butyl rubber.

3.2.2 Plastic Elastomeric Sheeting Installation

Sheeting shall be applied in sections no longer than 18 feet. Each sheeting shall be lapped at sides and ends a minimum of 6 inches over the preceding sheet. Lap splices shall be reinforced with 12-inch wide strips of plastic sheeting or as recommended in the approved installation instructions. Lap and splices shall be sealed in a full bed of adhesive at the rate recommended by the manufacturer of the material. Sheeting and joint strips shall be rolled with 50- to 100-pound roller on horizontal and 6 inch rubber hand roller on vertical surfaces.

3.2.3 Composite Self-Adhering Membrane Installation

On vertical surfaces, membrane shall be applied in lengths up to 8 feet starting at the bottom. Each sheet shall be lapped at edges and ends a minimum of 2-1/2 inches over the preceding sheets. The membrane shall be rolled to adhere with the substrate. Corners and joints shall be double-covered by first applying a 12-inch width of membrane centered along the corner or joint. Inside and outside corners shall then be covered with membrane. Exposed termination edges of membrane on horizontal or vertical surfaces shall be finished with a troweled bead of mastic. Mastic shall be applied around termination edges of membrane and around drains and projections. Mastic shall be applied at the termination of each day's work.

3.2.4 Chlorinated Polyethylene (CPE) Sheeting Installation

Sheets shall be lapped at edges and ends a minimum of 2-1/2 inches over the preceding sheet. All horizontal membranes shall overlap vertical surfaces by at least 3 inches.

3.2.5 Chloroprene Rubber Sheeting

Each sheet shall overlap the previously installed sheet by a minimum of 3 inches. Sheet shall be folded lengthwise to expose one half of the underside of the sheet for cleaning the sheet with cleaner recommended by the manufacturer. Adhesive shall be applied to sheet and substrate. Two coats of adhesive are required on the substrate with 1/2 hour between coats. Sheet shall not be bonded to substrate until adhesive does not come off at a dry finger touch. Chalk lines or masking tape shall be used as guides for adhesive application and positioning sheets. After adhesive has dried, sheet shall be folded back onto the substrate or previously applied sheet membrane. Membrane shall be rolled to obtain complete adhesion. The exposed edge of each sheet shall be further sealed with a fillet-shaped bead of adhesive, tooled to obtain positive contact with the surface of both sheets.

3.3 TESTS

When required, and after the system is cured, the membranes on horizontal surfaces shall be tested by flooding the entire waterproofed area with a

minimum of 2 inches head of water for a period of 24 hours. There shall be no water added after the start of the period. Water level shall be measured at the beginning and at the end of the 24-hour period. If the water level falls, remove the water and inspect the waterproofing membrane. Leak sites shall be marked, dried and repaired, and the test shall be repeated.

3.4 PROTECTION

Horizontal applications of membrane shall be protected from traffic during installation. No equipment shall be allowed directly on the membrane. Plywood, or similar material, overlayment shall be provided for wheel-ways. Walkways shall be provided where heavy traffic from other trades is expected. Materials shall not be stored on the membrane. A protective covering shall be installed over the membrane immediately after installation or testing. If membrane is to be exposed, a temporary covering shall be applied to protect the membrane until the protection board is installed.

3.4.1 Projections

Projections passing through membrane shall be flashed as recommended by the manufacturer of the waterproofing membrane.

3.4.2 Counterflashing

Waterproofing connecting with work exposed to the weather shall be counterflashed to form a watertight connection. Upper edge of membrane waterproofing and protective covering shall be counterflashed.

3.4.3 Expansion Joints and Fillets

Expansion joints and corner fillets shall be installed as recommended by the manufacturer of the waterproofing membrane.

3.4.4 Vertical Membrane Waterproofing

Waterproofing shall be protected with a 1/2 inch minimum fiberboard, 1/2 inch asphalt-impregnated fiberboard, 1 inch polystyrene foam insulation or 1/8 inch compatible water-resistant (bitumen type) protection board. Edges of protection shall be butted, and exposed surfaces shall be covered by a coating of bitumen.

3.4.5 Horizontal Membrane Waterproofing

Waterproofing shall be covered with Portland cement mortar not less than 3/4 inch thick, uniformly placed, and allowed to set before subsequent construction is installed.

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SECTION 07220A

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10/01

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UFGS-07220A (October 2001)

SECTION 07220A

ROOF INSULATION
10/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM P9513	(1996) Loss Prevention Data for Roofing Contractors
FM P7825a	(1998) Approval Guide Fire Protection
FM P7825c	(1998) Approval Guide Building Materials

UNDERWRITERS LABORATORIES (UL)

UL Bld Mat Dir	(1999) Building Materials Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Application of Insulation

Insulation manufacturer's recommendations for the application and installation of insulation.

Inspection

The inspection procedure for insulation installation, prior to start of roof insulation work.

SD-07 Certificates

Insulation

Certificate attesting that the expanded perlite or polyisocyanurate insulation contains recovered material and showing estimated percent of recovered material. Certificates of compliance for felt materials.

1.3 STORAGE OF MATERIALS

Insulation materials shall be stored in accordance with manufacturer's instructions. Insulation, base sheet, and felt shall be kept dry at all times, before, during, and after delivery to the site and shall be stored in an enclosed building or in a closed trailer. Wet insulation, wet base sheet or wet felt shall be permanently removed from the site.

1.4 FIRE CLASSIFICATION

Insulation shall have been tested as part of a roof construction assembly of the type used in this project, and the construction shall be listed as Fire-Classified in UL Bld Mat Dir or Class I in FM P7825a.

PART 2 PRODUCTS

2.1 OMITTED

2.2 INSULATION

Insulation shall be a standard product of the manufacturer and shall be factory marked with the manufacturer's name or trade mark, the material specification number, the R-value at 75 degrees F, and the thickness. Minimum thickness shall be as recommended by the manufacturer. Boards shall be marked individually. The thermal resistance of insulation shall be not less than the R-value shown on the drawings. The insulation manufacturing process shall not include chlorofluoro carbons (CFC) or formaldehydes. Contractor shall comply with EPA requirements in conformance with Section 01670 RECYCLED / RECOVERED MATERIALS. Insulation shall be one, or a combination of the following materials:

2.2.1 Omitted
2.2.2 Omitted
2.2.3 Omitted
2.2.4 Omitted
2.2.5 Omitted
2.2.6 Omitted
2.2.7 Omitted
2.2.8 Omitted

2.2.9 Vented Nail Base Insulation

Vented nail base insulation shall be a polyisocyanurate insulation board bonded to a minimum 3/8 inch thick APA rated waferboard or oriented strand board (OSB) on the top side and a glass fiber reinforced felt facer on the bottom side. The thickness of the vented nail base insulation shall be as required to provide the R-value shown on the drawing. However, the minimum thickness shall be 1-1/2 inches. There shall be a minimum 1 inch venting space between the insulation board and nail base board. Venting spacers shall be designed to allow approximately 50 percent free space below the nail base to allow for cross ventilation in any direction. Insulation sides and ends shall have tongue and groove profile to reduce heat loss at the joints.

2.3 FASTENERS

Fasteners shall be specifically designed screws and plates or spikes and plates of sufficient length to hold insulation securely in place. Fasteners shall conform to insulation manufacturer's recommendations except

that holding power, when driven, shall be not less than 40 pounds each in steel deck. Fasteners for steel decks shall conform to FM P7825c for Class I roof deck construction, and shall be spaced to withstand an uplift pressure of 60 pounds per square foot.

2.4 OMITTED
2.5 OMITTED
2.6 OMITTED

2.7 WOOD NAILERS

Wood nailers shall conform to Section 06100A ROUGH CARPENTRY, including preservative treatment. Edge nailers shall be not less than nominal 6 inches wide and of thickness to finish flush with the top surface of the insulation. Surface mounted nailers shall be a nominal 3 inches wide by the full thickness of the insulation.

PART 3 EXECUTION

3.1 COORDINATION REQUIREMENTS

Insulation and roofing membrane shall be finished in one operation up to the line of termination at the end of each day's work. Completed sections shall be glaze coated when more than one day is required to finish the roofing. Phased construction will not be permitted.

3.2 ENVIRONMENTAL CONDITIONS

The temperature of the roofing materials shall be as required by the manufacturer. There shall be no visible ice, frost, or moisture on the roof deck when the insulation and roofing are installed. Wind conditions shall be suitable for installation of insulation.

3.3 SUBSTRATE PREPARATION

The substrate construction of any bay or section of the building shall be completed before insulation work is begun thereon. Substrate surface shall be smooth, clean, and dry at time of application.

3.4 OMITTED
3.5 OMITTED

3.6 INSTALLATION OF WOOD NAILERS

Nailers shall be secured to steel decks as indicated. Bolt anchors shall have nuts and washers countersunk, and bolts shall be cut flush with top of nailer. Powder-actuated fasteners, sized and spaced for nailer anchorage equivalent to that specified and indicated, may be used when approved. Surface mounted nailers shall be installed parallel with the roof slope and shall be spaced not over 47 inches face-to-face, except that where the insulation units are less than 47 inches in length the nailers shall be spaced to minimize cutting of the insulation.

3.7 APPLICATION OF INSULATION

Units of insulation shall be laid in courses parallel with the roof slope. End joints shall be staggered. Insulation shall be cut to fit neatly against adjoining surfaces. Joints between insulation boards shall not exceed 1/4 inch. Where insulation is applied over steel deck, long edge

joints shall continuously bear on surfaces of the steel deck. Insulation which can be readily lifted after installation is not considered to be adequately secured. Insulation shall be applied so that all roof insulation applied each day is waterproofed the same day. Phased construction will not be permitted.

3.7.1 Mechanical Fastening

On steel decks insulation shall be mechanically fastened. Method of attachment shall be in accordance with recommendations of the insulation manufacturer and requirements specified.

3.7.2 Steel Decks

Insulation on steel deck shall be compatible with mechanical fastening and shall meet fire resistant requirements.

3.7.3 Omitted
3.7.4 Omitted

3.7.5 Protection Requirements

The insulation shall be kept dry at all times. Insulation boards shall not be kicked into position. Exposed edges of the insulation shall be protected by cutoffs at the end of each work day or whenever precipitation is imminent. Cutoffs shall be 2 layers of bituminous-saturated felt set in plastic bituminous cement. Cutoffs shall be removed when work is resumed. Edges of insulation at open spaces between insulation and parapets or other walls and spaces at curbs, scuttles, and expansion joints, shall be protected until permanent roofing and flashing is applied.

3.8 INSPECTION

The Contractor shall establish and maintain an inspection procedure to assure compliance of the installed roof insulation with the contract requirements. Any work found not to be in compliance with the contract shall be promptly removed and replaced or corrected in an approved manner. Quality control shall include, but not be limited to, the following:

a. Observation of environmental conditions; number and skill level of insulation workers; start and end time of work.

b. Verification of certification, listing or label compliance with FM P9513.

c. Verification of proper storage and handling of insulation and vapor retarder materials before, during, and after installation.

d. Inspection of vapor retarder application, including edge envelopes and mechanical fastening.

e. Inspection of mechanical fasteners; type, number, length, and spacing.

f. Coordination with other materials, cants, sleepers, and nailing strips.

g. Inspection of insulation joint orientation and laps between layers, joint width and bearing of edges of insulation on deck.

h. Installation of cutoffs and proper joining of work on subsequent days.

i. Continuation of complete roofing system installation to cover insulation installed same day.

-- End of Section --

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SECTION 07240

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UFGS-07240 (October 2001)

SECTION 07240

EXTERIOR INSULATION AND FINISH SYSTEMS
10/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred within the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 117	(1997) Operating Salt Spray (Fog) Apparatus
ASTM C 67	(2000)Sampling and Testing Brick and Structural Clay products
ASTM C 150	(2000) Portland Cement
ASTM C 473	(2000) Physical Testing of Gypsum Panel Products
ASTM C 578	(1995) Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 920	(1998) Elastomeric Joint Sealants
ASTM C 1177/C 1177M	(1999) Glass Mat Gypsum Substrate for Use as Sheathing
ASTM C 1186	(1999; Rev. A) Flat Non-Asbestos Fiber-Cement Sheets
ASTM D 2247	(1999) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D 3273	(2000) Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
ASTM E 84	(2000) Surface Burning Characteristics of Building Materials
ASTM E 136	(1999) Behavior of Materials in Vertical Tube Furnace at 750 Degrees C
ASTM E 331	(2000) Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

ASTM E 695	(1997) Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading
ASTM G 23	(1996) Operating Light-Exposure Apparatus (Carbon-Arc Type) with and Without Water for Exposure of Nonmetallic Materials

EXTERIOR INSULATION MANUFACTURERS ASSOCIATION (EIMA)

EIMA TM 101.01	(1995) Freeze/Thaw Resistance of Exterior Insulation and Finish Systems (EIFS), Class PB.
EIMA TM 101.86	(1995, Rev. Aug. 1995) Resistance of Exterior Insulation and Finish Systems, Class PB, to the Effects of Rapid Deformation (Impact)
EIMA TM 105.01	(1995) Alkali Resistance of Glass Fiber Reinforcing Mesh for Use in Exterior Insulation and Finish Systems

INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)

UBC 26-4	Evaluation of Flammability Characteristics of Exterior, Non load-Bearing Wall Panel Assemblies using Foam Plastic Insulation
UBC 26-9	Evaluation of Flammability Characteristics of Exterior Non load-Bearing Wall Assemblies Containing Combustible Components using Intermediate-Scale, Multistory Test Apparatus Title

NATIONAL FIRE PROTECTION ASSOCIATION, INC. (NFPA)

NFPA 268	(1996) Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source

1.2 SYSTEM DESCRIPTION AND REQUIREMENTS

The drainable exterior insulation and finish system (EIFS) shall be a job-fabricated exterior wall covering consisting of sheathing, insulation board, reinforcing fabric, base coat, finish coat, adhesive and mechanical fasteners as applicable. The system components shall be compatible with each other and with the substrate as recommended or approved by, and the products of, a single manufacturer regularly engaged in furnishing Exterior Insulation and Finish Systems. All materials shall be installed by an applicator approved by the system manufacturer. EIFS shall be Class PB and shall be color and finish as indicated in Section 09000 BUILDING COLOR AND FINISH SCHEUDLE.

1.2.1 System Requirements and Tests

The system shall meet the performance requirements as veryfied by the tests listed below. Where a wall system of similar type, size, and design as specified for this project has been previously tested under the condition

specified herein, the resulting test reports may be submitted in lieu of job specific tests.

1.2.1.1 Water Penetration

Test the system for water penetration by uniform static air pressure in accordance with ASTM E 331. There shall be no penetration of water beyond the plane of the base coat/EPS board interface after 15 minutes at 6.4 psf or 20% of positive design wind pressure, whichever is greater.

1.2.1.2 Wind Load

Test the system for wind load by uniform static air pressure in accordance with ASTM E 330 (procedure A) to a minimum pressure of 30 psf. There shall be no permanent deformation, delamination, or other deterioration.

1.2.1.3 Full scale or intermediate scale fire test

Conduct wall fire test using apparatus, specimen, performance criteria, and procedure in accordance with UBC 26-4. The specimen shall include the complete system using 102mm (4-inch) thick insulation board. At the option of the Contractor, UBC 26-9, Intermediate-Scale Test may be substituted in lieu of the Full-Scale Multi- Story Fire test. The following requirements shall be met:

a. No vertical spread of flame within core of panel from one story to the next.

b. No flame spread over the exterior surface.

c. No vertical flame spread over the interior surface from one story to the next.

d. No significant lateral spread of flame from compartment of fire origin to adjacent spaces.

1.2.1.4 Mock-Up Installation of EIFS

Complete wall mock-up installation 4 feet high by 6 feet wide, including typical control joints. Control joints to be filled with sealant of type, manufacturer, and color selected. Construct mock-up installation at job site. Build mock-up to comply with the following requirements, using materials indicated for the completed work:

a. Locate mock-up installation(s) in the location and size as directed by the Contracting Officer.

b. Demonstrate the proposed range of color, texture, thickness, insulation, and workmanship.

c. Obtain Contracting Officer's written approval of mock-up before starting fabrication of work.

d. Maintain mock-up installation(s) during construction as a standard for judging the completed work by protecting them from weather and construction activities.

e. When directed, demolish and remove mock-up from the site.

1.2.2 Component Requirements and Tests

The components of the system shall meet the performance requirements as veryfied by the tests listed below.

1.2.2.1 Surface Burning Characteristics

Conduct ASTM E 84 test on samples consisting of insulation board, base coat, reinforcing fabric, and finish coat. Cure for 28 days. The flame spread index shall be 25 or less and the smoke developed index shall be 450 or less.

1.2.2.2 Radiant Heat

The system shall be tested in accordance with NFPA 268 with no ignition during the 20-minute period.

1.2.2.3 Impact Resistance

a. Class PB Systems: Hemispherical Head Test; 28-day cured specimen of PB EIFS in accordance with EIMA TM 101.86. The test specimen shal exhibit no broken reinforcing fabric per EIMA TM 101.86 at an impact of 25-49 inch/pounds.

b. Impact Mass: Test 28-day cured specimen of PM EIFS in accordance with ASTM E 695. The test specimen shall exhibit no cracking or denting after twelve impacts by 30 pounds lead shot mass from 6-inch to 6 feet drop heights in 6-inch intervals.

1.2.3 Sub-Component Requirements and Tests

Unless otherwise stated, the test specimen shall consist of reinforcement, base coat, and finish coat applied in accordance with manufacturer's printed recommendations to the insulation board to be used on the building. For mildew resistance, only the finish coat is applied onto glass slides for testing. These specimen shall be suitably sized for the apparatus used and be allowed to cure for a minimum of 28 days prior to testing.

1.2.3.1 Abrasion Resistance

Test in accordance with ASTM D 968, Method A. Test a minimum of two specimens. After testing, the specimens shall show only very slight smoothing, with no loss of film integrity after 132 gallons of water.

1.2.3.2 Accelerated Weathering

Test in accordance with ASTM G 23, Method 1. After 2000 hours specimens shall exhibit no visible cracking, flaking, peeling, blistering, yellowing, fading, or other such deterioration.

1.2.3.3 Mildew Resistance

Test in accordance with ASTM D 3273. The specimen shall consist of the finish coat material, applied to clean 3-inch by 4-inch glass slides and shall be allowed to cure for 28 days. After 28 days of exposure, the specimen shall not show any growth.

1.2.3.4 Salt Spray Resistance

Test in accordance with ASTM B 117. The specimen shall be a minimum of 4-inch by 6-inch and shall be tested for 300 hours. After exposure, the specimen shall exhibit no observable deterioration, such as chalking, fading, or rust staining.

1.2.3.5 Water Resistance

Test in accordance with ASTM D 2247. The specimen shall be a minimum of 4-inch by 6-inch. After 14 days, the specimen shall exhibit no cracking, checking, crazing, erosion, blistering, peeling, or delamination.

1.2.3.6 Absorption-Freeze/Thaw

Class PB systems shall be tested in accordance with EIMA TM 101.01 for 60 cycles of freezing and thawing. No cracking, checking, or splitting, and neglible weight gain. Class PM systems shall be tested in accordance with ASTM C 67 for 50 cycles of freezing and thawing. After testing, the specimens shall exhibit no cracking or checking, and have negligible weight gain.

1.2.3.7 Sample Boards

Unless otherwise stated, provide sample EIFS Component 12 by 24 inches, on sheathing board, including finish color and texture, typical joints and sealant. If more than one color, finish, or pattern is used, provide one sample for each. The test specimen shall consist of reinforcement, base coat, and finish coat applied in accordance with manufacturer's printed recommendations to the insulation board to be used on the building.

1.2.4 Moisture Analysis

Perform a job specific vapor transmission analysis based on project specific climate and specified wall components and materials. Indicate the temperatures and relative humidities for the inside and outside of the building; a complete listing of the building components, their thickness, thermal resistance and permeance, as well as building location and use. If a mathematical model was used for the analysis, include the name of the model and the supplier/developer.

1.3 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Shop Drawings

Show wall layout, construction and expansion joints, decorative grooves, layout of sheathing board, thermal insulation board, and reinforcement mesh and strip reinforcing fabric; joint and flashing details; details at wall penetrations; types and location of fasteners; details at windows and details at base, roof, parapet, and corners.

SD-03 Product Data

Sheathing board

Thermal insulation

Adhesive

Mechanical Fasteners

Accessories

Base coat

Portland cement

Reinforcing fabric

Finish coat

Joint Sealant

Primer

Bond breaker

Backer Rod

Warranty

Include joint and other details, such as end conditions, corners, windows, parapet. Include shelf life and recommended cleaning solvents in data for sealants. Include material safety data sheets (MSDS) for all components of the EIFS. The MSDS shall be available at the job site.

SD-04 Samples

Sample Boards

Color and Texture

Mock-up Installation of EIFS

SD-05 Design Data

Wind load Calculations

Moisture analysis Calculations

SD-06 Test Reports

Abrasion resistance

Accelerated weathering

Impact resistance

Mildew resistance

Salt spray resistance

Water vapor transmission

Absorption-freeze-thaw

Flame spread

Water penetration

Water resistance

Full scale or intermediate scale fire test

Flame spread

Radiant heat

Wind load

SD-07 Certificates

Qualifications of EIFS Manufacturer

Qualification of EIFS Installer

Qualification of Sealant Applicator

Certify that EIFS installer meets requirements specified under paragraph "Qualification of Installer," and that sealant applicator is approved by the EIFS Manufacturer.

Qualifications of Third Party Inspector

Submit evidence that third party inspector has current certification from the Exterior Design Institute or equal inspector certification as inspector for the installation of EIFS.

Inspection Check List

Submit filled-out inspection check list as required in paragraph "Quality Control," certifying that the installation of critical items meets the requirements of this specification.

SD-08 Manufacturer's Instructions

Installation

Manufacturer's standard printed instructions for the installation of the EIFS. Include requirements for condition and preparation of substrate, installation of EIFS, and requirements for sealants and sealing.

SD-10 Operation and Maintenance Data

EIFS

Include detailed finish repair procedures and information regarding compatibility of sealants with base and finish coatings.

1.4 QUALITY ASSURANCE

1.4.1 Qualifications of EIFS Manufacturer

The EIFS shall be the product of a manufacturer who has been in the practice of manufacturing and designing EIFS for a period of not less than 3 years, and has been involved in at least five projects similar to this project in size, scope, and complexity, in the same or a similar climate as this project.

1.4.2 Qualification of EIFS Installer

The EIFS Installer shall be trained and approved by the EIFS manufacturer to install the system and shall have successfully installed at least five projects at or near the size and complexity of this project. The Contractor shall employ qualified workers trained and experienced in installing the manufacturer's EIFS.

1.4.3 Qualification of Sealant Applicator

The sealant applicator shall be experienced and competent in the installation of high performance industrial and commercial sealants and shall have successfully installed at least five projects at or near the size and complexity of this project.

1.4.4 Insulation Board

Insulation board shall be approved and labeled under third party quality program as required by applicable building code.

1.4.5 Pre-Installation Conference

After approval of submittals and before commencing any work on the EIFS, including installation of any sheathing board, insulation, and associated work, the Contracting Officer will hold a pre-installation conference to review:

a. Drawings, specifications, and samples;

b. Procedure for on site inspection and acceptance of EIFS substrate and pertinent details (for example, mock-up installation);

c. Contractor's plan for coordination of work of the various trades involved in providing EIF system and other components;

d. Inspection procedures; and

e. Safety requirements.

Pre-installation conference shall be attended by the Contractor, EIFS Q.C. Specialist (EIFS Inspector), and all personnel directly responsible for installation of the EIF system, including sealant applicator, and personnel responsible for related work, such as flashing and sheet metal, windows and doors, and a representative of the EIFS manufacturer. Before beginning EIFS work, the Contractor shall confirm in writing the resolution of conflicts among those attending the preinstallation conference.

1.5 DELIVERY AND STORAGE

Deliver materials to job site in original unopened packages, marked with

manufacturer's name, brand name, and description of contents. Store materials off the ground and in accordance with the manufacturer's recommendations in a clean, dry, well-ventilated area. Protect stored materials from rain, sunlight, and excessive heat. Keep coating materials which would be damaged by freezing at a temperature not less than 40 degrees F. Do not expose insulation board to flame or other ignition sources.

1.6 ENVIRONMENTAL CONDITIONS

a. Do not prepare materials or apply EIFS during inclement weather unless appropriate protection is provided. Protect installed materials from inclement weather until they are dry.

b. Apply sealants and wet materials only at ambient temperatures of 40 degrees F or above and rising, unless supplemental heat is provided. The system shall be protected from inclement weather and to maintain this temperature for a minimum of 24 hours after installation.

c. Do not leave insulation board exposed to sunlight after installation.

1.7 WARRANTY

Furnish manufacturer's standard warranty for the EIFS. Warranty shall run directly to Government and cover a period of not less than 5 years from date Government accepted the work.

PART 2 PRODUCTS

2.1 COMPATIBILITY

Provide all materials compatible with each other and with the substrate, and as recommended by EIFS manufacturer.

2.2 SHEATHING BOARD

2.2.1 Fiber Reinforced Cement Sheathing Board

a. Meet ASTM C 1186, Type B, Grade I.

b. Non-combustible per ASTM E 136.

c. Nail Pull Resistance: No less than 120 pounds when tested in accordance with ASTM C 473.

d. Thickness no less than 1/2 inch.

e. Water Absorption not to exceed 17 percent.

2.2.2 Glass Mat Gypsum Sheathing Board

a. Conform to ASTM C 1177/C 1177M.

b. Nail Pull Resistance: No less than 120 pounds when tested in accordance with ASTM C 473.

2.3 ADHESIVE

Manufacturer's standard product, including primer as required, and shall be compatible with substrate and insulation board to which the system is applied.

2.4 OMITTED

2.5 MECHANICAL FASTENERS

Corrosion resistant and as approved by EIFS manufacturer. Select fastener type and pattern based on applicable wind loads and substrate into which fastener will be attached, to provide the necessary pull-out, tensile, and shear strengths.

2.6 THERMAL INSULATION

2.6.1 Manufacturer's Recommendations

Provide only thermal insulation recommended by the EIFS manufacturer for the type of application intended.

2.6.2 Insulation Board

Insulation board shall be standard product of manufacturer and shall be compatible with other systems components. Boards shall be factory marked individually with the manufacturer's name or trade mark, the material specification number, the R-value at 75 degree F, and thickness. No layer of insulation shall be less than 3/4 inch thick. The maximum thickness of all layers shall not exceed 4-inch. Insulation board shall be certified as aged, in block form, prior to cutting and shipping, a minimum of 6 weeks by air drying, or equivalent.

a. Thermal resistance: As indicated.

b. Insulating material: ASTM C 578 Type I or IV, as recommended by the EIFS manufacturer and treated to be compatible with other EIFS components. Age insulation by air drying a minimum of 6 weeks prior to cutting and shipping.

2.7 BASE COAT

Manufacturer's standard product and compatible with other systems components.

2.8 PORTLAND CEMENT

Conform to ASTM C 150, Type I or II as required, fresh and free of lumps, and approved by the systems manufacturer.

2.9 REINFORCING FABRIC

Reinforcing fabric mesh shall be alkali-resistant, balanced, open weave, glass fiber fabric made from twisted multi-end strands specifically treated for compatibility with the other system materials, and comply with EIMA TM 105.01 and as recommended by EIFS manufacturer.

2.10 FINISH COAT

Manufacturer's standard product conforming to the requirements in the

paragraph on Sub-Component Requirements and Tests. For color consistency, use materials from the same batch or lot number.

2.11 PRIMER

Non-staining, quick-drying type recommended by sealant manufacturer and EIFS manufacturer.

2.12 ACCESSORIES

Conform to recommendations of EIFS manufacturer, including trim, edging, anchors, expansion joints. All metal items and fasteners to be corrosion resistant.

2.13 JOINT SEALANT

Non-staining, quick-drying type meeting ASTM C 920, Class 25, compatible with the finish system type and grade, and recommended by both the sealant manufacturer and EIFS manufacturer.

2.14 BOND BREAKER

As required by EIFS manufacturer and recommended by sealant manufacturer and EIFS manufacturer.

2.15 BACKER ROD

Closed cell polyethylene free from oil or other staining elements and as recommended by sealant manufacturer and EIFS manufacturer. Do not use absorptive materials as backer rod. The backer rod should be sized 25 percent larger than the width of the joint.

PART 3 EXECUTION

3.1 EXAMINATION

Examine substrate and existing conditions to determine that the EIFS can be installed as required by the EIFS manufacturer and that all work related to the EIFS is properly coordinated. Surface shall be sound and free of oil, loose materials or protrusions which will interfere with the system installation. If deficiencies are found, notify the Contracting Officer and do not proceed with installation until the deficiencies are corrected. The substrate shall be plane, with no deviation greater than 1/4 inch when tested with a 10-foot straightedge. Determine flatness, plumbness, and any other conditions for conformance to manufacturer's instructions.

3.2 SURFACE PREPARATION

Prepare existing surfaces for application of the EIFS to meet flatness tolerances and surface preparation according to manufacturer's installation instructions but provide a flatness of not more than 1/4 inch in 10 feet. Provide clean surfaces free of oil and loose material without protrusions adversely affecting the installation of the insulation board. Due to substrate conditions or as recommended by the system manufacturer, a primer may be required. Use masking tape to protect areas adjacent to the EIFS to prevent base or finish coat to be applied to areas not intended to be covered with the EIFS. The Contractor shall not proceed with the installation until all noted deficiencies of the substrate are corrected.

3.3 INSTALLATION

Install EIFS as indicated, comply with manufacturer's instructions except as otherwise specified, and in accordance with the shop drawings. EIFS shall be installed only by an applicator trained and approved by the EIFS manufacturer. Specifically, include all manufacturer recommended provisions regarding flashing and treatment of wall penetrations.

3.3.1 Sheathing Board

Edges and ends of boards shall be butted snugly with vertical joints staggered to provide full and even support for the insulation. Do not align sheathing board joints with wall openings. Provide support at both vertical and horizontal joints. Attach sheathing board to metal studs with self-tapping drywall screws. Place fasteners sufficiently close to support imposed loads, but not more than 8 inches apart on each supporting stud. Space fasteners more closely when required for negative wind load resistance.

3.3.2 Insulation Board

Unless otherwise specified by the system manufacturer, place the long edge horizontally from level base line. Stagger vertical joints and interlock at corners. Butt joints tightly. Provide flush surfaces at joints. Offset insulation board joints from joints in sheathing by at least 8 inches. Use L-shaped insulation board pieces at corners of openings. Joints of insulation shall be butted tightly. Surfaces of adjacent insulation boards shall be flush at joints. Gaps greater than 1/16 inch between the insulation boards shall be filled with slivers of insulation. Uneven board surfaces with irregularities projecting more than 1/16 inch shall be rasped in accordance with the manufacturer's instructions to produce an even surface. Attach insulation board as recommended by manufacturer. The adhered insulation board shall be allowed to remain undisturbed for 24 hours prior to proceeding with the installation of the base coat/reinforcing mesh, or longer if necessary for the adhesive to dry. However, do not leave insulation board exposed longer than recommended by insulation manufacturer.

3.3.2.1 Mechanically Fastened Insulation Boards

Fasten with manufacturer's standard corrosion resistant anchors, spaced as recommended by manufacturer, but not more than 2 feet horizontally and vertically.

3.3.2.2 Adhesively Fastened Insulation Boards

Apply insulation board using adhesive spread with a notched trowel to the back of the insulation boards in accordance with the manufacturer’s instructions.

3.3.3 Base Coat and Reinforcing Fabric Mesh

3.3.3.1 Class PB Systems

Mix base coat in accordance with the manufacturer's instructions and apply to insulated wall surfaces to the thickness specified by the system manufacturer and provide any other reinforcement recommended by EIFS manufacturer. Trowel the reinforcing fabric mesh into the wet base coat material. Fully embed the mesh in the base coat. When properly worked-in,

the pattern of the reinforcing fabric mesh shall not be visible. Provide diagonal reinforcement at opening corners. Back-wrap all terminations of the EIFS. Overlap the reinforcing fabric mesh a minimum of 2 inches on previously installed mesh, or butted, in accordance with the manufacturer’s instructions. Allow the adhered insulation board to dry for 24 hours, or longer if necessary, prior to proceeding with the installation of the base coat/reinforcing fabric mesh. Install reinforcing fabric in accordance with and manufacturer's instructions.

3.3.4 Finish Coat

Apply and level finish coat in one operation. Obtain final texture by trowels, floats, or by spray application as necessary to achieve the required finish matching approved mock-up installation. Apply the finish coat to the dry base coat maintaining a wet edge at all times to obtain a uniform appearance. The thickness of the finish coat shall be in accordance with the system manufacturer’s current published instructions. Apply finish coat so that it does not cover surfaces to which joint sealants are to be applied. The base coat/reinforcing mesh must be allowed to dry a minimum of 24 hours prior to the application of the finish coat. Surface irregularities in the base coat, such as trowel marks, board lines, reinforcing mesh laps, etc., shall be corrected prior to application of the finish coat.

3.4 JOINT SEALING

Seal EIFS at openings as recommended by the system manufacturer. Apply sealant only to the base coat. Do not apply sealant to the finish coat.

3.4.1 Surface Preparation, Backer Rod, and Primer

Immediately prior to application, remove loose matter from joint. Ensure that joint is dry and free of paint, finish coat, or other foreign matter. Install backer rod. Apply primer as required by sealant and EIFS manufacturer. Check that joint width is as shown on drawings but in no case shall it be less than 0.5 inch for perimeter seals and 0.75 inch for expansion joints. The width shall not be less than 4 times the anticipated movement. Check sealant manufacturer's recommendations regarding proper width to depth ratio.

3.4.2 Sealant

Apply sealant in accordance with sealant manufacturer's instructions with gun having nozzle that fits joint width. Do not use sealant that has exceeded shelf life or cannot be discharged in a continuous flow. Completely fill the joint solidly with sealant without air pockets so that full contact is made with both sides of the joint. Tool sealant with a round instrument that provides a concave profile and a uniformly smooth and wrinkle free sealant surface. Do not wet tool the joint with soap, water, or any other liquid tooling aid. Do not apply sealant until all EIFS coatings are fully dry. During inclement weather, protect the joints until sealant application. Use particular caution in sealing joints between window and door frames and the EIFS wall and at all other wall penetrations. Clean all surfaces to remove excess sealant.

3.5 FIELD QUALITY CONTROL

Throughout the installation, the Contractor shall establish and maintain an inspection procedure to assure compliance of the installed EIFS with

contract requirements. Work not in compliance shall be removed and replaced or corrected in an approved manner. The inspection procedures, from acceptance of deliveries through installation of sealants and final acceptance shall be performed by qualified inspector trained by the manufactuter. No work on the EIFS shall be performed unless the inspector is present at the job site.

3.5.1 Third Party Inspection

Provide full time third party inspection during the entire process of installing the EIFS, from examination through cleanup. The third party inspector shall be certified by the Exterior Design Institute (EDI) or by an equivalent independent party and shall be trained in the proper installation of EIFS.

3.5.2 Inspection Check List

During the installation and at the completion of installation, perform inspections covering at the minimum all applicable items enumerated on the attached check list. The inspector shall initial and date all applicable items, sign the check list, and submit it to the Contracting Officer at the completion of the EIFS erection.

CHECK LIST

Item	Description	Appr'd/Date
a.	Materials are handled and stored correctly.	_____ ____
b.	Environmental conditions are within specified limits, including temperature not below 4 degrees C (40 degrees F), and the work is protected from the elements as required.	_____ _____
c.	Preparation and installation is performed by qualified personnel using the correct tools.	_____ _____
d.	Adjacent areas to which EIFS is not to be applied (such as on window and door frames) are protected with masking tape, plastic films, drop cloths, etc. to prevent accidental application of EIFS materials.	_____ ____
e.	Control, expansion and aesthetic joints are installed as indicated or recommended. Accessories are properly installed.	_____ ____
f.	Substrate is in-plane, properly attached, clean, dry, and free of contaminants. Concrete substrate is free of efflorescence.	_____ ____
g.	Materials are mixed thoroughly and in proper proportions.	_____ ____
h.	Adhesive is applied in sufficient quantity with proper-size notched trowel.	_____ ____
i.	Mechanical attachments have proper spacing, layout and fastener depth.	_____ ____
j.	Insulation boards are tightly abutted, in running bond	_____ ____

CHECK LIST

Item	Description	Appr'd/Date_
	pattern, with joints staggered with the sheathing, board corners interlocked, L-shaped boards around openings, edges free of adhesive, and provision for joints. Gaps are filled and surfaces rasped.	
k.	Insulation adhesive must be allowed to dry (a minimum of 24-hours) prior to the application of the finish coat.	_____ ____
l.	Reinforcing fabric mesh is properly back-wrapped at terminations.	_____ ____
m.	Reinforcing fabric mesh is fully embedded and properly placed. Corners are reinforced. Openings are diagonally reinforced. Mesh overlaps minimum 65 mm (2-1/2 inches).	_____ ____
n.	Base coat thickness is within specified limits.	_____ ____
o.	The base coat/reinforcing fabric mesh must be allowed to dry (a minimum of 24-hours) prior to the application of the finish coat.	_____ ____
p.	Finish coat is applied with sufficient number of personnel and stopped at suitable points. Floats and methods of texturing are uniform.	_____ ____
q.	All Flashings are properly installed.	_____ ____
r.	All joints are properly sealed in their entire length at time and under environmental conditions as specified by the manufacturer.	_____ ____
s.	All scaffolding, equipment, materials, debris and temporary protection are removed from site upon completion.	_____ ____

Name of Inspector:_____ Signed:_____ Date:_____

3.6 CLEANUP

Upon completion, remove all scaffolding, equipment, materials and debris from site. Remove all temporary protection installed to facilitate installation of EIFS.

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SECTION 07311

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08/98

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CEGS-07311 (August 1998)

SECTION 07311

ROOFING, STRIP SHINGLES
08/98

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 226	(1997) Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 1056	(1998) Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 1667	(1997) Flexible Cellular Materials - Vinyl Chlorine Polymers and Copolymers (Closed-Cell Foam)
ASTM D 1970	(1997) Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
ASTM D 3018	(1990; R 1994) Class A Asphalt Shingles Surfaced With Mineral Granules
ASTM D 3161	(1995a) Wind-Resistance of Asphalt Shingles (Fan-Induced Method)
ASTM D 3462	(1997) Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules
ASTM D 4869	(1988; R 1993) Asphalt-Saturated Organic Felt Shingle Underlayment Used in Roofing
ASTM E 108	(1996) Fire Tests of Roof Coverings

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA Asph Shing Roof Mnl	(1996) Asphalt Shingle Roofing Manual

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Application of Roofing Materials

Manufacturer's catalog data, description of underlayment, shingles, fasteners, ridge vents, and flashing. Manufacturer's instructions, annotated or supplemented by the Contractor to indicate configuration and method for installing the materials, and for waterproofing of joints where flashings change direction. The number, spacing and orientation of fasteners shall be specified.

SD-04 Samples

Shingles; G, ED

Full shingle sample and manufacturer's standard size samples of materials and products requiring color or finish selection.

1.3 DELIVERY AND STORAGE OF MATERIALS

Materials shall be delivered in manufacturer's unopened bundles and containers with the manufacturer's brand and name marked clearly thereon. Shingles shall be stored in accordance with manufacturer's printed instructions. Roll goods shall be stored on end in an upright position or in accordance with manufacturer's recommendations. Immediately before laying, roofing felt shall be stored for 24 hours in an area maintained at a temperature not lower than 50 degrees F.

1.4 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 MATERIALS

Materials shall conform to the following requirements:

2.1.1 Metal Drip Edges

Metal drip edges shall be minimum 26 gauge galvanized steel or an equivalent non-corrosive non-staining material, vented or unvented, as shown.

2.1.2 Underlayment

Organic felt; ASTM D 4869 or ASTM D 226, non perforated Type I, number 15.

2.1.3 Leak Barrier Underlayment

Self-adhering leak barrier or ice dam underlayment shall comply with ASTM D 1970 for sealability around nails.

2.1.4 Ventilators

2.1.4.1 Omitted

2.1.4.2 Nailable Plastic Shingle Over Type Ridge Vents

Ridge vents shall be constructed of UV stabilized nailable rigid polypropylene material, approximately 1 foot wide and 1 inch thick, and shall be in 4 foot long interlocking sections with self-aligning ends or corrugated polyethylene rigid roll or rigid strip ridge vent with aluminum wind deflectors on each side. Vents shall be designed to prevent infiltration of insects, rain, and snow.

2.1.4.3 Nailable Mesh Shingle Over Type Ridge Vents

Ridge vents shall be constructed of UV stabilized nailable polyester mesh material, approximately 1 foot wide. Vents shall be designed to prevent infiltration of insects, rain, and snow.

2.1.5 Nails

Nails shall be round head 11 or 12 gauge galvanized steel or equivalent corrosion resistant roofing nails. Nail heads shall be 3/8 inch minimum diameter, with flat and smooth low profile. Shanks shall be barbed or otherwise deformed for added pull-out resistance. Nails shall be long enough to penetrate all layers of roofing materials and achieve secure anchorage into the roof deck. Nails shall extend through the underside of plywood or wood panel roof decks, and shall penetrate at least 3/4 inch into wood plank decks.

2.1.6 Shingles

Shingles shall be 40 years and approximately 12 by 36 inches in dimension and architectural design. Shingles shall have self-sealing adhesive strips and shall meet a wind velocity rating of 80 mph plus or minus 5 percent in accordance with ASTM D 3161. Shingles shall be manufacturer's standard type for project area. Glass felt shingles shall comply with ASTM D 3018 and ASTM D 3462 Type I (self-sealing), ASTM E 108 Class A (a light degree of fire protection), and shall weigh not less than 300 pounds.

2.1.7 Expansion Joint Material

Expansion joint materials shall be bellows or U-shaped type conforming to Section 07600 SHEET METALWORK, GENERAL. Premolded type shall be closed-cell cellular rubber conforming to ASTM D 1056 or closed-cell vinyl or polyvinyl chloride conforming to ASTM D 1667.

2.2 COLOR

Shingle color shall be in accordance with Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACES

The construction of any bay or section of roof decking shall be completed before roofing work is started. Roof surfaces shall be smooth, firm, dry, and free from loose boards, large cracks, and projecting ends that might damage the roofing. Vents and other projections through roofs shall be properly flashed and secured in position, and projecting nails shall be driven flush with the deck.

3.2 APPLICATION OF ROOFING MATERIALS

3.2.1 Flashings

Metal flashings shall conform to Section 07600 SHEET METALWORK, GENERAL. Metal flashings shall be provided at the intersections of roofs and adjoining walls and at projections through the deck such as chimneys and vent stacks. Valley flashing shall be of the woven type, in accordance with NRCA Asph Shing Roof Mnl.

3.2.2 Metal Drip Edges

Metal drip edges shall be provided along the eaves and rakes. The metal drip edge shall be applied directly over the underlayment along the rakes and directly on the wood deck at the eaves. Metal drip edges shall extend back from the edge of the deck not less than 3 inches and shall be secured with compatible nails spaced not more than 10 inches on center along the inner edge.

3.2.3 Underlayment

Before any shingles are applied, a single layer of asphalt-saturated-felt underlayment shall be applied to the roof deck sheathing. In areas subject to ice damming, two plies of organic felt set in hot asphalt or asphalt lap cement, or an adhered polymer modified bitumen membrane underlayment shall be applied starting from the eaves to a point 24 inches inside the interior wall line.

3.2.4 Ridge Vents

Ridge vents shall be provided along the ridge lines where shown. Ridge vents shall be installed in accordance with the manufacturer's printed instructions.

3.2.5 Shingles

Shingles with the correct recommended exposure shall be applied in accordance with the manufacturer's printed instructions as they appear on the bundle wrapping.

3.2.6 Building Expansion Joints

Expansion joints shall be located where indicated and shall be of the size and details shown.

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SECTION 07600

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04/00

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CEGS-07600 (April 2000)

SECTION 07600

SHEET METALWORK, GENERAL
04/00

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 167	(1999) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM B 32	(1996) Solder Metal
ASTM B 209	(1996) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 370	(1998) Copper Sheet and Strip for Building Construction
ASTM D 226	(1997a) Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 543	(1995) Evaluating the Resistance of Plastics to Chemical Reagents
ASTM D 822	(1996) Conducting Tests on Paint and Related Coatings and Materials Using Filtered Open-Flame Carbon-Arc Exposure Apparatus
ASTM D 828	(1997) Tensile Properties of Paper and Paperboard Using Constant-Rate-of-Elongation-Apparatus
ASTM D 1784	(1999a) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 2822	(1991; R 1997el) Asphalt Roof Cement
ASTM D 4022	(1994) Coal Tar Roof Cement, Asbestos Containing

ASTM D 4586	(1993) Asphalt Roof Cement, Asbestos Free
ASTM E 96	(1995) Water Vapor Transmission of Materials

SHEET METAL & AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION (SMACNA)

SMACNA Arch. Manual	(1993; Errata; Addenda Oct 1997) Architectural Sheet Metal Manual

1.2 GENERAL REQUIREMENTS

Sheet metalwork shall be accomplished to form weathertight construction without waves, warps, buckles, fastening stresses or distortion, and shall allow for expansion and contraction. Cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the work of other trades shall be performed by sheet metal mechanics. Installation of sheet metal items used in conjunction with roofing shall be coordinated with roofing work to permit continuous roofing operations. Sheet metalwork pertaining to heating, ventilating, and air conditioning is specified in Section 15895 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Materials

Drawings of sheet metal items showing weights, gauges or thicknesses; types of materials; expansion-joint spacing; fabrication details; and installation procedures.

1.4 DELIVERY, STORAGE, AND HANDLING

Materials shall be adequately packaged and protected during shipment and shall be inspected for damage, dampness, and wet-storage stains upon delivery to the jobsite. Materials shall be clearly labeled as to type and manufacturer. Sheet metal items shall be carefully handled to avoid damage. Materials shall be stored in dry, ventilated areas until immediately before installation.

PART 2 PRODUCTS

2.1 MATERIALS

Lead, lead-coated metal, and galvanized steel shall not be used. Any metal listed by SMACNA Arch. Manual for a particular item may be used, unless otherwise specified or indicated. Materials shall conform to the requirements specified below and to the thicknesses and configurations established in SMACNA Arch. Manual. Different items need not be of the same metal, except that if copper is selected for any exposed item, all

exposed items shall be copper.

2.1.1 Accessories

Accessories and other items essential to complete the sheet metal installation, though not specifically indicated or specified, shall be provided.

2.1.2 Aluminum Extrusions

ASTM B 221, Alloy 6063, Temper T5.

2.1.3 Bituminous Cement

Type I asphalt cement conforming to ASTM D 2822 or ASTM D 4586. For coal tar roofing; coal tar cement conforming to ASTM D 4022.

2.1.4 Sealant

Unless otherwise specified, sealant shall be an elastomeric weather resistant sealant as specified in Section 07900 JOINT SEALING.

2.1.5 Fasteners

Fasteners shall be compatible with the fastened material and shall be the type best suited for the application.

2.1.6 Felt

ASTM D 226, Type I.

2.1.7 Polyvinyl Chloride (PVC) Reglets

ASTM D 1784, Class 14333D, 0.075 inch minimum thickness.

2.1.8 Aluminum Alloy Sheet and Plate

ASTM B 209, anodized color medium bronze, form, alloy, and temper appropriate for use.

2.1.9 Copper

ASTM B 370, Temper H 00.

2.1.10 Stainless Steel

ASTM A 167, Type 302 or 304; fully annealed, dead soft temper.

2.1.11 Solder

ASTM B 32, 95-5 tin-antimony.

2.1.12 Through-Wall Flashing

a. Electro-sheet copper not less than 5 ounces, factory coated both sides with acid- and alkali-resistant bituminous compound not less than 6 ounces per square foot or factory covered both sides with asphalt-saturated cotton fabric, asphalt saturated glass-fiber fabric, or with 40-pound reinforced kraft paper bonded with

asphalt.

b. Stainless steel, Type 304, not less than 0.003 inch thick, completely encased by and permanently bonded on both sides to 50 pound high strength bituminized crepe kraft paper, using hot asphalt, heat, and pressure.

c. Nonreinforced, waterproof, impermeable extruded elastomeric single ply sheeting not less than 30 mils thick.

d. Omitted.

e. Other through-wall flashing material may be used provided the following performance criteria are met.

(1) No cracking or flaking when bent 180 degrees over a 1/32 inch mandrel and rebent at the same point over the same mandrel in an opposite direction at 32 degrees F.

(2) Water vapor permeability not more than 2 perms when tested in accordance with ASTM E 96.

(3) Minimum breaking strength of 90 pounds per inch width in the weakest direction when tested in accordance with ASTM D 828.

(4) No visible deterioration after being subjected to a 400-hour direct weathering test in accordance with ASTM D 822.

(5) No shrinkage in length or width and less than 5 percent loss of breaking strength after a 10-day immersion, per ASTM D 543, in 5 percent (by weight) solutions, respectively, of sulfuric acid, hydrochloric acid, sodium hydroxide or saturated lime (calcium hydroxide).

2.1.13 Louvers

Louvers shall be storm resistant wall louvers and shall bear the BSRIA certification for water penetration in accordance with the HEVAC Technical Specification "Laboratory Testing and Rating of Weather Louvers When Subjected to Simulated Rain." The rating shall show a minimum of 99.0 percent effectiveness ratio at 1447 fpm free air velocity when tested at an exterior wind velocity of 29.1 mph and a simulated rainfall of 2.95 in/hr for 60 minutes. Louvers shall be aluminum with factory finish. Louvers shall have enclosed drainable sill pan.

2.1.14 Louver Screen

All louvers shall have bird screen except all louvers at dining facility shall have insect screen. All louver screens shall be in frames. Bird screens shall conform to ASTM E 437, 1/2 inch square opening, type 304 stainless steel wire. Frames shall be removable type of stainless steel or extruded aluminum. Insect screens shall conform to ASTM E 437, 1/8 inch square opening, Type 304 stainless steel wire. Frames shall be removable type of stainless steel or extruded aluminum.

2.1.15 Metal Soffit Panels

Metal soffit panels shall be located as indicated on the drawings. Width of sheets with interlocking configurations shall provide not less than 8

inches of coverage in place. Design provisions shall be made for thermal expansion and contraction consistent with the type of system to be used. All sheets shall be square-cut. Soffit panels shall be not less than 1/2 inch deep. Exposed face of soffit panels shall have a flush or V-groove profile. Where indicated, soffit panels shall be perforated for ventilation. Where vented soffit panels are indicated, perforations shall permit no less than 13.5 percent free air. Manufacturer's standard matching accessories shall be provided including fastening systems and trim.

2.1.16 Gutters and Downspouts

Gutters and downspouts shall be aluminum fabricated to the size and shape indicated on the drawings. Aluminum thickness for gutters and downspouts shall comply with SMACNA-02. Gutter brackets and spacers shall be of the same material and finish as the gutter and shall be sized to comply with the size requirements shown in SMACNA Arch. Manual. Downspout hangers shall be minimum 1/16 by 1 inch and of the same material and finish as the downspout.

2.1.17 Copings

Fabricate of 0.05 inch thick aluminum sheets 8 feet to 10 feet long to profile shown. Fabricate roof side of coping so as to extend down over base flashing as shown. Use continuous edge strips with drips at bottom edges on exterior wall side. Use slotted holes for fasteners on roof wall side if continuous cleats or edge strips are not used. Form joints between sections shall be made with concealed splice plates sealed as recommended by manufacturer. Factory prefabricated mitered corners and closed ends shall be provided. Fabricate exterior ends of coping closures of same appearance as exterior wall side. Fabricate ends of coping terminating at vertical building surfaces to form a slot for the installation of sealant unless otherwise recommended by manufacturer.

2.2 FACTORY FINISH

2.2.1 Fascia, Copings, Gutters, Gutter Hangers, Downspouts, Downspout Straps, Louvers and Exposed Flashing

Fascia, copings, gutters, gutter hangers, downspouts, downspout straps, louvers and exposed flashing shall have a factory-applied paint finish unless indicated otherwise. The interior surfaces of the gutters and downspouts shall have the same finish as the exterior surfaces. Color shall be as indicated in Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

2.2.2 Metal Soffit Panels and Accessories

Metal soffit panels and accessories shall have a factory-applied polyvinylidene fluoride finish on the exposed surface. The exterior factory finish shall consist of a baked-on topcoat with an appropriate prime coat. The exterior coating shall be a nominal 1 mil thickness consisting of a topcoat of not less than 0.7 mil dry film thickness and the paint manufacturer's recommended primer of not less than 0.2 mil thickness. The interior surface shall be 0.2 mil prime coat. Color shall be as indicated in Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Gutters and downspouts shall be designed and fabricated in conformance with SMACNA Arch. Manual; louvers shall be fabricated in conformance with SMACNA Arch. Manual and as indicated. Unless otherwise specified or indicated, exposed edges shall be folded back to form a 1/2 inch hem on the concealed side, and bottom edges of exposed vertical surfaces shall be angled to form drips. Bituminous cement shall not be placed in contact with roofing membranes.

3.2 EXPANSION JOINTS

Expansion joints shall be provided as specified in SMACNA Arch. Manual. Expansion joints in continuous sheet metal shall be provided at 40 foot intervals for copper and stainless steel and at 32 foot intervals for aluminum, except extruded aluminum gravel stops and fasciae which shall have expansion joints at not more than 12 foot spacing. Joints shall be evenly spaced. An additional joint shall be provided where the distance between the last expansion joint and the end of the continuous run is more than half the required interval spacing.

3.3 PROTECTION OF ALUMINUM

Aluminum shall not be used where it will be in contact with copper or where it will contact water which flows over copper surfaces. Aluminum that will be in contact with wet or pressure-treated wood, mortar, concrete, masonry, or ferrous metals shall be protected against galvanic or corrosive action by one of the following methods:

3.3.1 Paint

Aluminum surfaces shall be solvent cleaned and given one coat of zinc-molybdate primer and one coat of aluminum paint as specified in Section 09900 PAINTING, GENERAL.

3.3.2 Nonabsorptive Tape or Gasket

Nonabsorptive tape or gasket shall be placed between the adjoining surfaces and cemented to the aluminum surface using a cement compatible with aluminum.

3.4 CONNECTIONS AND JOINTING

3.4.1 Soldering

Soldering shall apply to copper, and stainless steel items. Edges of sheet metal shall be pretinned before soldering is begun. Soldering shall be done slowly with well heated soldering irons so as to thoroughly heat the seams and completely sweat the solder through the full width of the seam. Edges of stainless steel to be pretinned shall be treated with soldering acid flux. Soldering shall follow immediately after application of the flux. Upon completion of soldering, the acid flux residue shall be thoroughly cleaned from the sheet metal with a water solution of washing soda and rinsed with clean water.

3.4.2 Riveting

Joints in aluminum sheets 0.040 inch or less in thickness shall be mechanically made.

3.4.3 Seaming

Flat-lock and soldered-lap seams shall finish not less than 1 inch wide. Unsoldered plain-lap seams shall lap not less than 3 inches unless otherwise specified. Flat seams shall be made in the direction of the flow.

3.5 CLEATS

A continuous cleat shall be provided where indicated or specified to secure loose edges of the sheet metalwork. Butt joints of cleats shall be spaced approximately 1/8 inch apart. The cleat shall be fastened to supporting wood construction with nails evenly spaced not over 12 inches on centers. Where the fastening is to be made to concrete or masonry, screws shall be used and shall be driven in expansion shields set in concrete or masonry.

3.6 GUTTERS AND DOWNSPOUTS

Gutters and downspouts shall be installed as indicated. Gutters shall be supported by continuous cleats or by cleats spaced not less than 36 inches apart. Downspouts shall be rigidly attached to the building. Supports for downspouts shall be spaced according to manufacturer's recommendations.

3.7 FLASHINGS

Flashings shall be installed at locations indicated and as specified below. Sealing shall be according to the flashing manufacturer's recommendations. Flashings shall be installed at intersections of roof with vertical surfaces and at projections through roof, except that flashing for heating and plumbing, including piping and floor drains, and for electrical conduit projections through roof or walls are specified in other sections. Except as otherwise indicated, counter flashings shall be provided over base flashings. Perforations in flashings made by masonry anchors shall be covered up by an application of bituminous plastic cement at the perforation. Flashing shall be installed on top of joint reinforcement. Flashing shall be formed to direct water to the outside of the system.

3.7.1 Base Flashing

Metal base flashing shall be coordinated with roofing work. Metal base flashing shall be set in plastic bituminous cement over the roofing membrane, nailed to nailing strip, and secured in place on the roof side with nails spaced not more than 3 inches on centers.

3.7.2 Counter Flashings

Except as otherwise indicated, counter flashings shall be provided over base flashings. Counter flashing shall be installed as shown on the drawings. Counter flashing shall be factory formed to provide spring action against the base flashing.

3.7.3 Stepped Flashing

Stepped flashing shall be installed where sloping roofs surfaced with shingles abut vertical surfaces. Separate pieces of base flashing shall be placed in alternate shingle courses.

3.7.4 Through-Wall Flashing

Through-wall flashing includes sill, lintel, and spandrel flashing. The flashing shall be laid with a layer of mortar above and below the flashing

so that the total thickness of the two layers of the mortar and flashing are the same thickness as the regular mortar joints. Flashing shall not extend further into the masonry backup wall than the first mortar joint. Joints in flashing shall be lapped and sealed. Flashing shall be one piece for lintels and sills.

3.7.4.1 Lintel Flashing

Lintel flashing shall extend the full length of lintel. Flashing shall extend through the wall one masonry course above the lintels and shall be bent down over the vertical leg of the outer steel lintel angle not less than 2 inches, or shall be applied over top of masonry and precast concrete lintels. Bedjoints of lintels at control joints shall be underlaid with sheet metal bond breaker.

3.7.4.2 Sill Flashing

Sill flashing shall extend the full width of the sill and not less than 4 inches beyond ends of sill except at control joint where the flashing shall be terminated at the end of the sill.

3.7.5 Valley Flashing

Valley flashing shall be installed as specified in SMACNA Arch. Manual and as indicated.

3.8 FASCIA AND COPINGS

Fascia shall be fabricated and installed as indicated and in accordance with SMACNA Arch. Manual. Copings shall be installed on walls topped with a wood plank, install a continuous edge strip on the front edge of the plank. Install a continuous edge strip on the rear edge of the plank if slotted holes for fasteners on roof wall side is not provided. Lock the coping to the edge strip with 3/4 inch loose lock seam. Install ends adjoining vertical construction so as to form space for installation of sealants. Sealant shall be as specified in Section 07900 JOINT SEALING. Coping shall be installed with 1/4 inch joint between edges of coping sections. Install concealed splice plates centered at each joint and securely lock in place.

3.9 INSTALLATION OF LOUVERS

Louvers shall be rigidly attached to the supporting construction. The installation shall be raintight. Louver screen shall be installed as indicated.

3.10 REGLETS

Reglets shall be a factory fabricated product of proven design, complete with fittings and special shapes as required. Open-type reglets shall be filled with fiberboard or other suitable separator to prevent crushing of the slot during installation. Reglet plugs shall be spaced not over 12 inches on centers and reglet grooves shall be filled with sealant. Friction or slot-type reglets shall have metal flashings inserted the full depth of slot and shall be lightly punched every 12 inches to crimp the reglet and counter flashing together. Polyvinyl chloride reglets shall be sealed with the manufacturer's recommended sealant.

3.11 CONTRACTOR QUALITY CONTROL

The Contractor shall establish and maintain a quality control procedure for sheet metal used in conjunction with roofing to assure compliance of the installed sheet metalwork with the contract requirements. Any work found not to be in compliance with the contract shall be promptly removed and replaced or corrected in an approved manner. Quality control shall include, but not be limited to, the following:

a. Observation of environmental conditions; number and skill level of sheet metal workers; condition of substrate.

b. Verification of compliance of materials before, during, and after installation.

c. Inspection of sheet metalwork for proper size and thickness, fastening and joining, and proper installation.

The actual quality control observations and inspections shall be documented and a copy of the documentation furnished to the Contracting Officer at the end of each day.

-- End of Section --

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07/01

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SECTION 07810A

SPRAY-APPLIED FIREPROOFING
07/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 119	(2000) Fire Tests of Building Construction and Materials
ASTM E 605	(1993; R 1996) Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
ASTM E 736	(1992) Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
ASTM E 759	(1992; R 1996) Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members
ASTM E 760	(1992; R 1996el) Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members
ASTM E 761	(1992) Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
ASTM E 859	(1993) Air Erosion of Sprayed Fire-Resistive Materials (SFRMS) Applied to Structural Members
ASTM E 937	(1993) Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
ASTM E 1042	(1992; R 1997e1) Acoustically Absorptive Materials Applied by Trowel or Spray
ASTM G 21	(1996) Determining Resistance of Synthetic Polymeric Materials to Fungi

UNDERWRITERS LABORATORIES (UL)

UL 263	(1997; Rev thru Jun 1998) Fire Tests of Building Construction and Materials
UL Fire Resist Dir	(1999) Fire Resistance Directory (2 Vol.)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Fireproofing Material

Data identifying performance characteristics of fireproofing material. Data shall include recommended application requirements and indicate thickness of fireproofing that must be applied to achieve each required fire rating.

SD-04 Samples

Spray-Applied Fireproofing

One sample panel, 18 inches square, for each specified type of fireproofing. Also, a designated sample area of not less than 100 square feet shall be prepared. Sample area shall be representative of typical installation of fireproofing including metal decks, beams, columns and attachments. Equipment, materials and procedures used in the sample area shall be the same as, or representative of, that to be used in the work. The sample area shall be approved prior to proceeding with fireproofing work in any other area. The approved sample area shall be used as a reference standard for applied fireproofing material. Sample area shall remain in place and open to observation until all spray-applied fireproofing is completed and accepted, at which time it may become part of the work.

SD-06 Test Reports

Fire Resistance Rating

Reports and test records, attesting that the fireproofing material conforms to the specified requirements. Each test report shall conform to the report requirements specified by the test method.

Field Tests

Test reports documenting results of tests on the applied material in the project. Report shall include defects identified, repair procedures, and results of the retests when required.

SD-07 Certificates

Installer Qualifications

Manufacturer's certification that each listed installer is qualified and trained to install the specified fireproofing. Evidence that each fireproofing installer has had a minimum of 3 years experience in installing the specified type of fireproofing.

Surface Preparation

Manufacturer's certification that surfaces to be protected have been inspected and are acceptable to receive spray-applied fireproofing. The statement shall list the structural members and the areas that have been inspected and certified.

Manufacturer's Inspection

Manufacturer's certification that the spray-applied fireproofing in the entire project complies with the manufacturer's criteria and recommendations.

1.3 DELIVERY AND STORAGE

Packaged material shall be delivered in the original unopened containers, marked to show the brand name, the manufacturer, and the UL markings. Fireproofing material shall be kept dry until ready to be used, and shall be stored off the ground, under cover and away from damp surfaces. Damaged or opened containers will be rejected. Material with shelf-life shall be applied prior to expiration of the shelf-life.

1.4 ENVIRONMENTAL CONDITIONS

1.4.1 Temperature

Substrate and ambient air temperatures shall be maintained above 40 degrees F during application and for 24 hours before and after application. Relative humidity shall be maintained within the limits recommended by the fireproofing manufacturer.

1.4.2 Ventilation

Adequate ventilation shall be provided to properly dry the fireproofing after application. In enclosed areas, a minimum of four air exchanges per hour shall be provided by forced air circulation.

1.5 INSTALLER QUALIFICATIONS

Each installer of fireproofing material shall be trained and have a minimum of 3 years' experience in the installation of fireproofing of the type specified.

1.6 MANUFACTURER'S SERVICES

The manufacturer or its representative shall be onsite prior to, periodically during, and at completion of the application, to provide the specified inspections and certifications; and to ensure that preparations are adequate and that the material is applied according to manufacturer's recommendations and the contract requirements.

1.7 FIRE RESISTANCE RATING

Fire resistance ratings shall be in accordance with the fire rated

assemblies listed in UL Fire Resist Dir. Proposed materials not listed in UL Fire Resist Dir shall have fire resistance ratings at least equal to the UL Fire Resist Dir ratings as determined by an approved independent testing laboratory, based on tests specified in UL 263 or ASTM E 119. Fireproofing shall be applied to structural steel members, with the hourly fire resitance rating and in accordance with the UL design or approved equivalent as indicated on drawings.

1.8 EXTENT OF FIREPROOFING

In barracks buildings, all structural steel and undersides of steel floors shall be protected with spray-applied fireproofing to a fire resistance hour-rating as indicated.

PART 2 PRODUCTS

2.1 SPRAY-APPLIED FIREPROOFING

Spray-applied fireproofing material, including sealer, shall conform to ASTM E 1042, Class (a), Category A, either Type I or Type II, except that the dust removed shall not exceed 0.0025 gram per square foot of fireproofing material applied as specified in the project. Material shall be asbestos free, and shall resist fungus for a period of 28 days when tested in accordance with ASTM G 21.

2.1.1 Dry Density and Cohesion/Adhesion

Fireproofing shall have a minimum ASTM E 605 dry density and ASTM E 736 cohesion/adhesion properties as follows:

2.1.1.1 Concealed Structural Components

Fireproofing for structural components concealed above the ceiling, or within a wall, chase, or furred space, shall have a minimum average applied dry density of 15 pounds per cubic foot and a cohesion/adhesion strength of 200 psf.

2.1.1.2 Exposed Structural Components

Fireproofing for exposed structural components, except where otherwise specified or indicated, shall have a minimum applied dry density of 22 pounds per cubic foot and a cohesion/adhesion strength of 300 psf.

2.1.1.3 Mechanical Rooms and Storage Areas

Fireproofing for structural components located in mechanical rooms and storage areas shall have a minimum applied dry density of 40 pounds per cubic foot and a cohesion/adhesion strength of 400 psf.

2.1.2 Deflection

Spray-applied fireproofing shall not crack, spall, or delaminate when tested in accordance with ASTM E 759.

2.1.3 Bond-Impact

Spray-applied fireproofing material shall not crack, spall or delaminate when tested in accordance with ASTM E 760.

2.1.4 Compressive Strength

The minimum compressive strength shall be 1000 psf when tested in accordance with ASTM E 761.

2.1.5 Corrosion

Spray-applied fireproofing material shall not contribute to corrosion of test panels when tested as specified in ASTM E 937.

2.1.6 Air Erosion

Dust removal shall not exceed 0.025 gram per square foot when tested in accordance with ASTM E 859.

2.2 SEALER

Sealer shall be the type approved by the manufacturer of the fireproofing material and shall be white or green color.

2.3 WATER

Water used for material mixing and surface preparation shall be potable.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Surfaces to be fireproofed shall be thoroughly cleaned of dirt, grease, oil, paint, primers, loose rust, rolling lubricant, mill scale or other contaminants that will interfere with the proper bonding of the sprayed fireproofing to the substrate. Painted/primed steel substrates shall be tested in accordance with ASTM E 119, with specified sprayed fireproofing material, to provide the required fire-resistance rating; painted or primed steel surfaces may require a fireproofing bond test to determine if the paint formulation will impair proper adhesion. If it is determined that surfaces to receive fire proofing should not be painted, omission of painting shall be coordinated with Section 09900 PAINTS AND COATINGS. Overhead areas to be fireproofed shall be cleared of all obstructions interfering with the uniform application of the spray-applied fireproofing. Hardware such as support sleeves, inserts, clips, hanger attachment devices and the like shall be installed prior to the application of the fireproofing. Condition of the surfaces shall be acceptable to the manufacturer prior to application of spray-applied fireproofing. Applications listed for use on primed surfaces shall be in accordance with the manufacturer's recommendations and standards, and detailed in submittal item SD-03 Product Data.

3.2 PROTECTION

Surfaces not to receive spray-applied fireproofing shall be covered to prevent contamination by splatter, rebound and overspray. Exterior openings in areas to receive spray-applied fireproofing shall be covered prior to and during application of fireproofing with tarpaulins or other approved material. Surfaces not to receive fireproofing shall be cleaned of fireproofing and sealer.

3.3 MIXING

Fireproofing material shall be mixed in accordance with the manufacturer's recommendations.

3.4 APPLICATION

3.4.1 Sequence

Prior to application of fireproofing on each floor, the manufacturer shall inspect and approve application equipment, water supply and pressure, and the application procedures. Fireproofing shall be applied to underside of steel floor assemblies only after floor construction is complete. No floor traffic shall be allowed during application and during a 7-day minimum curing period. Fireproofing material shall be applied prior to the installation of ductwork, piping and conduits which would interfere with uniform application of the fireproofing.

3.4.2 Application Technique

Water pressure and volume shall be maintained to manufacturer's recommendations throughout the fireproofing application. Fireproofing material shall be applied to the thickness and density established for the specified fire resistance rating, in accordance with the procedure recommended by the manufacturer, and to a uniform density and texture. Fireproofing material shall not be tamped to achieve the desired density.

3.4.3 Sealer Application

Sealer shall be applied to all fireproofing. Sealer shall be applied after field testing has been conducted and after corrective measures and repairs, if required, have been completed.

3.5 FIELD TESTS

The applied fireproofing shall be tested by an approved independent testing laboratory, in approved locations, for density, cohesion/adhesion in accordance with ASTM E 736, and for thickness in accordance with ASTM E 605. Two sets of tests shall be conducted on each floor or 10,000-square-foot area, whichever is less, at the approved locations. Any area showing less than minimum requirements shall be corrected. Proposed corrective measures, in writing, shall be approved before starting the corrective action. Corrected work shall be retested.

3.5.1 Thickness, Density, Cohesion/Adhesion

Each structural component type shall be tested at floor decks, beams, and columns. Minimum average thickness shall be as required by UL Fire Resist Dir. Density and cohesion/adhesion shall be as specified.

3.5.2 Repair

Additional fireproofing material may be added to provide proper thickness. Rejected areas of fireproofing shall be corrected to meet specified requirements by adding fireproofing material to provide the proper thickness, or by removing defects and respraying with new fireproofing material. Repairs shall use same type of fireproofing material as originally applied or patching materials recommended by the manufacturer. Repaired areas shall be retested and reinspected. Fireproofing material shall be applied to voids or damaged areas by hand-trowel, or by respraying.

3.5.3 Manufacturer's Inspection

The manufacturer shall inspect the fireproofing work after the work is completed on each floor or area, including testing, repair and clean-up, and shall certify that the work complies with the manufacturer's criteria and recommendations. Before the sprayed material is covered, and after all of the fireproofing work is completed, including repair, testing, and clean-up; and after mechanical, electrical and other work in contact with fireproofing material has been completed, the manufacturer shall re-inspect the work and certify that the entire project complies with the manufacturer's criteria and recommendations.

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SECTION 07840

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08/00

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CEGS-07840 (August 2000)

SECTION 07840

FIRESTOPPING
08/00

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 84	(1999) Surface Burning Characteristics of Building Materials
ASTM E 119	(1998) Fire Tests of Building Construction and Materials
ASTM E 814	(1997) Fire Tests of Through-Penetration Fire Stops
ASTM E 1399	(1997) Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems

UNDERWRITERS LABORATORIES (UL)

UL 723	(1996; Rev thru Dec 1998) Test for Surface Burning Characteristics of Building Materials
UL 1479	(1994; Rev thru Feb 1998) Fire Tests of Through-Penetration Firestops
UL 2079	(1998) Tests for Fire Resistance of Building Joint Systems
UL Fire Resist Dir	(1999) Fire Resistance Directory (2 Vol.)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Firestopping Materials

Detail drawings including manufacturer's descriptive data, typical details conforming to UL Fire Resist Dir or other details certified by another nationally recognized testing laboratory, installation instructions or UL listing details for a firestopping assembly in lieu of fire-test data or report. For those firestop applications for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgement, derived from similar UL system designs or other tests, shall be submitted for review and approval prior to installation. Submittal shall indicate the firestopping material to be provided for each type of application. When more than 5 penetrations or construction joints are to receive firestopping, drawings shall indicate location and type of application.

SD-07 Certificates

Firestopping Materials

Certificates attesting that firestopping material complies with the specified requirements. In lieu of certificates, drawings showing UL classified materials as part of a tested assembly may be provided. Drawings showing evidence of testing by an alternate nationally recognized independent laboratory may be substituted.

Installer Qualifications

Documentation of training and experience.

Inspection

Manufacturer's representative certification stating that firestopping work has been inspected and found to be applied according to the manufacturer's recommendations and the specified requirements.

1.3 GENERAL REQUIREMENTS

Firestopping shall consist of furnishing and installing tested and listed firestop systems, combination of materials, or devices to form an effective barrier against the spread of flame, smoke and gases, and maintain the integrity of fire resistance rated walls, partitions, floors, and ceiling-floor assemblies, including through-penetrations and construction joints and gaps. Through-penetrations include the annular space around pipes, tubes, conduit, wires, cables and vents. Construction joints include those used to accommodate expansion, contraction, wind, or seismic movement; firestopping material shall not interfere with the required movement of the joint. Gaps requiring firestopping include gaps between the curtain wall and the floor slab and between the top of the fire-rated walls and the roof or floor deck above.

1.4 STORAGE AND DELIVERY

Materials shall be delivered in the original unopened packages or containers showing name of the manufacturer and the brand name. Materials shall be stored off the ground and shall be protected from damage and exposure to elements. Damaged or deteriorated materials shall be removed from the site.

1.5 INSTALLER QUALIFICATIONS

The Contractor shall engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary staff, training, and a minimum of 3 years experience in the installation of manufacturer's products per specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an installer engaged by the Contractor does not in itself confer qualification on the buyer. The Installer shall have been trained by a direct representative of the manufacturer (not distributor or agent) in the proper selection and installation procedures.

1.6 COORDINATION

The specified work shall be coordinated with other trades. Firestopping materials, at penetrations of pipes and ducts, shall be applied prior to insulating, unless insulation meets requirements specified for firestopping. Firestopping materials at building joints and construction gaps shall be applied prior to completion of enclosing walls or assemblies. Cast-in-place firestop devices shall be located and installed in place before concrete placement. Pipe, conduit or cable bundles shall be installed through cast-in-place device after concrete placement but before area is concealed or made inaccessible.

PART 2 PRODUCTS

2.1 FIRESTOPPING MATERIALS

Firestopping materials shall consist of commercially manufactured, asbestos-free products complying with the following minimum requirements:

2.1.1 Fire Hazard Classification

Material shall have a flame spread of 25 or less, and a smoke developed rating of 50 or less, when tested in accordance with ASTM E 84 or UL 723. Material shall be an approved firestopping material as listed in UL Fire Resist Dir or by a nationally recognized testing laboratory.

2.1.2 Toxicity

Material shall be nontoxic to humans at all stages of application.

2.1.3 Fire Resistance Rating

Firestopping will not be required to have a greater fire resistance rating than that of the assembly in which it is being placed.

2.1.3.1 Through-Penetrations

Firestopping materials for through-penetrations, as described in paragraph GENERAL REQUIREMENTS, shall provide "F" and "T" fire resistance ratings in accordance with ASTM E 814 or UL 1479. Fire resistance ratings shall be as follows:

a. Penetrations of Fire Resistance Rated Walls and Partitions: F Rating = Rating of wall or partition being penetrated.

b. Penetrations of Fire Resistance Rated Floors, Roof-Ceiling Assemblies and Ceiling-Floor Assemblies: F Rating = 1 hour, T Rating = 1 hour.

2.1.3.2 Construction Joints and Gaps

Fire resistance ratings of construction joints, as described in paragraph GENERAL REQUIREMENTS, and gaps such as those between floor slabs or roof decks and curtain walls shall be the same as the construction in which they occur. Construction joints and gaps shall be provided with firestopping materials and systems that have been tested per ASTM E 119 or UL 2079 to meet the required fire resistance rating. Systems installed at construction joints shall meet the cycling requirements of ASTM E 1399 or UL 2079.

PART 3 EXECUTION

3.1 PREPARATION

Areas to receive firestopping shall be free of dirt, grease, oil, or loose materials which may affect the fitting or fire resistance of the firestopping system. For cast-in-place firestop devices, formwork or metal deck to receive device prior to concrete placement shall be sound and capable of supporting device.

3.2 INSTALLATION

Firestopping material shall completely fill void spaces regardless of geometric configuration, subject to tolerance established by the manufacturer. Firestopping systems for filling floor voids 4 inches or more in any direction shall be capable of supporting the same load as the floor is designed to support or shall be protected by a permanent barrier to prevent loading or traffic in the firestopped area. Firestopping shall be installed in accordance with manufacturer's written instructions. Tested and listed firestop systems shall be provided in the following locations, except in floor slabs on grade:

a. Penetrations of duct, conduit, tubing, cable and pipe through floors and through fire-resistance rated walls, partitions, and ceiling-floor assemblies.

b. Penetrations of vertical shafts such as pipe chases, elevator shafts, and utility chutes.

c. Gaps at the intersection of floor slabs and curtain walls, including inside of hollow curtain walls at the floor slab.

d. Gaps at perimeter of fire-resistance rated walls and partitions, such as between the top of the walls and the bottom of roof decks.

e. Construction joints in floors and fire rated walls and partitions.

f. Other locations where required to maintain fire resistance rating of the construction.

3.2.1 Insulated Pipes and Ducts

Thermal insulation shall be cut and removed where pipes or ducts pass through firestopping, unless insulation meets requirements specified for firestopping. Thermal insulation shall be replaced with a material having equal thermal insulating and firestopping characteristics.

3.2.2 Fire Dampers

Fire dampers shall be installed and firestopped in accordance with Section 15895 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM.

3.3 INSPECTION

Firestopped areas shall not be covered or enclosed until inspection is complete and approved. A manufacturer's representative shall inspect the applications initially to ensure adequate preparations (clean surfaces suitable for application, etc.) and periodically during the work to assure that the completed work has been accomplished according to the manufacturer's written instructions and the specified requirements.

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06/97

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CEGS-07900 (June 1997)

Includes changes through Notice 2 (June 2000)

SECTION 07900

JOINT SEALING
06/97

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 509	(1994) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C 570	(1995) Oil- and Resin-Base Caulking Compound for Building Construction
ASTM C 734	(1993) Low-Temperature Flexibility of Latex Sealants After Artificial Weathering
ASTM C 920	(1998) Elastomeric Joint Sealants
ASTM D 217	(1997) Cone Penetration of Lubricating Grease (IP50/88)
ASTM D 1056	(1998) Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 1565	(1999) Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Open-Cell Foam)
ASTM E 84	(1999) Surface Burning Characteristics of Building Materials

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Backing

Bond-Breaker

Sealant

Manufacturer's descriptive data including storage requirements, shelf life, curing time, instructions for mixing and application, and primer data (if required). A copy of the Material Safety Data Sheet shall be provided for each solvent, primer or sealant material.

SD-07 Certificates

Sealant

Certificates of compliance stating that the materials conform to the specified requirements.

1.3 ENVIRONMENTAL REQUIREMENTS

The ambient temperature shall be within the limits of 40 to 90 degrees F when the sealants are applied.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the job in the manufacturer's original unopened containers. The container label or accompanying data sheet shall include the following information as applicable: manufacturer, name of material, formula or specification number, lot number, color, date of manufacture, mixing instructions, shelf life, and curing time at the standard conditions for laboratory tests. Materials shall be handled and stored to prevent inclusion of foreign materials. Materials shall be stored at temperatures between 40 and 90 degrees F unless otherwise specified by the manufacturer.

PART 2 PRODUCTS

2.1 BACKING

Backing shall be 25 to 33 percent oversize for closed cell and 40 to 50 percent oversize for open cell material, unless otherwise indicated.

2.1.1 Rubber

Cellular rubber sponge backing shall be ASTM D 1056, Type 2, closed cell, Class A, Grade 5, round cross section.

2.1.2 PVC

Polyvinyl chloride (PVC) backing shall be ASTM D 1565, Grade VO 12, open-cell foam, round cross section.

2.1.3 Synthetic Rubber

Synthetic rubber backing shall be ASTM C 509, Option I, Type I, preformed rods or tubes.

2.1.4 Neoprene

Neoprene backing shall be ASTM D 1056, closed cell expanded neoprene cord Type 2, Class C, Grade 2C2.

2.2 BOND-BREAKER

Bond-breaker shall be as recommended by the sealant manufacturer to prevent adhesion of the sealant to backing or to bottom of the joint.

2.3 PRIMER

Primer shall be non-staining type as recommended by sealant manufacturer for the application.

2.4 CAULKING

Oil- and resin-based caulking shall be ASTM C 570, Type 1, Use G.

2.5 SEALANT

2.5.1 Omitted

2.5.2 Elastomeric

Elastomeric sealants shall conform to ASTM C 920 and the following:

a. Polysulfide Sealant: Type S, Grade NS, Class 25, Use NT, M, G, A, or O as required.

b. Polyurethane sealant: Grade NS, Class 25, Use T, NT, M, G, A, or O as required.

c. Silicone sealant: Type S, Grade NS, Class 25, Use NT, M, G, A, or O as required.

2.5.3 Acoustical

Rubber or polymer-based acoustical sealant shall have a flame spread of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E 84. Acoustical sealant shall have a consistency of 250 to 310 when tested in accordance with ASTM D 217, and shall remain flexible and adhesive after 500 hours of accelerated weathering as specified in ASTM C 734, and shall be non-staining.

2.6 SOLVENTS AND CLEANING AGENTS

Solvents, cleaning agents, and accessory materials shall be provided as recommended by the manufacturer.

PART 3 EXECUTION

3.1 GENERAL

3.1.1 Surface Preparation

The surfaces of joints to receive sealant or caulk shall be free of all frost, condensation and moisture. Oil, grease, dirt, chalk, particles of mortar, dust, loose rust, loose mill scale, and other foreign substances shall be removed from surfaces of joints to be in contact with the sealant. Oil and grease shall be removed with solvent and surfaces shall be wiped dry with clean cloths. For surface types not listed below, the sealant manufacturer shall be contacted for specific recommendations.

3.1.2 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, the materials shall be removed by sandblasting or wire brushing. Laitance, efflorescence and loose mortar shall be removed from the joint cavity.

3.1.3 Steel Surfaces

Steel surfaces to be in contact with sealant shall be sandblasted or, if sandblasting would not be practical or would damage adjacent finish work, the metal shall be scraped and wire brushed to remove loose mill scale. Protective coatings on steel surfaces shall be removed by sandblasting or by a solvent that leaves no residue.

3.1.4 Aluminum Surfaces

Aluminum surfaces to be in contact with sealants shall be cleaned of temporary protective coatings. When masking tape is used for a protective cover, the tape and any residual adhesive shall be removed just prior to applying the sealant. Solvents used to remove protective coating shall be as recommended by the manufacturer of the aluminum work and shall be non-staining.

3.1.5 Wood Surfaces

Wood surfaces to be in contact with sealants shall be free of splinters and sawdust or other loose particles.

3.2 APPLICATION

3.2.1 Masking Tape

Masking tape shall be placed on the finish surface on one or both sides of a joint cavity to protect adjacent finish surfaces from primer or sealant smears. Masking tape shall be removed within 10 minutes after joint has been filled and tooled.

3.2.2 Backing

Backing shall be installed to provide the indicated sealant depth. The installation tool shall be shaped to avoid puncturing the backing.

3.2.3 Bond-Breaker

Bond-breaker shall be applied to fully cover the bottom of the joint without contaminating the sides where sealant adhesion is required.

3.2.4 Primer

Primer shall be used on concrete masonry units, wood, or other porous surfaces in accordance with instructions furnished with the sealant. Primer shall be applied to the joint surfaces to be sealed. Surfaces adjacent to joints shall not be primed.

3.2.5 Sealant

Sealant shall be used before expiration of shelf life. Multi-component

sealants shall be mixed according to manufacturer's printed instructions. Sealant in guns shall be applied with a nozzle of proper size to fit the width of joint. Joints shall be sealed as detailed in the drawings. Sealant shall be forced into joints with sufficient pressure to expel air and fill the groove solidly. Sealant shall be installed to the indicated depth without displacing the backing. Unless otherwise indicated, specified, or recommended by the manufacturer, the installed sealant shall be dry tooled to produce a uniformly smooth surface free of wrinkles and to ensure full adhesion to the sides of the joint; the use of solvents, soapy water, etc., will not be allowed. Sealants shall be installed free of air pockets, foreign embedded matter, ridges and sags. Sealer shall be applied over the sealant when and as specified by the sealant manufacturer.

3.3 CLEANING

The surfaces adjoining the sealed joints shall be cleaned of smears and other soiling resulting from the sealant application as work progresses.

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05/01

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UFGS-08110 (May 2001)

SECTION 08110

STEEL DOORS AND FRAMES

05/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A250.4	(1994) Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings
ANSI A250.6	(1997) Hardware on Standard Steel Doors (Reinforcement - Application)
ANSI A250.8	(1998) SDI-100 Recommended Specifications for Standard Steel Doors and Frames

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 591	(1998) Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications
ASTM A 653/A 653M	(2000) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 924/A 924M	(1999) General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM C 578	(1995) Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 591	(1994) Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
ASTM C 612	(1993) Mineral Fiber Block and Board Thermal Insulation
ASTM D 2863	(1997) Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)
ASTM E 283	(1991) Rate of Air Leakage Through

	Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

DOOR AND HARDWARE INSTITUTE (DHI)

ANSI/DHI A115	(1991) Steel Door Preparation Standards (Consisting of A115.1 through A115.6 and A115.12 through A115.18)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1999) Fire Doors and Fire Windows
NFPA 105	(1999) The Installation of Smoke-Control Door Assemblies
NFPA 252	(1999) Standard Methods of Fire Tests of Door Assemblies

STEEL DOOR INSTITUTE (SDOI)

SDI 105	(1998) Recommended Erection Instructions for Steel Frames
SDI 111-C	Recommended Louver Details for Standard Steel Doors
SDI 111-F	Recommended Existing Wall Anchors for Standard Steel Doors and Frames
SDI 113	(1979) Apparent Thermal Performance of STEEL DOOR and FRAME ASSEMBLIES

UNDERWRITERS LABORATORIES (UL)

UL 10B	(1997) Fire Tests of Door Assemblies

1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Doors

Frames

Accessories

Weatherstripping

Show elevations, construction details, metal gages, hardware provisions, method of glazing, and installation details.

Schedule of doors

Schedule of frames

Submit door and frame locations.

SD-03 Product Data

Doors

Frames

Accessories

Weatherstripping

Submit manufacturer's descriptive literature for doors, frames, and accessories. Include data and details on door construction, panel (internal) reinforcement, insulation, and door edge construction. When "custom hollow metal doors" are provided in lieu of "standard steel doors," provide additional details and data sufficient for comparison to ANSI A250.8 requirements.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors, frames, and accessories undamaged and with protective wrappings or packaging. Provide temporary steel spreaders securely fastened to the bottom of each welded frame. Store doors and frames on platforms under cover in clean, dry, ventilated, and accessible locations, with 1/4 inch airspace between doors. Remove damp or wet packaging immediately and wipe affected surfaces dry. Replace damaged materials with new.

PART 2 PRODUCTS

2.1 STANDARD STEEL DOORS

ANSI A250.8, except as specified otherwise. Prepare doors to receive hardware specified in Section 08702, BUILDERS' HARDWARE. Undercut where indicated. Exterior doors shall have top edge closed flush and sealed to prevent water intrusion. Doors shall be 1-3/4 inches thick, unless otherwise indicated.

2.1.1 Classification - Level, Performance, Model

2.1.1.1 Omitted

2.1.1.2 Heavy Duty Doors

ANSI A250.8, Level 2, physical performance Level B, Model 2, with core construction as required by the manufacturer for interior doors and for exterior doors, of size(s) and design(s) indicated. Where vertical stiffener cores are required, the space between the stiffeners shall be filled with mineral board insulation. Provide Level II doors at mechanical rooms, storage rooms, electrical rooms and communications rooms.

2.1.1.3 Omitted

2.1.1.4 Maximum Duty Doors

ANSI A250.8, Level 4, physical performance Level A, Model 2 with core

construction as required by the manufacturer of size(s) and design(s) indicated. Where vertical stiffener cores are required, the space between the stiffeners shall be filled with mineral board insulation. Provide Level 4 for doors at building entrances and circulation spaces.

2.2 OMITTED

2.3 INSULATED STEEL DOOR SYSTEMS

Insulated steel doors shall have a core of polyurethane foam and an R factor of 10.0 or more (based on a k value of 0.16); face sheets, edges, and frames of galvanized steel not lighter than 23 gage, 16 gage, and 16 gage respectively; magnetic weatherstripping; nonremovable-pin hinges; thermal-break aluminum threshold; and vinyl door bottom. Doors and frames shall receive phosphate treatment, rust-inhibitive primer, and baked acrylic enamel finish. Doors shall have been tested in accordance with ANSI A250.4 and shall have met the requirements for Level C. Prepare doors to receive hardware specified in Section 08702, BUILDERS' HARDWARE. Doors shall be 1 3/4 inches thick. Provide insulated steel doors and frames at entrances.

2.4 OMITTED

2.5 ACCESSORIES

2.5.1 Omitted

2.5.2 Louvers

2.5.2.1 Interior Louvers

SDI 111-C, Louvers shall be stationary sightproof type where scheduled. Detachable moldings on room or non-security side of door; on security side of door, moldings to be integral part of louver. Form louver frames of 20 gage steel and louver blades of a minimum 24 gage. Sightproof louvers to be inverted "V" blade design or inverted "Y" blade design with minimum net-free opening as indicated on mechanical drawings.

2.5.2.2 Exterior Louvers

Louvers shall be inverted "V" type with minimum net-free opening as shown on the mechanical drawings. Weld or tenon louver blades to continuous channel frame and weld assembly to door to form watertight assembly. Form louvers of hot-dip galvanized steel of same gage as door facings. Louvers shall have steel-framed insect screens secured to room side and readily removable. Provide aluminum wire cloth, 18 by 18 or 18 by 16 inch mesh, for insect screens. Net-free louver area to be before screening.

2.5.3 Astragals

For pairs of exterior steel doors which will not have aluminum astragals or removable mullions, as specified in Section 08702, BUILDERS' HARDWARE, provide overlapping steel astragals with the doors. For interior pairs of fire rated and smoke control doors, provide stainless steel astragals complying with NFPA 80 for fire rated assemblies and NFPA 105 for smoke control assemblies.

2.5.4 Moldings

Provide moldings around glass of interior and exterior doors and louvers of interior doors. Provide nonremovable moldings on outside of exterior doors and on corridor side of interior doors. Other moldings may be stationary or removable. Secure inside moldings to stationary moldings, or provide snap-on moldings. Muntins shall interlock at intersections and shall be fitted and welded to stationary moldings.

2.6 INSULATION CORES

Insulated cores shall be of type specified, and provide an apparent U-factor of .48 in accordance with SDI 113 and shall conform to:

a. Rigid Polyurethane Foam: ASTM C 591, Type 1 or 2, foamed-in-place or in board form, with oxygen index of not less than 22 percent when tested in accordance with ASTM D 2863; or

b. Rigid Polystyrene Foam Board: ASTM C 578, Type I or II; or

c. Mineral board: ASTM C 612, Type I.

2.7 STANDARD STEEL FRAMES

ANSI A250.8, except as otherwise specified. Form frames to sizes and shapes indicated, with welded corners. Provide steel frames for doors, transoms, sidelights, mullions, cased openings, and interior glazed panels, unless otherwise indicated.

2.7.1 Welded Frames

Continuously weld frame faces at corner joints. Mechanically interlock or continuously weld stops and rabbets. Grind welds smooth.

2.7.2 Omitted

2.7.3 Mullions and Transom Bars

Mullions and transom bars shall be closed or tubular construction and shall member with heads and jambs butt-welded thereto. Bottom of door mullions shall have adjustable floor anchors and spreader connections.

2.7.4 Stops and Beads

Form stops and beads from 20 gage steel. Provide for glazed and other openings in standard steel frames. Secure beads to frames with oval-head, countersunk Phillips self-tapping sheet metal screws or concealed clips and fasteners. Space fasteners approximately 12 to 16 inches on centers. Miter molded shapes at corners. Butt or miter square or rectangular beads at corners.

2.7.5 Omitted
2.7.6 Omitted

2.7.7 Anchors

Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, not lighter than 18 gage.

2.7.7.1 Wall Anchors

Provide at least three anchors for each jamb. For frames which are more than 7.5 feet in height, provide one additional anchor for each jamb for each additional 2.5 feet or fraction thereof.

a. Masonry: Provide anchors of corrugated or perforated steel straps or 3/16 inch diameter steel wire, adjustable or T-shaped;

b. Stud partitions: Weld or otherwise securely fasten anchors to backs of frames. Design anchors to be fastened to closed steel studs with sheet metal screws, and to open steel studs by wiring or welding;

c. Completed openings: Secure frames to previously placed concrete or masonry with expansion bolts in accordance with SDI 111-F; and

2.7.7.2 Floor Anchors

Provide floor anchors drilled for 3/8 inch anchor bolts at bottom of each jamb member. Where floor fill occurs, terminate bottom of frames at the indicated finished floor levels and support by adjustable extension clips resting on and anchored to the structural slabs.

2.8 FIRE AND SMOKE DOORS AND FRAMES

NFPA 80 and NFPA 105 and this specification. The requirements of NFPA 80 and NFPA 105 shall take precedence over details indicated or specified.

2.8.1 Labels

Fire doors and frames shall bear the label of Underwriters Laboratories, Inc. (UL), Factory Mutual Engineering and Research (FM), or Warnock Hersey International (WHI) attesting to the rating required. Testing shall be in accordance with NFPA 252 or UL 10B. Labels shall be metal with raised letters, and shall bear the name or file number of the door and frame manufacturer. Labels shall be permanently affixed at the factory to frames and to the hinge edge of the door. Door labels shall not be painted.

2.8.2 Oversized Doors

For fire doors and frames which exceed the size for which testing and labeling are available, furnish certificates stating that the doors and frames are identical in design, materials, and construction to a door which has been tested and meets the requirements for the class indicated.

2.8.3 Astragal on Fire and Smoke Doors

On pairs of labeled fire doors, conform to NFPA 80 and UL requirements. On smoke control doors, conform to NFPA 105.

2.9 WEATHERSTRIPPING

2.9.1 Integral Gasket

Black synthetic rubber gasket with tabs for factory fitting into factory slotted frames, or extruded neoprene foam gasket made to fit into a continuous groove formed in the frame, may be provided in lieu of head and jamb seals specified in Section 08702, BUILDERS' HARDWARE. Insert gasket in groove after frame is finish painted. Air leakage of weatherstripped

doors shall not exceed 1.25 cubic feet per minute of air per square foot of door area when tested in accordance with ASTM E 283.

2.10 HARDWARE PREPARATION

Provide minimum hardware reinforcing gages as specified in ANSI A250.6. Drill and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of ANSI A250.8 and ANSI A250.6. For additional requirements refer to ANSI/DHI A115. Drill and tap for surface-applied hardware at the project site. Build additional reinforcing for surface-applied hardware into the door at the factory. Locate hardware in accordance with the requirements of ANSI A250.8, as applicable. Punch door frames, with the exception of frames that will have weatherstripping gasketing, to receive a minimum of two rubber or vinyl door silencers on lock side of single doors and one silencer for each leaf at heads of double doors. Set lock strikes out to provide clearance for silencers.

2.11 FINISHES

2.11.1 Factory-Primed Finish

All surfaces of doors and frames shall be thoroughly cleaned, chemically treated and factory primed with a rust inhibiting coating as specified in ANSI A250.8, or paintable A25 galvannealed steel without primer. Where coating is removed by welding, apply touchup of factory primer.

2.11.2 Hot-Dip Zinc-Coated and Factory-Primed Finish

Fabricate exterior doors and interior doors at shower areas and frames from hot dipped zinc coated steel, alloyed type, that complies with ASTM A 924/A 924M and ASTM A 653/A 653M. The Coating weight shall meet or exceed the minimum requirements for coatings having 0.4 ounces per square foot, total both sides, i.e., A40. Repair damaged zinc-coated surfaces by the application of zinc dust paint. Thoroughly clean and chemically treat to insure maximum paint adhesion. Factory prime as specified in ANSI A250.8. Provide for exterior doors and interior doors at shower areas.

2.11.3 Electrolytic Zinc-Coated Anchors and Accessories

Provide electrolytically deposited zinc-coated steel in accordance with ASTM A 591, Commercial Quality, Coating Class A. Phosphate treat and factory prime zinc-coated surfaces as specified in ANSI A250.8.

2.12 FABRICATION AND WORKMANSHIP

Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable. On wraparound frames for masonry partitions, provide a throat opening 1/8 inch larger than the actual masonry thickness. Design frames in exposed masonry walls or partitions to allow sufficient space between the inside back of trim and masonry to receive calking compound.

2.12.1 Grouted Frames

For frames to be installed in exterior walls and to be filled with mortar or grout, fill the stops with strips of rigid insulation to keep the grout out of the stops and to facilitate installation of stop-applied head and jamb seals.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Frames

Set frames in accordance with SDI 105. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction. Where frames require ceiling struts or overhead bracing, anchor frames to the struts or bracing. Backfill frames with mortar. When an additive is provided in the mortar, coat inside of frames with corrosion-inhibiting bituminous material. For frames in exterior walls, ensure that stops are filled with rigid insulation before grout is placed.

3.1.2 Doors

Hang doors in accordance with clearances specified in ANSI A250.8. After erection and glazing, clean and adjust hardware.

3.1.3 Fire and Smoke Doors and Frames

Install fire doors and frames, including hardware, in accordance with NFPA 80. Install fire rated smoke doors and frames in accordance with NFPA 80 and NFPA 105.

3.2 PROTECTION

Protect doors and frames from damage. Repair damaged doors and frames prior to completion and acceptance of the project or replace with new, as directed. Wire brush rusted frames until rust is removed. Clean thoroughly. Apply an all-over coat of rust-inhibitive paint of the same type used for shop coat.

3.3 CLEANING

Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove mastic smears and other unsightly marks.

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SECTION 08120

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09/99

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UFGS-08120N (September 1999)

SECTION 08120

ALUMINUM DOORS AND FRAMES
09/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA 45	(1980) Aluminum Finishes

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 605.2	(1992; Addendum 1995) High Performance Organic Coatings on Architectural Extrusions and Panels

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1997; Rev. A) Carbon Structural Steel
ASTM B 209	(1996) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM E 283	(1991) Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E 331	(1996) Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

1.2 PERFORMANCE REQUIREMENTS

1.2.1 Structural

Shapes and thicknesses of framing members shall be sufficient to withstand a design wind load of not less than 30 pounds per square foot of supported area with a deflection of not more than 1/175 times the length of the member and a safety factor of not less than 1.65. Provide glazing beads, moldings, and trim of not less than 0.050 inch nominal thickness.

1.2.2 Air Infiltration

When tested in accordance with ASTM E 283, air infiltration shall not exceed 0.06 cubic foot per minute per square foot of fixed area at a test pressure of 6.24 pounds per square foot (50-mile per hour wind).

1.2.3 Water Penetration

When tested in accordance with ASTM E 331, there shall be no water penetration at a pressure of 8 pounds per square foot of fixed area.

1.3 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Doors and Frames

Show elevations of each door type, size of doors and frames, metal gages, details of door and frame construction, methods of anchorage, glazing details, weatherstripping, provisions for and location of hardware, and details of installation.

SD-08 Manufacturer's Instructions

Doors and Frames

Submit detail specifications and instructions for installation, adjustments, cleaning, and maintenance.

1.4 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the site for damage. Unload and store with minimum handling. Provide storage space in dry location with adequate ventilation, free from dust or water, and easily accessible for inspection and handling. Stack materials on nonabsorptive strips or wood platforms. Do not cover doors and frames with tarps, polyethylene film, or similar coverings. Protect finished surfaces during shipping and handling using manufacturer's standard method, except that no coatings or lacquers shall be applied to surfaces to which calking and glazing compounds must adhere.

PART 2 PRODUCTS

2.1 DOORS AND FRAMES

Swing-type aluminum doors and frames of size, design, and location indicated. Provide doors complete with frames, framing members, subframes, adjoining sidelights, trim, and accessories.

2.2 MATERIALS

2.2.1 Anchors

Stainless steel or steel with hot-dipped galvanized finish.

2.2.2 Weatherstripping

Continuous wool pile, silicone treated, or type recommended by door manufacturer.

2.2.3 Aluminum Alloy for Doors and Frames

ASTM B 221, Alloy 6063-T5 for extrusions. ASTM B 209, alloy and temper best suited for aluminum sheets and strips.

2.2.4 Fasteners

Hard aluminum or stainless steel.

2.2.5 Structural Steel

ASTM A 36/A 36M.

2.2.6 Aluminum Paint

Type as recommended by aluminum door manufacturer.

2.3 FABRICATION

2.3.1 Aluminum Frames

Extruded aluminum shapes with contours approximately as indicated. Provide removable glass stops and glazing beads for frames accommodating fixed glass. Use countersunk stainless steel Phillips screws for exposed fastenings, and space not more than 12 inches o.c. Mill joints in frame members to a hairline fit, reinforce, and secure mechanically.

2.3.2 Aluminum Doors

Of type, size, and design indicated and not less than 1 3/4 inches thick. Minimum wall thickness, 0.125 inch, except beads and trim, 0.050 inch. Door sizes shown are nominal and shall include standard clearances as follows: 0.093 inch at hinge and lock stiles, 0.125 inch between meeting stiles, 0.125 inch at top rails, 0.187 inch between bottom and threshold, and 0.687 inch between bottom and floor. Bevel single-acting doors 0.063 or 0.125 inch at lock, hinge, and meeting stile edges.

2.3.2.1 Full Glazed Stile and Rail Doors

Doors shall have wide stiles and rails as indicated. Fabricate from extruded aluminum hollow seamless tubes or from a combination of open-shaped members interlocked or welded together. Fasten top and bottom rail together by means of welding or by 3/8 or 1/2 inch diameter cadmium-plated tensioned steel tie rods. Provide an adjustable mechanism of jack screws or other methods in the top rail to allow for minor clearance adjustments after installation.

2.3.3 Welding and Fastening

Where possible, locate welds on unexposed surfaces. Dress welds on exposed surfaces smoothly. Select welding rods, filler wire, and flux to produce a uniform texture and color in finished work. Remove flux and spatter from surfaces immediately after welding. Exposed screws or bolts will be permitted only in inconspicuous locations, and shall have countersunk heads. Weld concealed reinforcements for hardware in place.

2.3.4 Weatherstripping

Provide on stiles and rails of exterior doors. Fit into slots which are integral with doors or frames. Weatherstripping shall be replaceable without special tools. Installation shall allow doors to swing freely and close positively. Air leakage of a single leaf weatherstripped door shall not exceed 1.25 cubic feet per minute of air per square foot of door area when tested in accordance with ASTM E 283.

2.3.5 Anchors

On the backs of subframes, provide anchors of the sizes and shapes indicated for securing subframes to adjacent construction. Anchor transom bars at ends and mullions at head and sill. Reinforce and anchor freestanding door frames to floor construction as indicated on approved shop drawings and in accordance with manufacturer's recommendation. Place anchors near top and bottom of each jamb and at intermediate points not more than 25 inches apart.

2.3.6 Provisions for Hardware

Hardware is specified in Section 08702, BUILDERS' HARDWARE. Deliver hardware templates and hardware (except field-applied hardware) to the door manufacturer for use in fabrication of aluminum doors and frames. Cut, reinforce, drill, and tap doors and frames at the factory to receive template hardware. Provide doors to receive surface-applied hardware, except push plates, kick plates, and mop plates, with reinforcing only; drill and tap in the field. Provide hardware reinforcements of stainless steel or steel with hot-dipped galvanized finish, and secure with stainless steel screws.

2.3.7 Provisions for Glazing

Provide extruded aluminum snap-in glazing beads on interior side of doors. Provide extruded aluminum, theft-proof, snap-in glazing beads or fixed glazing beads on exterior or security side of doors. Glazing beads shall have vinyl insert glazing gaskets. Design glazing beads to receive glass of thickness indicated or specified. Glazing is specified in Section 08810, GLASS AND GLAZING.

2.3.8 Finishes

Provide exposed aluminum surfaces with factory finish of anodic coating or organic coating.

2.3.8.1 Anodic Coating

Clean exposed aluminum surfaces and provide an anodized finish conforming to AA 45. Finish shall be integral color-anodized, designation AA-M10-C22-A42, Architectural Class I 0.7 mil or thicker or electrolytically deposited color-anodized, designation AA-M10-C22-A44, Architectural Class I 0.7 mil or thicker. Color shall be as indicated in Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

2.3.8.2 Organic Coating

Clean and prime exposed aluminum surfaces. Provide a high-performance finish in accordance with AAMA 605.2 with total dry film thickness of not less than 1.2 mils. The finish color shall be as indicated in Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

PART 3 EXECUTION

3.1 INSTALLATION

Plumb, square, level, and align frames and framing members to receive doors and adjoining sidelights. Anchor frames to adjacent construction as indicated and in accordance with manufacturer's printed instructions. Anchor bottom of each frame to rough floor construction with 3/32 inch thick stainless steel angle clips secured to back of each jamb and to floor construction; use stainless steel bolts and expansion rivets for fastening clip anchors. Seal metal-to-metal joints between framing members as specified in Section 07900, JOINT SEALANTS. Hang doors to produce clearances specified in paragraph entitled "Aluminum Doors," of this section. After erection and glazing, adjust doors and hardware to operate properly.

3.2 PROTECTION FROM DISSIMILAR MATERIALS

3.2.1 Dissimilar Metals

Where aluminum surfaces come in contact with metals other than stainless steel, zinc, or small areas of white bronze, protect from direct contact by one or a combination of the following methods:

a. Paint the dissimilar metal with one coat of heavy-bodied bituminous paint.

b. Apply a good quality elastomeric sealant between the aluminum and the dissimilar metal.

c. Paint the dissimilar metal with one coat of primer and one coat of aluminum paint.

d. Use a nonabsorptive tape or gasket in permanently dry locations.

3.2.2 Drainage from Dissimilar Metals

In locations where drainage from dissimilar metals has direct contact with aluminum, provide protective paint, to prevent aluminum discoloration.

3.2.3 Masonry and Concrete

Provide aluminum surfaces in contact with mortar, concrete, or other masonry materials with one coat of heavy-bodied bituminous paint.

3.2.4 Wood or Other Absorptive Materials

Provide aluminum surfaces in contact with absorptive materials subject to frequent moisture, and aluminum surfaces in contact with treated wood, with two coats of aluminum paint or one coat of heavy-bodied bituminous paint. In lieu of painting the aluminum, the Contractor shall have the option of painting the wood or other absorptive surface with two coats of aluminum paint and sealing the joints with elastomeric sealant.

3.3 CLEANING

Upon completion of installation, clean door and frame surfaces in accordance with door manufacturer's recommended procedure. Do not use abrasive, caustic, or acid cleaning agents.

3.4 PROTECTION

Protect doors and frames from damage and from contamination by other materials such as cement mortar. Prior to completion and acceptance of the work, restore damaged doors and frames to original condition, or replace with new ones.

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CEGS-08210 (August 2000)

SECTION 08210

WOOD DOORS
08/00

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ARCHITECTURAL WOODWORK INSTITUTE (AWI)

AWI-02	(1994) Architectural Woodwork Quality Standards, Guide Specifications and Quality Certification Program

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1995) Fire Doors and Windows
NFPA 101	(1997) Safety to Life from Fire in Buildings and Structures
NFPA 252	(1995) Fire Tests of Door Assemblies

NATIONAL WOOD WINDOW & DOOR ASSOCIATION (NWWDA)

NWWDA I.S. 1-A	(1993) Architectural Wood Flush Doors
NWWDA I.S. 4	(1994) Water-Repellent Preservative Non-Pressure Treatment for Millwork

1.2 GENERAL REQUIREMENTS

1.2.1 Standard Products

Doors shall be of the type, size, and design indicated on the drawings, and shall be the standard products of manufacturers regularly engaged in the manufacture of wood doors.

1.2.2 Marking

Each door shall bear a stamp, brand, or other identifying mark indicating quality and construction of the door. The identifying mark or a separate certification shall include identification of the standard on which construction of the door is based, identity of the manufacturing plant, identification of the standard under which preservative treatment, if used, was made, and identification of the doors having a Type I glue bond.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Wood Doors

Drawings indicating the location of each door, elevation of each type of door, details of construction, marks to be used to identify the doors, and location and extent of hardware blocking. Drawings shall include catalog cuts or descriptive data for doors, weatherstripping, flashing, and thresholds to be used.

SD-03 Product Data

Fire Doors

Manufacturers preprinted installation and touch-up instructions.

SD-04 Samples

Factory Coated Natural Finish

Samples of factory applied natural finish.

SD-07 Certificates

Fire Rated Doors
Adhesives

Certificates for oversize fire doors and/or door/frame assemblies stating that the doors are identical in design, materials, and construction to a door that has been tested and meets the requirements for the class indicated. Certificate stating that adhesives used for proposed doors do not contain any formaldehyde.

1.4 STORAGE

Doors shall be stored in fully covered areas and protected from damage and from extremes in temperature and humidity. Doors shall be stored on supports to prevent warping or twisting, and to provide ventilation. Factory cartons or wrappers shall be kept intact until installation.

1.5 HARDWARE

Hardware, including weatherstripping and thresholds, is specified in Section 08702 BUILDERS' HARDWARE.

1.6 GLAZING

Glazing is specified in Section 08810 GLASS AND GLAZING.

1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend

beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 GENERAL FABRICATION REQUIREMENTS

2.1.1 Edge Sealing

Wood end-grain exposed at edges of doors shall be sealed prior to shipment.

2.1.2 Preservative Treatment

Exterior softwood doors shall be water-repellent preservative treated in accordance with NWWDA I.S. 4.

2.1.3 Adhesives

Adhesives shall be in accordance with NWWDA I.S. 1-A, requirements for Type II Bond Doors (water-repellent) for interior doors. Adhesive for doors to receive a transparent finish shall be nonstaining. Adhesives shall contain no formaldehydes.

2.1.4 Prefitting

Doors shall be furnished prefitted or unfitted at the option of the Contractor.

2.2 FLUSH DOORS

Flush doors shall be solid core and shall conform to NWWDA I.S. 1-A, except for the 1 year acclimatization requirement in paragraph T-2, which shall not apply. Wood doors shall be 5-ply construction with faces, stiles, and rails bonded to the cores.

2.2.1 Core Construction

2.2.1.1 Solid Cores

Door construction shall be glued wood block core or particle board core with vertical and horizontal edges bonded to the core. Blocking and hardware reinforcements for particle board doors shall be blocking option HB-1-5, HB-2-5, HB-4, or HB-6 in accordance with NWWDA I.S. 1-A.

2.2.2 Face Panels

2.2.2.1 Natural Finished Wood Veneer Doors

Veneer doors to receive natural finish shall be Premium Grade, book matched birch veneer in accordance with NWWDA I.S. 1-A. Vertical stile strips shall be selected to provide edges of the same species and/or color as the face veneer. Door finish shall be in accordance with paragraph FINISHING.

2.3 OMITTED

2.4 FIRE RATED DOORS

Fire rated door assemblies shall bear the listing identification label of a nationally recognized testing laboratory qualified to perform tests of fire door assemblies in accordance with NFPA 252 and having a listing for the

tested assemblies. The specific time interval rating on the labels shall be as shown. Door assemblies shall be in accordance with NFPA 80. Listing identification on labels shall be constructed and permanently applied by a method which results in their destruction should they be removed. Fire rated doors shall be mineral core.

2.4.1 Reinforcement Blocking

Fire rated doors shall be provided, as required, with hardware reinforcement blocking, and top, bottom, and intermediate rail blocking. Lock blocks shall be manufacturer's standard. Reinforcement blocking shall be in compliance with the manufacturer's labeling requirements. Reinforcement blocking shall not be of mineral material.

2.4.2 Stile Edges

Composite fire rated doors shall be provided with vertical stile edges that do not contain fire retardant salts. Vertical stiles shall be of the same species and/or color as the face veneer.

2.5 MOULDING AND EDGING

Moulding and edging shall be as shown. Wood species for transparent finished doors shall be compatible with veneer.

2.6 INSERT LOUVERS

Where indicated, doors shall be provided with sightproof insert louvers. Louvers shall be stationary or adjustable as shown. Blades shall be welded or tenoned to the frame and the entire assembly fastened to the door with metal or wood moldings on both sides as shown. The frame shall be nonremovable from the outside of the door.

2.7 OMITTED

2.8 FINISHING

2.8.1 Factory Coated Natural Finish

Doors indicated to receive factory coated natural finish shall be given a transparent finish conforming to AWI-02, Section 1500, Premium Grade, light stain, medium rubbed sheen, open grain effect. Finish shall be AWI factory finish system Number TR3 or TR4. Color of the natural finish shall be in accordance with Section 09000 BUILDING COLOR AND FINISH SCHEDULE. Edges of unfitted doors shall be field finished after fitting to the frames.

PART 3 EXECUTION

3.1 INSTALLATION OF DOORS

3.1.1 General Use Doors

Doors shall be fit, hung, and trimmed as required. Door shall have a clearance of 1/8 inch at the sides and top and shall have a bottom clearance of 1/4 inch over thresholds and 1/2 inch at other locations unless otherwise shown. The lock edge or both edges of doors shall be beveled at the rate of 1/8 inch in 2 inches. Cuts made on the job shall be sealed immediately after cutting, using a clear varnish or sealer. Bottom of doors shall be undercut to allow clear door swing over carpeted areas.

Vertical edges of doors which have not been rounded or beveled at the factory shall be eased when the doors are installed.

3.1.2 Fire Doors

Installation, hardware, and operational characteristics shall conform to NFPA 80 and NFPA 101 and shall be in strict conformance with the manufacturer's printed instructions. Properly sized pilot holes shall be drilled for screws in door edges. Factory applied labels shall remain intact where installed. Labeled hinge stile edge and top edge of door shall not be trimmed. Lockstile edge and bottom edge may be trimmed only to the extent recommended by the door manufacturer.

-- End of Section --

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SECTION 08331

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09/98

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CEGS-08331 (September 1998)

SECTION 08331

METAL ROLLING COUNTER DOORS
09/98

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 209	(1996) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

1.2 GENERAL

Rolling counter doors shall be of the type, size, and design indicated on the drawings, and shall be the standard product of a manufacturer regularly engaged in the production of rolling counter doors. Each door shall be provided with a permanent label showing the manufacturer's name and address and the model number of the door.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Approved Detail Drawings

Drawings showing elevations of each door type, details of anchorage, details of construction, location and description of hardware, shape and thickness of materials, details of joints and connections, and details of guides and fittings. A schedule showing the location of each counter door shall be included with the drawings.

SD-03 Product Data

Rolling Counter Doors

Manufacturer's descriptive data and catalog cuts.

Installation
Cleaning

Manufacturer's preprinted installation and cleaning instructions.

SD-10 Operation and Maintenance Data

Operation

Six complete copies of maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, troubleshooting guides, and simplified diagrams for the equipment as installed. Spare parts data for each different item of material and equipment specified shall be supplied not later than 1 month prior to the date of beneficial occupancy. The data shall include a complete list of parts and supplies, with current unit prices and source of supply, and a list of the parts recommended by the manufacturer to be replaced after 3 years of service.

1.4 DELIVERY AND STORAGE

Rolling counter doors shall be delivered to the jobsite wrapped in a protective covering with the brands and names clearly marked thereon. Rolling counter doors shall be stored in accordance with the manufacturer's instructions in a dry location that is adequately ventilated and free from dust, water, or other contaminants, and in a manner that permits easy access for inspecting and handling. Doors shall be handled carefully to prevent damage. Damaged items that cannot be restored to like-new condition shall be replaced.

1.5 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 BASIC COMPONENTS

2.1.1 Curtain

The curtain shall be fabricated of extruded aluminum slats conforming to ASTM B 221, Alloy 6063. Thickness of slat material shall be as required by width of opening. Slats shall be approximately 1-1/4 to 1-1/2 inch wide with a depth of crown of 1/2 inch. Alternate slats shall be fitted with end locks to maintain curtain alignment. Bottom of curtain shall be provided with tubular bar reinforcement matching the curtain, and fitted with a resilient bottom seal.

2.1.2 Jamb Guides

Guides shall be of 1/8 inch minimum thickness extruded aluminum conforming to ASTM B 221, Alloy 6063, and shall be fitted with neoprene silencers or replaceable heavy nap striping to eliminate noise and dust infiltration.

2.1.3 Counterbalance Shaft Assembly

The curtain shall be coiled around a steel tube of sufficient thickness and

diameter to prevent deflection exceeding 0.03 inch per foot. The barrel shall contain oil tempered helical steel torsion springs capable of sufficient torque to counterbalance the weight of the curtain. Springs shall be calculated to provide a minimum of 7,500 operating cycles (one complete cycle of door operation will begin with the door in the closed position, move to the full open position and return to the closed position).

2.1.4 Brackets

Brackets shall be a minimum 12 gauge thickness steel if flat plate, or 16 gauge thickness if there are a minimum of 3 returns of 3/4 inch width.

2.1.5 Hood

The hood shall be of 0.040 inch minimum thickness aluminum sheet conforming to ASTM B 209, Alloy 5005.

2.1.6 Locks

The curtain shall be locked at both sides of bottom bar by a chrome-plated cylinder lock keyed into the building keying system. Lock shall be on the administration room side of the counter door. Keying shall conform to Section 08702 BUILDERS' HARDWARE.

2.2 ROLLING COUNTER DOOR (NON-RATED)

Rolling counter doors shall conform to the requirements specified herein and shall be constructed of aluminum curtains, guides and hood components.

2.3 OMITTED
2.4 OMITTED

2.5 OPERATION

2.5.1 Manual Operation

The curtain shall be operated by means of manual push-up with lift handles or continuous full width lift bar.

2.6 OMITTED

2.7 FINISH

Exposed parts of the counter door, including the curtain, bottom rail, guides, and hood shall be of uniform finish and appearance. Aluminum shall have a clear anodized finish. All other steel parts shall be given a shop coat of primer paint standard with the manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

Doors shall be installed in accordance with approved detail drawings and manufacturer's instructions. Anchors and inserts for guides, brackets, hardware, and other accessories shall be accurately located. Upon completion, doors shall be free from warp, twist, or distortion. Doors shall be lubricated, properly adjusted, and demonstrated to operate freely.

3.2 OMITTED

3.3 CLEANING

Aluminum doors shall be cleaned in accordance with manufacturer's approved instructions.

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SECTION 08353

OPERABLE PARTITIONS

04/00

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PART 3 EXECUTION

3.1 INSTALLATION

-- End of Section Table of Contents --

CEGS-08353 (April 2000)

SECTION 08353

OPERABLE PARTITIONS
04/00

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 84	(1998el) Surface Burning Characteristics of Building Materials
ASTM E 90	(1997) Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
ASTM E 413	(1987; R 1994) Rating Sound Insulation

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Operable Partitions

Drawings containing complete schematic diagrams and details required to demonstrate that the system has been coordinated and will properly function as a unit. Drawings shall show proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including clearances for maintenance and operation.

SD-03 Product Data

Operable Partitions

Manufacturer's descriptive data, performance charts, catalog cuts, and installation instructions.

SD-04 Samples

Operable Partitions; G, ED

Manufacturer's standard color samples of specified surfaces and finishes.

SD-07 Certificates

Materials
Operable Partitions

Certificate attesting that the materials meet the requirements specified and that partitions have specified acoustical and flame retardant properties, as determined by test.

SD-10 Operation and Maintenance Data

Operable Partitions

*5

Six complete copies of operating instructions ~~outlining the procedures required for electrically operated partitions~~. The instructions shall include the manufacturer's name, model number, service manual, parts list, and brief description of all equipment and operating features. Data shall include a complete list of parts and supplies, with current unit prices and source of supply, and a list of the parts recommended by the manufacturer to be replaced after 3 years of service.

Six complete copies of maintenance instructions explaining routine maintenance procedures including inspection, adjustments, lubrication, and cleaning. The instructions shall list possible breakdown, methods of repair, and a troubleshooting guide.

1.3 DELIVERY AND STORAGE

Materials shall be delivered to the jobsite in the manufacturer's original, unopened packages and shall be stored with protection from the weather, humidity and temperature variations, dirt and dust, or other contaminants.

1.4 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 MATERIALS

Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of such products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Equipment shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site. Door and partition finishes shall have a Class A rating when tested in accordance with ASTM E 84.

2.1.1 Omitted
2.1.2 Omitted
2.1.3 Omitted

2.1.4 Wall Fabric Surfacing

Wall fabric surfacing shall be 100 percent polyolefin with acrylic backing and stain-repellant surface coating. Weight shall be 12.15 ounce per linear yard.

2.1.5 Hardware

Operable partitions shall have manufacturer's standard hardware. Hardware shall be anodized aluminum with a natural finish, chrome plated or brass plated metal or painted finish.

2.1.6 Sweep Strips

Sweep strips shall be vinyl or other material which will not crack or craze with severe usage. Sweep strip shall control STC to the specified rating.

2.1.7 Track

Track shall be recessed or surface mounted as shown and shall be of extruded aluminum or enamel finish steel. Track shall be manufacturer's standard product designed for the weight of door or partition furnished. Track sections shall be provided in the maximum lengths practicable, not less than 6 feet long except for narrow doors and at ends of runs where short length is required. Suitable joint devices such as interlocking keys shall be provided at each joint to provide permanent alignment of track.

2.1.8 Metal Soffit

Soffit shall be provided when steel track is recessed. Soffit shall be of metal of adequate thickness to protect the ceiling from damage by door operation and shall be provided with the door manufacturer's standard neutral-color applied finish. Soffit on aluminum track shall be an integral part of the track.

2.2 OMITTED
2.3 OMITTED

2.4 OPERABLE PARTITIONS
*3 *5
Operable partitions shall consist of top hung ball bearing carriers which support ~~continuously-~~hinged paired modular panels. Panels shall be not more than 4 feet wide, except for end closure panels, and shall be full height to track. Panels shall have a protective edge which fully surrounds and protects the edges of the surface material or surface material which wraps around the vertical panel edges without vertical trim. Panels shall be constructed of minimum 16 gauge thick steel frames with minimum 22 gauge thick face panels spot welded to the frame. Panel thickness and composition shall be designed to provide an STC rating as indicated in accordance with ASTM E 90 and ASTM E 413. Doors shall have vinyl sweep top seals which compress against the bottom of the top track. Bottom seals shall be a vinyl sweep mechanical seal which will expand in place or panels which will be lowered by self-contained operating device. Panels shall lock in place to form a stable, rigid partition. Panels shall be surfaced with wall fabric. Partition finish shall have a flame spread rating of not more than 25 in accordance with ASTM E 84.

2.5 OMITTED

2.6 COLOR

Color shall be in accordance with Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall be in accordance with the manufacturer's approved installation instructions.

-- End of Section --

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DIVISION 08 - DOORS & WINDOWS

SECTION 08520

ALUMINUM AND ENVIRONMENTAL CONTROL ALUMINUM WINDOWS

03/00

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-- End of Section Table of Contents --

CEGS-08520 (March 2000)

SECTION 08520

ALUMINUM AND ENVIRONMENTAL CONTROL ALUMINUM WINDOWS
03/00

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 101	(1997) Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors
AAMA 603	(1998) Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 283	(1991) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E 330	(1997el) Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
ASTM E 547	(1996) Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential

INSECT SCREENING WEAVERS ASSOCIATION (ISWA)

ISWA IWS 089	(1990) Recommended Standards and Specifications for Insect Wire Screening (Wire Fabric)

NATIONAL FENESTRATION RATING COUNCIL (NFRC)

NFRC 100	(1997) Procedure for Determing Fenestration Product U-factors
NFRC 200	(1997) Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence

SCREEN MANUFACTURERS ASSOCIATION (SMA)

SMA ANSI/SMA 1004	(1987) Aluminum Tubular Frame Screens for Windows

1.2 WINDOW PERFORMANCE

Aluminum windows shall meet the following performance requirements. Testing requirements shall be performed by an independent testing laboratory or agency.

1.2.1 Structural Performance

Structural test pressures on window units shall be for positive load (inward) and negative load (outward) in accordance with ASTM E 330. After testing, there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms or any other damage which could cause window to be inoperable. There shall be no permanent deformation of any main frame, sash or ventilator member in excess of the requirements established by AAMA 101 for the window types and classification specified in this section.

1.2.2 Air Infiltration

Air infiltration shall not exceed the amount established by AAMA 101 for each window type when tested in accordance with ASTM E 283.

1.2.3 Water Penetration

Water penetration shall not exceed the amount established by AAMA 101 for each window type when tested in accordance with ASTM E 547.

1.2.4 Thermal Performance

Thermal transmittance for thermally broken aluminum windows with insulating glass shall not exceed a U-factor of 0.40 Btu/hr-ft^2-F determined according to NFRC 100, and a solar heat gain coefficient (SHGC) of0.55 Btu/hr-ft^2-F determined according to NFRC 200. Window units shall comply with the U.S. Department of Energy, Energy Star Window Program for the Central Climate Zone.

1.2.5 Condensation Index Rating

The condensation index rating shall be 85 as determined using NFRC approved software THERM.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Aluminum Windows
Insect Screens

Drawings indicating elevations of window, rough-opening dimensions for each type and size of window, full-size sections, thicknesses of metal, fastenings, methods of installation and anchorage, connections with other work, type of wall construction, size and spacing of anchors, method of glazing, types and locations of operating hardware, mullion details, weatherstripping details, screen details including method of attachment, and window schedules showing locations of each window type.

SD-03 Product Data

Aluminum Windows

Manufacturer's descriptive data and catalog cut sheets.

Aluminum Windows

Manufacturer's preprinted installation instructions and cleaning instructions.

SD-04 Samples

Aluminum Windows

Manufacturer's standard color samples of the specified finishes.

SD-06 Test Reports

Aluminum Windows

Reports for each type of aluminum window attesting that identical windows have been tested and meet all performance requirements established under paragraph WINDOW PERFORMANCE.

SD-07 Certificates

Aluminum Windows

Certificates stating that the aluminum windows are AAMA certified conforming to requirements of this section. Labels or markings permanently affixed to the window will be accepted in lieu of certificates. Product ratings determined using NFRC 100 and NFRC 200 shall be authorized for certification and properly labeled by the manufacturer.

1.4 QUALIFICATION

Window manufacturer shall specialize in designing and manufacturing the type of aluminum windows specified in this section, and shall have a minimum of 5 years of documented successful experience. Manufacturer shall have the facilities capable of meeting contract requirements, single-source responsibility and warranty.

1.5 OMITTED

1.6 DELIVERY AND STORAGE

Aluminum windows shall be delivered to project site and stored in accordance with manufacturer's recommendations. Damaged windows shall be

replaced with new windows.

1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 ALUMINUM WINDOW TYPES

Aluminum windows shall consist of complete units including sash, glass, frame, weatherstripping, and hardware. Windows shall conform to AAMA 101. Windows shall be double-glazed. Operable windows shall permit cleaning the outside glass from inside the building.

2.1.1 Omitted
2.1.2 Omitted

2.1.3 Single-Hung and Double-Hung Windows

Aluminum single-hung (H) and double-hung (H) windows shall conform to AAMA 101 H-C30 type which operate vertically with the weight of sash offset by a counterbalancing mechanism mounted in window to hold the sash stationary at any open position. Windows shall be provided with a tilt-in sash. Single-hung and double-hung windows shall be provided with locking devices to secure the sash in the closed position. Counterbalancing mechanisms shall be easily replaced after installation.

2.1.4 Omitted

2.1.5 Horizontal-Sliding Windows

Aluminum horizontal (HS) sliding windows shall conform to AAMA 101 HS-C30 type consisting of sliding sash and fixed lite. Sash guides shall be nylon wheels. Windows shall be provided with locking devices to secure the sash in the closed position.

2.2 WEATHERSTRIPPING

Weatherstripping for ventilating sections shall be of type designed to meet water penetration and air infiltration requirements specified in this section in accordance with AAMA 101, and shall be manufactured of material compatible with aluminum and resistant to weather. Weatherstrips shall be factory-applied and easily replaced in the field. Neoprene or polyvinylchloride weatherstripping are not acceptable where exposed to direct sunlight.

2.3 INSECT SCREENS

Insect screens shall be aluminum window manufacturer's standard design, and shall be provided where scheduled on drawings. Insect screens shall be fabricated of roll-formed tubular-shaped aluminum frames conforming to SMA ANSI/SMA 1004 and (18 x 16) aluminum mesh screening conforming with ISWA IWS 089, Type III.

2.4 ACCESSORIES

2.4.1 Fasteners

Fastening devices shall be window manufacturer's standard concealed design made from aluminum, stainless steel, cadmium-plated steel, nickel/chrome-plated steel in compliance with AAMA 101. Self-tapping sheet metal screws will not be acceptable for material thicker than 1/16 inch.

2.4.2 Hardware

Hardware shall be as specified for each window type and shall be fabricated of aluminum, stainless steel, cadmium-plated steel, zinc-plated steel or nickel/chrome-plated steel in accordance with requirements established by AAMA 101.

2.4.3 Window Anchors

Provide concealed anchors for all windows of the type recommended by the window manufacturer for the specific types of construction. Anchoring devices shall be made of aluminum, cadmium-plated steel, stainless steel, or zinc-plated steel conforming to AAMA 101.

2.5 GLASS AND GLAZING

Aluminum windows shall be designed for inside glazing, field glazing, and for glass types scheduled on drawings and specified in Section 08810 GLASS AND GLAZING. Units shall be complete with glass and glazing provisions to meet AAMA 101. Glazing material shall be compatible with aluminum, and shall not require painting.

2.6 FINISH

2.6.1 Omitted

2.6.2 Baked-Acrylic Resin-Based Coating

Exposed surfaces of aluminum windows shall be finished with acrylic resin-based coating conforming to AAMA 603, total dry thickness of 1.0 mils. Finish shall be free of scratches and other blemishes.

2.6.3 Omitted

2.6.4 Color

Color shall be in accordance with Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

PART 3 EXECUTION

3.1 INSTALLATION

Aluminum windows shall be installed in accordance with approved shop drawings and manufacturer's published instructions. Aluminum surfaces in contact with masonry, concrete, wood and dissimilar metals other than stainless steel, zinc, cadmium or small areas of white bronze, shall be protected from direct contact using protective materials recommended by AAMA 101. The completed window installation shall be watertight in accordance with Section 07900 JOINT SEALING. Glass and glazing shall be installed in accordance with requirements of this section and Section 08810 GLASS AND GLAZING.

3.2 ADJUSTMENTS AND CLEANING

3.2.1 Hardware Adjustments

Final operating adjustments shall be made after glazing work is complete. Operating sash or ventilators shall operate smoothly and shall be weathertight when in locked position.

3.2.2 Cleaning

Aluminum window finish and glass shall be cleaned on exterior and interior sides in accordance with window manufacturer's recommendations. Alkaline or abrasive agents shall not be used. Precautions shall be taken to avoid scratching or marring window finish and glass surfaces.

-- End of Section --

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SECTION 08702

BUILDERS' HARDWARE (FORT BRAGG PROJECTS)

03/96

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CEGS-08700 (March 1996)

Includes changes through Notice 2 (August 1997)

SECTION 08702

BUILDERS' HARDWARE
(FORT BRAGG PROJECTS)
03/96

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A117.1	(1992) Providing Accessibility and Usability for Physically Handicapped People

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 283	(1991) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen
ASTM F 883	(1990) Padlocks

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA-01	(Effective thru Jun 1995) Directory of Certified Locks & Latches
BHMA-02	(Effective thru Jul 1995) Directory of Certified Door Closers
BHMA-03	(Effective thru Jul 1996) Directory of Certified Exit Devices
BHMA ANSI/BHMA A156.1	(1988) Butts and Hinges
BHMA ANSI/BHMA A156.2	(1989) Bored and Preassembled Locks and Latches
BHMA ANSI/BHMA A156.3	(1994) Exit Devices
BHMA ANSI/BHMA A156.4	(1992) Door Controls - Closers
BHMA ANSI/BHMA A156.5	(1992) Auxiliary Locks & Associated Products
BHMA ANSI/BHMA A156.6	(1994) Architectural Door Trim

BHMA ANSI/BHMA A156.7	(1988) Template Hinge Dimensions
BHMA ANSI/BHMA A156.8	(1994) Door Controls - Overhead Stops and Holders
BHMA ANSI/BHMA A156.13	(1994) Mortise Locks & Latches
BHMA ANSI/BHMA A156.15	(1995) Closer Holder Release Devices
BHMA ANSI/BHMA A156.16	(1989) Auxiliary Hardware
BHMA ANSI/BHMA A156.18	(1993) Materials and Finishes
BHMA ANSI/BHMA A156.20	(1989) Strap and Tee Hinges and Hasps
BHMA ANSI/BHMA A156.21	(1989) Thresholds

DOOR AND HARDWARE INSTITUTE (DHI)

DHI-04	(1976) Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames
DHI-05	(1990) Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames
DHI-A115.IG	(1994) Installation Guide for Doors and Hardware
DHI A115-W	(Varies) Wood Door Hardware Standards (Incl All5-W1 thru A115-W9)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1995) Fire Doors and Windows
NFPA 101	(1997) Safety to Life from Fire in Buildings and Structures
NFPA 105	(1993) Installation of Smoke-Control Door Assemblies

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Hardware and Accessories.

Manufacturer's descriptive data, technical literature, catalog cuts, and installation instructions. Spare parts data for locksets, exit devices, closers, electric locks, electric strikes, electro-magnetic closer holder release devices, and electric exit devices, after approval of the detail drawings, and not later than 3 months prior to the date of beneficial

occupancy. The data shall include a complete list of parts and supplies, with current unit prices and source of supply.

Hardware Schedule.

Hardware schedule listing all items to be furnished. The schedule shall include for each item: the quantities; manufacturer's name and catalog numbers; the ANSI number specified, sizes; detail information or catalog cuts; finishes; door and frame size and materials; location and hardware set identification cross-references to drawings; corresponding reference standard type number or function number from manufacturer's catalog if not covered by ANSI or BHMA; and list of abbreviations and template numbers.

Keying Schedule; G, RE.

The keying schedule shall be developed in accordance with the schedule shown on the drawings and with DHI publication "Keying Procedures, Systems, and Nomenclature." The keying schedule and bitting list shall be compatible with the installation's existing keying system and shall be submitted for approval by the installation prior to ordering any keying hardware.

SD-07 Certificates

Hardware and Accessories.

The hardware manufacturer's certificates of compliance stating that the supplied material or hardware item meets specified requirements. Each certificate shall be signed by an official authorized to certify in behalf of the product manufacturer and shall identify quantity and date or dates of shipment or delivery to which the certificates apply. A statement that the proposed hardware items appear in BHMA-01, BHMA-02 and BHMA-03 directories of certified products may be submitted in lieu of certificates.

SD-11 Closeout Submittals

Bitting List

The bitting list shall be furnished (prior to the prefinal inspection) to the PWBC locksmith by certified mail from the manufacturer or registered locksmith originating the system. The bitting list will include the type of keying system used and actual identification of key cuts and codes or cylinders. The bitting list shall be prepared by the manufacturer. However, if the contract requires less than 50 cores or cylinders, the bitting list may be prepared by the manufacturer or a registered locksmith certified by the Associated Locksmiths of America, Inc.

1.3 PREDELIVERY CONFERENCE

Upon approval of the Hardware Schedule, the construction Contractor shall arrange a conference with the hardware supplier, Contracting Officer and the using agency to determine keying system requirements. Location of the key control storage system, set-up and key identification labeling will also be determined.

1.4 DELIVERY, STORAGE, AND HANDLING

Hardware shall be delivered to the project site in the manufacturer's original packages. Each article of hardware shall be individually packaged

in the manufacturer's standard commercial carton or container, and shall be properly marked or labeled to be readily identifiable with the approved hardware schedule. Each change key shall be tagged or otherwise identified with the door for which its cylinder is intended. Where double cylinder functions are used or where it is not obvious which is the key side of a door, appropriate instructions shall be included with the lock and on the hardware schedule. Manufacturer's printed installation instructions, fasteners, and special tools shall be included in each package.

1.5 SPECIAL TOOLS

Special tools, such as those supplied by the manufacturer, unique wrenches, and dogging keys, shall be provided as required to adjust hardware items.

1.6 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

1.7 OPERATION AND MAINTENANCE MANUALS

Six complete copies of maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides shall be provided. The instructions for electro-magnetic closer holder release devices shall include simplified diagrams as installed.

PART 2 PRODUCTS

2.1 GENERAL HARDWARE REQUIREMENTS

Hardware shall conform to the requirements specified herein and the HARDWARE SETS listing at the end of this section. Hardware set numbers correspond to the set numbers shown on the drawings. Hardware items providing accessibility and usability for physically handicapped shall comply with ANSI A117.1.

2.2 TEMPLATES

Requirements for hardware to be mounted on metal doors or metal frames shall be coordinated between hardware manufacturer and door or frame manufacturer by use of templates and other information to establish location, reinforcement required, size of holes, and similar details. Templates of hinges shall conform to BHMA ANSI/BHMA A156.7.

2.3 HINGES

Hinges shall conform to BHMA ANSI/BHMA A156.1. Hinges used on metal doors and frames shall also conform to BHMA ANSI/BHMA A156.7. Except as otherwise specified, hinge sizes shall conform to the hinge manufacturer's printed recommendations.

2.3.1 Hinges for Reverse Bevel Doors with Locks

Hinges for reverse bevel doors with locks shall have pins that are made nonremovable by means such as a set screw in the barrel, or safety stud, when the door is in the closed position.

2.3.2 Contractor's Option

Hinges with antifriction bearings may be furnished in lieu of ball bearing hinges, except where prohibited for fire doors by the requirements of NFPA 80.

2.3.3 Pivot Hinges

Pivot hinges shall conform to BHMA ANSI/BHMA A156.4.

2.4 LOCKS AND LATCHES

To the maximum extent possible, locksets, latchsets and deadlocks shall be the products of a single manufacturer. Lock fronts for double-acting doors shall be rounded. Strikes for wood frames and pairs of wood doors shall be furnished with wrought boxes.

2.4.1 Mortise Lock and Latchsets

Mortise lock, latchsets, and strikes shall be series 1000 and shall conform to BHMA ANSI/BHMA A156.13, operational Grade 1. Strikes for security doors shall be rectangular without curved lip. Mortise type locks and latches for doors 1-3/4 inches thick and over shall have adjustable bevel fronts or otherwise conform to the shape of the door. Mortise locks shall have armored fronts.

2.4.2 Bored Lock and Latchsets

Bored lock, latchsets, and strikes shall be series 4000 and shall conform to BHMA ANSI/BHMA A156.2, Grade 1. Bored type locks and latches for doors 1-3/8 inches thick and over shall have adjustable bevel fronts or otherwise conform to the shape of the door.

2.4.3 Omitted

2.4.4 Auxiliary Locks and Associated Products

Bored and mortise dead locks and dead latches, narrow style dead locks and dead latches, rim latches, dead latches, and dead bolts shall conform to BHMA ANSI/BHMA A156.5. Bolt and latch retraction shall be dead bolt style. Strike boxes shall be furnished with dead bolt and latch strikes for Grade 1.

2.4.5 Lock Cylinders (Mortise, Rim and Bored)

Lock cylinders shall comply with BHMA ANSI/BHMA A156.5. Lock cylinder shall have not less than seven pins. Cylinders shall have key removable type cores. A grand master keying system shall be provided. An extension of the existing keying system shall be provided. The cylinders shall be compatible with existing locks that were manufactured by Best, have interchangeable cores and have an E type keyway. Construction interchangeable cores shall be provided. Disassembly of knob or lockset shall not be required to remove core from lockset. All locksets, lockable exit devices, and padlocks shall accept same interchangeable cores.

2.4.6 Omitted

2.4.7 Padlocks

Padlocks shall conform to ASTM F 883. Straps, tee hinges, and hasps shall conform to BHMA ANSI/BHMA A156.20.

2.4.8 Omitted

2.4.9 Lock Trim

Lock trim shall be cast, forged, or heavy wrought construction of commercial plain design. In addition to meeting the test requirement of BHMA ANSI/BHMA A156.2 or BHMA ANSI/BHMA A156.13, knobs, lever handles, roses, and escutcheons shall be 0.050 inch thick, if unreinforced. If reinforced, the outer shell shall be 0.035 inch thick and the combined thickness shall be 0.070 inch except that knob shanks shall be 0.060 inch thick. Knob diameter shall be 2-1/8 to 2-1/4 inches.Lever handles shall be of plain design with ends returned to no more than 1/2 inch from the door face. Knobs shall be provided for all lock trim unless noted otherwise in the hardware schedule.

2.5 EXIT DEVICES AND EXIT DEVICE ACCESSORIES

Exit devices and exit device accessories shall conform to BHMA ANSI/BHMA A156.3, Grade 1.

2.5.1 Exit Devices and Auxiliary Items

Trim shall be of wrought construction and commercial plain design with straight, beveled, or smoothly rounded sides, corners, and edges. Adjustable strikes shall be provided for rim type and vertical rod devices. Open back strikes shall be provided for pairs of doors with mortise and vertical rod devices; except open back strikes shall be used on labeled doors only where specifically provided for in the published listings. Touch bars shall be provided in lieu of conventional crossbars and arms. Escutcheons shall be provided not less than 7 by 2-1/4 inches. Escutcheons shall be cut to suit cylinders and operating trim.

2.5.2 Door Coordinator

Door coordinator without override feature shall be Type 21B and shall be provided for each pair of doors equipped with an overlapping astragal. The coordinator may be gravity or mechanically operated as indicated and shall be capable of holding the active door of a pair open until the inactive door has preceded it in the closing cycle. When used as fire exit hardware, the coordinator and carry bar shall be listed or labeled by a nationally recognized independent testing laboratory.

2.5.3 Removable Mullions

Removable mullions shall be Type 22 of the box type and shall be used only with those exit devices for which the mullions were manufactured. Mullions shall be furnished with mullion stabilizers of the same manufacturer.

2.5.4 Omitted

2.5.5 Automatic Flush Bolts

Automatic flush bolts shall be Type 25 in accordance with BHMA ANSI/BHMA A156.3, and shall be installed at the top and bottom of the inactive leaf of pairs of fire rated doors where specified in the hardware sets. Flush bolts shall be mortised in the strike edge of the door.

2.6 OMITTED

2.7 KEYING

Locks shall be keyed in sets or subsets as scheduled. Locks shall be furnished with the manufacturer's standard construction key system. Change keys for locks shall be stamped with change number and the inscription "U.S. Property - Do Not Duplicate." Keys shall be supplied as follows:

Locks:	2 change keys each lock except barracks bedrooms. Barracks Bedrooms: 1 man room - 2 keys per lock
Master keyed sets:	6 keys each set.
Grand master keys:	6 keys total.
Construction keys:	2 keys total.
Blank keys:	10 per change key.

The keys will be furnished to the Contracting Officer as described below in a container arranged for key control system storage in sets or subsets as approved in the keying schedule along with a chart identifying key location as to door, room, and key numbers.

2.7.1 Manufacturing

Permanent core control keys, grand masters, masters, or any submasters and the bitting list will be sent to the DPWE locksmith by registered mail prior to the prefinal inspection. Keying will be done by the manufacturer, if over 50 cores or cylinders. If the contract requires less than 50 cores or cylinders, the keying may be prepared by the manufacturer or a registered locksmith certified by the Associated Locksmiths of America, Inc.

2.7.2 Installation

The permanent cores or cylinders will be installed by a registered locksmith certified by the Associated Locksmiths of America, Inc. The Contractor's locksmith will change out all construction cores prior to final inspection. After the prefinal inspection and once the Contracting Officer's Representative has determined that the work is ready for a final inspection, all interior keys will be inserted in the locks so that the hardware can be checked for proper operation during final inspection. The exterior keys will be available during final inspection so that the exterior hardware can be checked for proper operation. At the completion of final inspection, all exterior keys will be retained by the Contracting Officer's Representative and controlled access will be allowed the Contractor and DPWE until all work has been completed. Once all work has been completed, the Contracting Officer's Representative will transfer the exterior keys to the DPWE.

2.8 DOOR CLOSING DEVICES

Door closing devices shall conform to BHMA ANSI/BHMA A156.4, Grade 1. Closing devices shall be products of one manufacturer for each type specified. The opening resistance of closing devices shall not exceed 15 1bf applied at the latch stile or exceed 5 1bfwhere low opening resistance is scheduled.

2.8.1 Surface Type Closers

Surface type closers shall be Grade 1, Series C02000 Full Cover with

options PT-4H, Size 1 or 2 through Size 6, and PT-4D with back check position valve. Except as otherwise specified, sizes shall conform to the manufacturer's published recommendations. Closers for outswinging exterior doors shall have parallel arms or shall be top jamb mounted. Closers for doors close to a wall shall be of narrow projection so as not to strike the wall at the 90-degree open position.

2.9 DOOR CONTROLS - OVERHEAD HOLDERS

Door controls - overhead holders shall conform to BHMA ANSI/BHMA A156.8.

2.10 ELECTRO-MAGNETIC HOLDERS

Door closers with integral hold-open device shall conform to BHMA ANSI/BHMA A156.15 and shall release the door upon activation of the building fire alarm system or interruption of electric power.

2.11 OMITTED

2.12 ARCHITECTURAL DOOR TRIM

Architectural door trim shall conform to BHMA ANSI/BHMA A156.6.

2.12.1 Door Protection Plates

2.12.1.1 Armor Plates

Armor plates shall be stainless steel, 36 inches in height, and 2 inches less in width than the width of the door for single doors and 1 inch less for pairs of doors. Edges of metal plates shall be beveled. Where the door has a louver panel, the armor plate shall be omitted if top of louver frame is more than 20 inches above the bottom of the door.

2.12.1.2 Kick Plates

Kick plates shall be stainless steel. Width of plates shall be 2 inches less than door width for single doors and 1 inchless for pairs of doors. Height shall be 16 inches, except where the bottom rail is less than 16 inches the plate shall extend to within 1/2 inch of the panel mold or glass bead. Edges of metal plates shall be beveled.

2.12.2 Omitted

2.12.3 Push Plates

2.12.3.1 Omitted

2.12.3.2 Flat Plates

Flat plates shall be Type J301 0.50 inch thick stainless steel, size 8 inches by 16 inches. Edges of metal plates shall be beveled.

2.12.4 Door Pulls and Push/Pull Units

2.12.4.1 Arm Pulls

Arm pulls shall be Category J400, double base, stainless steel.

2.12.4.2 Omitted

2.12.4.3 Door Pulls

Door pulls shall be Category J400 stainless steel of plain modern design. Pulls for hollow metal, mineral core wood or kalamein doors shall be Type J405 thru-bolted to Type J301 flat push plates.

2.12.5 Push and Pull Bars

Push and pull bars shall be Category J500, stainless steel. Edges of mounting plates shall be beveled.

2.13 AUXILIARY HARDWARE

Auxiliary hardware, consisting of door holders and door stops, shall conform to BHMA ANSI/BHMA A156.16. Lever extension flush bolts shall be Type L14081. Dustproof strikes shall be Type L04011 for doors that are not fire rated. Dustproof strikes shall be Type L04021 for fire rated doors.

2.14 MISCELLANEOUS

2.14.1 Omitted

2.14.2 Metal Thresholds

Thresholds shall conform to BHMA ANSI/BHMA A156.21. Thresholds for exterior doors shall be extruded aluminum of the type indicated and shall provide proper clearance and an effective seal with specified weather stripping. Latching thresholds shall conform to BHMA ANSI/BHMA A156.3, Type 26, and of such height that the bottom of the door shall be 1/8 inch over the tread of the threshold and 1/8 inch below the top of the stop. Where required, thresholds shall be modified to receive projecting bolts of flush bolts or exit devices. Thresholds for doors accessible to the handicapped shall be beveled with slopes not exceeding 1:2 and with heights not exceeding 1/2 inch. Air leakage rate of weatherstripping shall not exceed 0.5 cubic foot per minute per lineal foot of crack when tested in accordance with ASTM E 283 at standard test conditions.

2.14.3 Rain Drips

Extruded aluminum, not less than 0.07 inch thick, painted. Door sill rain drips shall be 1-1/2 inches to 1-3/4 inches high by 5/8 inch projection. Overhead rain drips shall be approximately 1-1/2 inches high by 2-1/2 inches projection and shall extend 2 inches on either side of the door opening width.

2.14.4 Aluminum Housed Type Weatherseals

Weatherseals of the type indicated shall consist of extruded aluminum retainers not less than 0.07 inch wall thickness with vinyl, neoprene, silicone rubber, polyurethane or vinyl brush inserts. Aluminum shall be bronze anodized. Weatherseal material shall be of an industrial/commercial grade. Seals shall remain functional through all weather and temperature conditions. Air leakage rate of weatherstripping shall not exceed 0.5 cubic foot per minute per lineal foot of crack when tested in accordance with ASTM E 283 at standard test conditions.

2.14.5 Gasketing

Gasketing shall be a compression type seal, silicon based, self-adhesive product for use on steel door frames with steel doors for hourly rating indicated on drawings. Color shall be bronze. Air leakage rate of weatherstripping shall not exceed 0.5 cubic foot per minute per lineal foot of crack when tested in accordance with ASTM E 283 at standard test conditions.

2.14.6 Key Control Storage System

One key control storage system shall be provided for each building. Key control storage system shall conform to BHMA ANSI/BHMA A156.5, type and capacity shall be as required, and shall be properly labeled for key identification. Setup, identification labeling and location of the key control storage shall be as directed at the Predelivery Conference.

2.15 FASTENINGS

Fastenings of proper type, size, quantity, and finish shall be supplied with each article of hardware. Machine screws and expansion shields shall be used for attaching hardware to concrete or masonry. Fastenings exposed to the weather in the finished work shall be of brass, bronze, or stainless steel. Sex bolts, through bolts, or machine screws and grommet nuts, where used on reverse-bevel exterior doors equipped with half-surface or full-surface hinges, shall employ one-way screws or other approved tamperproof screws. Screws for the jamb leaf of half-mortise and full-surface hinges attached to structural steel frames shall be one-way or other approved tamperproof type.

2.16 FINISHES

Unless otherwise specified, finishes shall conform to those identified in BHMA ANSI/BHMA A156.18. Where painting of primed surfaces is required, painting is specified in Section 09900 PAINTS AND COATINGS.

2.17 HARDWARE FOR FIRE DOORS

Hardware for fire doors shall conform to the requirements of NFPA 80and NFPA 101.

PART 3 EXECUTION

3.1 APPLICATION

Hardware shall be located in accordance with DHI-04 and DHI-05, except that deadlocks shall be mounted 48 inches above finish floor. When approved, slight variations in locations or dimensions will be permitted. Application shall be in accordance with DHI-A115.IG or DHI A115-W. Door control devices for exterior doors such as closers and holders, shall be attached to doors with thru bolts and nuts or sex bolts. Alternate fastening methods may be approved by the Contracting Officer when manufacturers' documentation is submitted to verify that the fastening devices and door reinforcements are adequate to resist wind induced stresses. Electric hardware items and access control devices shall be installed in accordance with manufacturer's printed installation procedures.

3.1.1 Hardware for Fire Doors and Smoke-Control Door Assemblies

Hardware for fire doors shall be installed in accordance with the requirements of NFPA 80. Exit devices installed on fire doors shall have a

visible label bearing the marking "Fire Exit Hardware". Other hardware installed on fire doors, such as locksets, closers, and hinges shall have a visible label or stamp indicating that the hardware items have been approved by an approved testing agency for installation on fire-rated doors. Hardware for smoke-control door assemblies shall be installed in accordance with NFPA 105.

3.1.2 Door-Closing Devices

Door-closing devices shall be installed and adjusted in accordance with the templates and printed instructions supplied by the manufacturer of the devices. Insofar as practicable, doors opening to or from halls and corridors shall have the closer mounted on the room side of the door.

3.1.3 Key Control Storage Systems

Key control storage system shall be installed where directed.

3.1.4 Kick Plates

Kick plates shall be installed on the push side of single-acting doors and on both sides of double-acting doors.

3.1.5 Auxiliary Hardware

Lever extension flush bolts shall be installed at the top and bottom of the inactive leaf of pairs of doors. The bottom bolt shall operate into a dust-proof floor strike or threshold.

3.1.6 Thresholds

Thresholds shall be secured with a minimum of three fasteners per single door width and six fasteners per double door width with a maximum spacing of 12 inches. Exterior thresholds shall be installed in a bed of sealant with expansion anchors and stainless steel screws. Minimum screw size shall be No. 10 length, dependent on job conditions, with a minimum of 3/4 inch thread engagement into the floor or anchoring device used.

3.1.7 Rain Drips

Door sill rain drips shall align with the bottom edge of the door. Overhead rain drips shall align with bottom edge of door frame rabbet. Drips shall be set in sealant and fastened with stainless steel screws.

3.1.8 Weatherseals

Weatherseals shall be located as indicated, snug to door face and fastened in place with color matched metal screws after door and frames have been finish painted. Screw spacing shall be as recommended by manufacturer.

3.1.9 Gasketing

Gasketing shall be installed at the inside edge of the hinge and head and latch sides of door frame. Frames shall be toleranced for a 1/8 inch clearance between door and frame. Frames shall be treated with tape primer prior to installation.

3.2 OPERATIONAL TESTS

Prior to acceptance of any electrical hardware system, an operational test shall be performed to determine if devices are operating as intended by the specifications. Wiring shall be tested for correct voltage, current carrying capacity, and proper grounding. Stray voltages in lock wiring shall be eliminated to prevent locking devices from releasing in critical situations.

3.3 HARDWARE SETS

BARRACKS (BK)

NOTE: There are multiple doors with same door number. See drawings.

BK-1 Door No. 1 - Living Unit Entry
Each door to have:

1-1/2 prs.	Hinges A5112 X 630
1	Lockset F-13 X 626
1	Viewer L03171 X 626
1	Closer C02012 w/PT4C and PT4G X 689
1	Door Sweep ROY414

BK-2 Door No. 5 - Living Unit Closet
Each door to have:

1-1/2 prs.	Hinges A2112 X 626
1	Latchset F75 X 626
1	Wall Stop L02251 X 626
1	H.D. Surface Bolt (pad lockable) Ives #0454 or equal
1	Flat Plate (8"X8") mount at surface bolt padlock resting area

BK-3 Door No. 3 - Living Unit Toilet, 105 - Lobby Toilet, 203 - Activity Room Toilet
Each door to have:

1-1/2 prs.	Hinges A5112 X 630
1	Privacy Lock F76 X 626
1	Wall Stop L02251 X 626

BK-4 Door No. 4 - Sleeping Room, 202 - Kitchen
Each door to have:

1-1/2 prs.	Hinges A2112 X 626
1	Lockset F82 X 626
1	Floor Stop L02141 X 626

BK-5 Door No. 15 - Mechanical (Pair of Doors)
Each pair to have:

3 prs.	Hinges A5112 X 630
1	Lockset F07 X 626
1	Surface Automatic Extension Flush Bolts, Type 25 (inactive leaf) X 626
2	O.H. Holder C08511
1	Threshold J32100
2	Sets overhead and sill raindrips

BK-6 Door No. 12 - Comm Rooms
Each door to have:

1-1/2 prs.	Hinges A5112, 630
1	Lockset F07, 626
1	Floor Stop L02131, 626

1	Closer C02093 x 689

BK-7 Door No. 06A, 06B - Breezeways (Pair of Doors)
Each pair to have:

3 prs.	Hinges A5111 X 630
2	Exit Devices, Type 1, Function 05
2	Closers C02021
1	Threshold J32180
1	Removable Mullion
1	Set Weatherseals
2	Door Sweeps R0Y414
2	Mortise Cylinders E09211 X 626

BK-8 Door Nos. 09, 10, 16, 17, 19, 20 - Elect. Closet, Mechanical Storage (Pair of Doors)
Each pair to have:

3 prs.	Hinges 5112 X 630
1	Lockset F07 X 626
1	Surface Automatic Extension Flush Bolts Type 25 (inactive leaf), 626
2	Closer Holder Release Devices C00331
1	Coordinator Type 21B, 626 @ Doors 16 and 17 only
1	Threshold J32100

BK-9 Door Nos. 02, 08, 11 - Elect. Closet, Comm Room, Mech Closet
Each door to have:

1-1/2 prs.	Hinges 5111 X 630
1	Lockset F07 X 626
1	Closer C02102 x 689

BK-10 Door No. 07 - Laundry, 204 - Activity Room
Each door to have:

1-1/2 prs.	Hinges 5111 X 630
1	Lockset F05 X 626
1	Closer Holder Release Device C00331

BK-11 Door No. 13, Janitor
Each door to have:

1-1/2 prs.	Hinges 5112 X 630
1	Lockset F05 X 626
1	Floor Stop L02131 X 626
1	Closer C02092 x 689

BK-12 Door No. 14 - Janitor
Each door to have:

1-1/2 prs.	Hinges 5112 X 630
1	Lockset F05 X 626
1	Closer C02102

BK-13 Door No. 101 - Vestibule, 201 - Activity Room
Each door to have:

1-1/2 prs.	Hinges 5111 X 630
1	Push and Pull Bar Set J504
1	Mortise Dead Lock E06071
1	Closer C02021 at Door 101 w/PT4C and PT4G X 689
1	Threshold J32100
1	Set Weatherseals

BK-14 Door No. 18, 102 - Lobby and Vestibule, Activity Room

Each door to have:

1-1/2 prs.	Hinges 5111 X 630
1	Push and Pull Bar Set J504
1	Mortise Dead Lock E06071 - Door 18 only
1	Closer C02011 at Door 18, C02021 at Door 102 w/PT4C and PT4G X 689

BK-15 Door No. 103 - Storage

Each door to have:

1-1/2 prs.	Hinges 5112 X 630
1	Lockset F05 X 626
1	Closer C02021

BK-16 Door No. 104 - Mail Room

Each door to have:

2 prs.	Hinges A5112 X 630
1	Lockset F05 X 626
2	Surface Bolts L04131 (for bolting top leaf to bottom leaf)
1	Floor Stop L02131 X 626
1	O.H Holder C02511

BK-17 Door No. 205 - Game Room

3 prs.	Hinges A5112 x 630
1	Lockset F75 x 626 w/lever handles
2	Combination Stop and Holder L01302
1	Set Lever Extension Flush Bolts L04082 w/dustproof strikes

BATTALION HEADQUARTERS (BH)

NOTE: The first floor of this facility is accessible to the handicapped. There are multiple doors with same numbers. See Drawings.

BH-1 Door No. 1

Each door to have:

3 prs.	Hinges A5111 X 630
2	Push and Pull Bar Set J504
1	Mortise Dead Lock E06071
1	Set Lever Extension Flush Bolts L04081
2	Closers C02021 Low Opening Resistance w/ PT4C, PT4F, PT4G X 689
1	Threshold J12100
1	Set Weatherseals

BH-2 Door No. 2

Each door to have:

3 prs.	Hinges A5111 X 630
2	Push and Pull Bar Set J504
2	Closers C02021 Low Opening Resistance w/ PT4C, PT4F, PT4G X 689

BH-3 Door No. 3

Each door to have:

1-1/2 prs.	Hinges A5111 X 630
1	Lockset F75 X 626 w/ Lever Handles
1	Closer C02021 w/ PT4C and PT4G X 689

BH-4 Door No. 4

Each door to have:

1-1/2 prs.	Hinges A5112 X 630
1	Lockset F82 X 626 w/ Lever Handles

1	Closer C02011 X 689
1	Wall Stop L02251 X 626

BH-5 Door Nos. 5, 6, 7, 11, 12, 20
Each door to have:

1-1/2 prs.	Hinges A5112 X 630
1	Lockset F82 X 626 w/ Lever Handles
1	Wall Stop L02251 X 626

BH-6 Door No. 8
Each door to have:

1-1/2 prs.	Hinges A5112 X 630
1	Lockset F82 X 626 w/ Lever Handles
1	Closer C02011 X 689 w/ PT4G

BH-7 Door No. 9
Each door to have:

1-1/2 prs.	Hinges A5111 X 630
1	Push Plate
1	Door Pull
1	Closer C02011 w/ PT4G X 689
1	Kick Plate

BH-8 Door No. 10
Each door to have:

1-1/2 prs.	Hinges A5111 X 630
1	Push and Pull Bar Set J504
1	Closer C02021 Low Opening Resistance w/ PT4C, PT4F, PT4G X 689

BH-9 Door No. 13
Each door to have:

3 prs.	Hinges A5111 X 630
1	Lockset F20 X 626
1	Set Automatic Flush Bolts, Type 25
2	O.H. Holders C08511
1	Threshold J32100
1	Set Weatherseals
1	Set Rain Drips top and bottom

BH-10 Door Nos. 15, 21
Each door to have:

1-1/2 prs.	Hinges A5111 X 630
1	Lockset F05 X 626 w/ Lever Handles
1	Closer C02021 Low Opening Resistance w/ PT4C, PT4F, PT4G X 689
1	Threshold J12100
1	Set Weatherseals
1	Set Rain Drips top and bottom

BH-11 Door Nos. 16, 19
Each door to have:

1-1/2 prs.	Hinges A5112 X 630
1	Lockset F76 X 626 w/ Lever Handles
1	O.H. Holder C02511

BH-12 Door No. 17 except 82 SIG Large Battalion Headquarters
Each door to have:

2 prs.	Hinges A5112 X 630

1	Lockset F05 X 626 w/ Lever Handles
2	Surface Bolts L04131 (for bolting top leaf to bottom leaf)
1	Floor Stop L02131 X 626
1	O.H. Holder C02511

COMPANY OPERATIONS FACILITIES (COF)

NOTE: There are multiple doors with same numbers. See Drawings.

COF-1 Door Nos. 1, 3
Each door to have:

1-1/2 prs.	Hinges A5111 X 630
1	Lockset F20 X 626
1	Closers C02021 w/ PT4C and PT4G X 689
1	Threshold J32100
1	Set Weatherseals

COF-2 Door No. 2, 17 Door 17 at QUAD Medium COF - 307th EN only
Each door to have:

3 prs.	Hinges A5111 X 630
1	Lockset F20 X 626
1	Set Automatic Flush Bolts, Type 25
2	O.H. Holders C08511
1	Threshold J32100
1	Set Weatherseals
1	Set Rain Drips for Top and Bottom except when door is located under cover

COF-3 Door No. 4
Each door to have:

1-1/2 prs.	Hinges A5111 X 630
1	Push Plate
1	Door Pull
1	Mortise Dead Lock E06071
1	Closer C02021 w/ PT4C and PT4G X 689
1	Threshold J32100
1	Set Weatherseals
1	Set Rain Drips Top and Bottom

COF-4 Door No. 5
Each door to have:

1-1/2 prs.	Hinges A5111 X 630
1	Lockset F05 X 626
1	Closer C02011 X 689
1	Wall Stop L02251 X 626

COF-5 Door Nos. 7, 10, 14, 19 Door 19 at QUAD Medium COF - 307th EN only
Each door to have:

1-1/2 prs.	Hinges A5112 X 630
1	Lockset F82 X 626
1	Wall Stop L02251 X 626

COF-6 Door No. 8
Each door to have:

1-1/2 prs.	Hinges A5111 X 630
1	Push Plate
1	Door Pull
1	Closer C02011 X 689 w/PT4C and PT4G

COF-7 Door No. 9
Each door to have:

1-1/2 prs.	Hinges A5111 X 630
1	Lockset F84 X 626
1	Closer C02011 X 689
1	Wall Stop L02251 X 626

COF-8 Door No. 11
Each door to have:

3 prs.	Hinges A5112 X 630
1	Lockset F82 X 626
1	Set Surface Bolts L04131
1	Wall Stop L02251 X 626

COF-9 Door No. 13
Each door to have:

1-1/2 prs.	Hinges A5112 X 630
1	Lockset F84 X 626
1	Closer C02021 X 689
1	Wall Stop L02251 X 626

COF-10 Door Nos. 15
Each door to have:

1-1/2 prs.	Hinges A5112 X 630
1	Lockset F76 X 626
1	Wall Stop L02251 X 626

COF-11 Door No. 16
Each door to have:

1-1/2 prs.	Hinges A5112 X 630
1	Lockset F84 X 626
1	Closer C02011 X 689
1	Wall Stop L02251 X 626

COF-12 Door No. 18 Door 18 at QUAD Medium COF - 307th EN only
Each door to have:

1-1/2 prs.	Hinges A5111 X 630
1	Lockset F82 X 626
1	O.H. Holders C08511
1	Threshold J32100
1	Set Weatherseals

REFUSE GARBAGE BUILDING (RGB)

RGB-1 Door No. 1
Each door to have:

1-1/2 prs.	Hinges A5112 X 630
1	Lockset F05 X 626 w/lever handles
1	Closers C02021, Low Opening Resistance w/PT4C, PT4F and PT4G X 689
1	Threshold J12100
1	Set Weatherseals

RGB-2 Door No. 3
Each door to have:

1-1/2 prs.	Hinges A5112 X 630
1	Lockset F82 X 626 w/lever handles
1	Closer C02011 w/PT4C and PT4G x 689

RGB-3 Door No. 4

1-1/2 prs	Hinges A5112 x 630
1	Lockset F76 x 626
1	Wall Stop L02251 x 626

RGB-4 Door No. 5

Each door to have:

1-1/2 prs.	Hinges A5112 X 630
1	Lockset F76 X 626 w/lever handles
2	O.H. Holder C02511

-- End of Section --

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DIVISION 08 - DOORS & WINDOWS

SECTION 08810

GLASS AND GLAZING

05/97

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CEGS-08810 (May 1997)

Includes changes through Notice 4 (May 2000)

SECTION 08810

GLASS AND GLAZING
05/97

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z97.1	(1984; R 1994) Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 509	(1994) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C 669	(1995) Glazing Compounds for Back Bedding and Face Glazing of Metal Sash
ASTM C 864	(1999) Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
ASTM C 920	(1998) Elastomeric Joint Sealants
ASTM C 1036	(1991; R 1997) Flat Glass
ASTM C 1048	(1997b) Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass
ASTM C 1172	(1996el) Laminated Architectural Flat Glass
ASTM D 395	(1998) Rubber Property - Compression Set
ASTM E 773	(1997) Accelerated Weathering of Sealed Insulating Glass Units
ASTM E 774	(1997) Classification of the Durability of Sealed Insulating Glass Units
ASTM E 1300	(1998) Determining the Minimum Thickness and Type of Glass Required to Resist a Specified Load

CODE OF FEDERAL REGULATIONS (CFR)

16 CFR 1201	Safety Standard for Architectural Glazing Materials

COMMERCIAL ITEM DESCRIPTION (CID)

CID A-A-378	(Basic) Putty Linseed Oil Type, (for Wood-Sash-Glazing)

GLASS ASSOCIATION OF NORTH AMERICA (GANA)

GANA Glazing Manual	(1997) Glazing Manual
GANA Standards Manual	(1995) Engineering Standards Manual

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1999) Fire Doors and Fire Windows
NFPA 252	(1995) Fire Tests of Door Assemblies
NFPA 257	(1996) Fire Tests for Window and Glass Block Assemblies

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation

Drawings showing complete details of the proposed setting methods, mullion details, edge blocking, size of openings, frame details, materials, and types and thickness of glass.

SD-03 Product Data

Insulating Glass
Glazing Accessories

Manufacturer's descriptive product data, handling and storage recommendations, installation instructions, and cleaning instructions.

SD-04 Samples

Insulating Glass

Two 8 x 10 inch samples of each of the following: insulating glass units.

SD-07 Certificates

Insulating Glass

Certificates stating that the glass meets the specified requirements. Labels or manufacturers marking affixed to the glass will be accepted in lieu of certificates.

Glazing Accessories

Certificates from the manufacturer attesting that the units meet the luminous and solar radiant transmission requirements for heat absorbing glass.

1.3 SYSTEM DESCRIPTION

Glazing systems shall be fabricated and installed watertight and airtight to withstand thermal movement and wind loading without glass breakage, gasket failure, deterioration of glazing accessories, and defects in the work. Glazed panels shall comply with the safety standards, as indicated in accordance with ANSI Z97.1. Glazed panels shall comply with indicated wind/snow loading in accordance with ASTM E 1300.

1.4 DELIVERY, STORAGE AND HANDLING

Glazing compounds shall be delivered to the site in the manufacturer's unopened containers. Glass shall be stored indoors in a safe, well ventilated dry location in accordance with manufacturer's instructions, and shall not be unpacked until needed for installation. Glass shall not be stored on site over 1 month.

1.5 PROJECT/SITE CONDITIONS

Glazing work shall not be started until outdoor temperature is above 40 degrees F and rising, unless procedures recommended by glass manufacturer and approved by Contracting Officer are made to warm the glass and rabbet surfaces. Ventilation shall be provided to prevent condensation of moisture on glazing work during installation. Glazing work shall not be performed during damp or raining weather.

1.6 WARRANTY

1.6.1 Insulating Glass

Manufacturer shall warrant the insulating glass to be free of fogging or film formation on the internal glass surfaces caused by failure of the hermetic seal for a period of 10 years from Date of Substantial Completion. Warranty shall be signed by manufacturer.

PART 2 PRODUCTS

2.1 OMITTED

2.2 ROLLED GLASS

2.2.1 Omitted

2.2.2 Wired Glass

Wired glass shall be Type II flat type, Class 1 - translucent, Quality q8 - glazing, Form 1 - wired and polished both sides, conforming to ASTM C 1036. Wire mesh shall be polished stainless steel Mesh 1 - diamond. Wired glass

for fire-rated windows shall bear an identifying UL label or the label of a nationally recognized testing agency, and shall be rated for 45 minutes when tested in accordance with NFPA 257. Wired glass for fire-rated doors shall be tested as part of a door assembly in accordance with NFPA 252. Color shall be clear.

2.3 INSULATING GLASS
*3
All exterior glazing units shall be insulating glass. Insulating glass shall be Class A preassembled units of dual-seal construction consisting of lites of glass separated by an aluminum, steel, or stainless steel, spacer and dehydrated space conforming to ASTM E 773 and ASTM E 774. Spacer shall be roll-formed, with bent or tightly welded or keyed and sealed joints to completely seal the spacer periphery and eliminate moisture and hydrocarbon vapor transmission into airspace through the corners. Primary seal shall be compressed polyisobutylene and the secondary seal shall be a specially formulated silicone. Glass types shall be as follows:

2.3.1 Omitted
2.3.2 Omitted
2.3.3 Omitted

2.3.4 Low-E Insulating Glass
*3
Low-E insulating units shall be Type I annealed flat glass, Class 1-clear with anti-reflective low-emissivity coating on No. 2 surface (inside surface of exterior pane), Quality q3 - glazing select, conforming to ASTM C 1036. Glass performance shall be U-Value/Winter Nighttime .31, shading coefficient .59. Color shall be clear. Interior glass pane shall be laminated glass conforming to paragraph Laminated Glass.

2.3.5 Tempered Insulating Glass

Exterior glass pane for tempered insulating units shall be tempered glass conforming to paragraph Tempered Glass. Interior glass pane shall be laminated glass conforming to paragraph Laminated Glass.

2.4 OMITTED

2.5 HEAT-TREATED GLASS

Heat-treated glass shall conform to the following requirements.

2.5.1 Tempered Glass

Tempered glass shall be kind FT fully tempered transparent flat type, Class 1-clear, Condition A uncoated surface, Quality q3 - glazing select, conforming to ASTM C 1048 and GANA Standards Manual. Color shall be clear.

2.6 LAMINATED GLAZINGS

2.6.1 Laminated Glass

Laminated glass shall consist of two layers of Type I transparent float glass, Class 1-clear Quality q3 - glazing select, conforming to ASTM C 1036. Glass shall be bonded together with 0.060 inch thick PVB interlayer under pressure, or alternatives such as resin laminates, conforming to requirements of 16 CFR 1201 and ASTM C 1172. Color shall be clear.

2.7 OMITTED
2.8 OMITTED

2.9 MIRRORS

2.9.1 Glass Mirrors

Glass for mirrors shall be Type I transparent flat type, Class 1-clear, Glazing Quality q1 1/4 inch thick conforming to ASTM C 1036. Glass color shall be clear. Glass shall be coated on one surface with silver coating, copper protective coating, and mirror backing paint. Silver coating shall be highly adhesive pure silver coating of a thickness which shall provide reflectivity of 83 percent or more of incident light when viewed through 1/4 inch thick glass, and shall be free of pinholes or other defects. Copper protective coating shall be pure bright reflective copper, homogeneous without sludge, pinholes or other defects, and shall be of proper thickness to prevent "adhesion pull" by mirror backing paint. Mirror backing paint shall consist of two coats of special scratch and abrasion-resistant paint , and shall be baked in uniform thickness to provide a protection for silver and copper coatings which will permit normal cutting and edge fabrication.

2.9.2 One-Way Mirrors Glass

One-way mirrors glass for one-way mirrors shall be Type I transparent flat type, Class 1 clear, glazing quality Q1, 1/4 inch thick conforming to ASTM C 1036. Glass shall be coated on one face with a hard adherent film of chromium or other approved coating of proven equivalent durability. Glass shall transmit not less than 5 percent nor more than 11 percent of total incident light in visible region, and shall reflect from front surface of coating not less than 45 percent of total incident light in visible region.

2.9.3 Mirror Accessories

2.9.3.1 Mastic

Mastic for setting mirrors shall be a polymer type mirror mastic resistant to water, shock, cracking, vibration and thermal expansion. Mastic shall be compatible with mirror backing paint, and shall be approved by mirror manufacturer.

2.9.3.2 Mirror Frames

Mirrors shall be provided with mirror frames (J-mold channels) fabricated of one-piece roll-formed Type 304 stainless steel with No. 4 brushed satin finish and concealed fasteners which will keep mirrors snug to wall. Frames shall be 1-1/4 x 1/4 x 1/4 inch continuous at top and bottom of mirrors. Concealed fasteners of type to suit wall construction material shall be provided with mirror frames.

2.9.3.3 Mirror Clips

Concealed fasteners of type to suit wall construction material shall be provided with clips.

2.10 OMITTED

2.11 GLAZING ACCESSORIES

2.11.1 Preformed Tape

Preformed tape shall be elastomeric rubber extruded into a ribbon of a width and thickness suitable for specific application. Tape shall be of type which will remain resilient, have excellent adhesion, and be chemically compatible to glass, metal, or wood.

2.11.2 Sealant

Sealant shall be elastomeric conforming to ASTM C 920, Type S or M, Grade NS, Class 12.5, Use G, of type chemically compatible with setting blocks, preformed sealing tape and sealants used in manufacturing insulating glass. Color of sealant shall be as selected.

2.11.3 Glazing Gaskets

Glazing gaskets shall be extruded with continuous integral locking projection designed to engage into metal glass holding members to provide a watertight seal during dynamic loading, building movements and thermal movements. Glazing gaskets for a single glazed opening shall be continuous one-piece units with factory-fabricated injection-molded corners free of flashing and burrs. Glazing gaskets shall be in lengths or units recommended by manufacturer to ensure against pull-back at corners. Glazing gasket profiles shall be as indicated on drawings.

2.11.3.1 Fixed Glazing Gaskets

Fixed glazing gaskets shall be closed-cell (sponge) smooth extruded compression gaskets of cured elastomeric virgin neoprene compounds conforming to ASTM C 509, Type 2, Option 1.

2.11.3.2 Wedge Glazing Gaskets

Wedge glazing gaskets shall be high-quality extrusions of cured elastomeric virgin neoprene compounds, ozone resistant, conforming to ASTM C 864, Option 1, Shore A durometer between 65 and 75.

2.11.3.3 Aluminum Framing Glazing Gaskets

Glazing gaskets for aluminum framing shall be permanent, elastic, non-shrinking, non-migrating, watertight and weathertight.

2.11.4 Putty and Glazing Compound

Glazing compound shall conform to ASTM C 669 for face-glazing metal sash. Putty shall be linseed oil type conforming to CID A-A-378 for face-glazing primed wood sash. Putty and glazing compounds shall not be used with insulating glass or laminated glass.

2.11.5 Setting and Edge Blocking

Neoprene setting blocks shall be dense extruded type conforming to ASTM D 395, Method B, Shore A durometer between 70 and 90. Edge blocking shall be Shore A durometer of 50 (+ or - 5). Silicone setting blocks shall be required when blocks are in contact with silicone sealant. Profiles, lengths and locations shall be as required and recommended in writing by glass manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

Openings and framing systems scheduled to receive glass shall be examined for compliance with approved shop drawings, GANA Glazing Manual and glass manufacturer's recommendations including size, squareness, offsets at corners, presence and function of weep system, face and edge clearance requirements and effective sealing between joints of glass-framing members. Detrimental materials shall be removed from glazing rabbet and glass surfaces and wiped dry with solvent. Glazing surfaces shall be dry and free of frost.

3.2 INSTALLATION

Glass and glazing work shall be performed in accordance with approved shop drawings, GANA Glazing Manual, glass manufacturer's instructions and warranty requirements. Glass shall be installed with factory labels intact and removed only when instructed. Wired glass and fire/safety rated glass shall be installed in accordance with NFPA 80. Edges and corners shall not be ground, nipped or cut after leaving factory. Springing, forcing or twisting of units during installation will not be permitted.

3.3 CLEANING

Upon completion of project, outside surfaces of glass shall be washed clean and the inside surfaces of glass shall be washed and polished in accordance with glass manufacturer's recommendations.

3.4 PROTECTION

Glass work shall be protected immediately after installation. Glazed openings shall be identified with suitable warning tapes, cloth or paper flags, attached with non-staining adhesives. Reflective glass shall be protected with a protective material to eliminate any contamination of the reflective coating. Protective material shall be placed far enough away from the coated glass to allow air to circulate to reduce heat buildup and moisture accumulation on the glass. Glass units which are broken, chipped, cracked, abraded, or otherwise damaged during construction activities shall be removed and replaced with new units.

-- End of Section --

SECTION 09000

BUILDING COLOR AND FINISH SCHEDULE
12/95

PART 1 GENERAL

1.1 SUMMARY

This section covers colors, patterns, and textures of exterior and interior floor, wall, ceiling, and equipment finish materials. If there is a conflect between this specification section and any other specification section or the drawings, this section shall take precedence.

1.1.1 SUBMITTALS

Government approval is required for submittals with a “GA” designation; submittals having an “FIO” designation are for information only. The following shall be submitted accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-14 Samples

Color Boards; GA

Three sets of color boards, 120 days after the Contractor is given Notice to proceed, complying with the following requirements:

a. Color boards shall reflect all actual finish textures, patterns, and colors required for this contract. All (SID) exterior and interior building related finishes shall be presented at one time for approval in the format indicated under part 1.1.1, c.

b. Materials shall be labeled with the finish type, manufacturer’s name, pattern, and color reference.

c. Samples shall be on size A4 or 8 ½ by 11 inch boards with a maximum spread of size A1 or 25 ½ by 33 inches for foldouts.

d. Samples for this color board are required in addition to samples requested in other specification sections.

e. Color boards shall be submitted to the following addresses:

U.S. Army Corps of Engineers, EN-DAS (one copy)
100 West Oglethorpe Avenue
Savannah, GA. 31410-36409
Attn: Interior Design

COE Barracks Area Office (4 copies)
U. S. Army Corps of Engineers
Building C-2629 Ardenes Street
P.O. Box 71558
Ft. Bragg, NC 28307

1.2 REFERENCES TO MANUFACTURERS AND PRODUCTS

The manufacturer's names and their products referenced in this section only indicate the color, texture, and pattern required for the materials listed. The products furnished shall meet the color, texture, and pattern indicated as well as the material quality and performance specified in the applicable technical sections. The use of manufacturer's names and products do not preclude the use of other manufacturer's products of approved equal color, texture, or pattern as long as all requirements in the technical sections are met.

1.3 ABBREVIATIONS: MANUFACTURERS AND MATERIALS

Abbreviation	Material	Manufacturer	Mfgr's No/Color
ATC-1	Acoustical Ceiling	Armstrong Fine Fissured Open Plan	1756 White
BB-1	Bullentin Boards	Claridge	Cork: 1110 Fawn Frame: 23 Earth Brown
Brick-1	Field Brick	Triangle or Palmetto Brick	#103 Light Flashed Common or Palmetto Common Light Flash
Brick 2	Accent Brick	Eisenhower	Dark Ironspot, Dark Flash
CG-1	Corner Guards Note: See Arch. Drwgs. for details.	Pawling	497 Chablis
CG-2	Corner Guards Note: See Arch. Drwgs. for details.	Pawling	497 Chablis
CR-1	Chair Rail	Pawling Accent lines:	WG-6X 486 Caisson 497 Chablis
CPT-1	Carpet	J & J Commercial Center Stage	4861 Fly Space
CPT-2	Carpet	Shaw Contract	Website, 79470 Celestral
CT-1	Ceramic Tile	Dal-Tile	K-101,White 4 ¼″ x 4 ¼″
CT-2	Ceramic Tile	Dal-Tile	D-1456,Doe 4 ¼″ x 4 ¼″
CT-3	Ceramic Tile	Dal-Tile	DH-57,Grape 4 ¼″ x 4 ¼″
CT-4	Ceramic Tile	Dal-Tile	DH-69,Denim

			4 ¼″ x 4 ¼″
CT-5	Ceramic Tile	Dal-Tile	DK-36,Mocha 2″ x 2″
CT-6	Ceramic Tile	Dal-Tile	DK-317,White 1″ x 1″
CT-7	Ceramic Tile	Dal-Tile	DK-23, Cobalt Blue 1″ x 1″
CT-8	Ceramic Tile	Dal-Tile	DK-136 Innocent Blush 2″ X 2″
CT-9	Ceramic Tile	Dal-Tile	DK-23, Cobalt Blue 2″ x 2″

(Note: CT-16 was renamed as CT-9, if portions of specification/drawings still reflect CT-16 as a finish, then CT-9 replaces CT-16 as the finish)

FP-1	Folding Partition	Modernfold	Maharam 303601 Tek-Wall, Lustra, 058 Cement
-	Folding Shower Seat	Bradley	Model 9563/9564 Wilsonart: Beige Nebula (479) Frame: stainless steel
GRT-1	Grout	Mapie	16 Malt
GRT-2	Grout	Mapie	37 Terra Cotta
LK-1	Lockers (metal)	Penco	736 Burgundy
LK-2	Lockers (TA-50)	-	Color: to match P-2
LMB-1	Liquidmarker Board	Claridge	Color: LCS White Frame: 23 Earth Brown
MB-1	Miniblinds	Levelor	308
Medallions	-	Pineapple Grove	See 1.4.18 for Sizes and type.
P-1	Paint Wall	Pittsburgh Paints	525-3 Crisp Linen Egg-shell

P-2	Paint Trim	Fed. Std. 595B	20313 Semi-gloss

Note: This color shall match the resilient base in color.

P-3	Paint Accent	Pittsburgh Paints	547-7 Annapolis Egg-shell
P-4	Paint Accent	Pittsburgh Paints	428-7 Warm Wassail Egg-shell
P-5	Paint Ceiling	Fed. Std. 595B	37886(warm white) Lusterless
P-6	Paint Wall	Pittsburgh Paint	507-3 Silver sword Egg-shell

Note: In the COF's, the IMS rooms shall have a fire-retardant paint to match P-6.

P-7	Paint	Pittsburgh Paints	523-4 Frangelica Egg-Shell
P-8	Paint Ceiling	Fed. Std. 595B	37925(white) Lusterless
Picnic Tables	-	Plastic Lumber Company	#FP1020 C030
PL-1	Plastic Laminate	Formica	7013-58 Santa Fe Slate
PL-2	Plastic Laminate	Formica	921-58 Birch
PL-3	Plastic Laminate	Formica	271-90 Blackstone
PL-4	Plastic Laminate	Wilsonart Chemsurf	4558-60 Artesia
PL-5	Plastic Laminate	Wilsonart	D25-60 Atlantis
PL-6	Plastic Laminate	Wilsonart	4788-60 Glazed Imperial
PL-Revel -1	Plastic Laminate Insert	Wilsonart	AK2101 (401) Bronze
PV-1	Paver	Crossville	A660,UPS Rosewood 12″ x 12″
PV-2	Paver	Crossville	A790,UPS Burgundy Smoke

			12″ x 12″
RB-1	Resilient Base	Mercer Rubberlyte	211
RFT-1	Resilient Floor Tile	Nora	825 C radius 1120 Nougat Brown
RM-1	Recessed Mat (Entry)	Pedimat	Treads: 9302 Gray Fox Rails: Med. Bronze
SC-1	Specialty Ceiling/ Lumineous Ceiling	USG Transparencies	Panel Pattern: Ice Cube
SR-1	Shower Receptor	Florestone Terrazzo	Tan and White Marble Chips w/ White Portland cement
SS-1	Solid Surfacing	Wilsonart	9073-ML Calypso Melange
SWC-1	Sisal Wallcovering	Fiberworks	419 (tan)
SWC-2	Sisal Wallcovering	Fiberworks	430 (blue)
TP-1	Toilet Partitions	General Partitions	Admiral Blue SB-415
Trash Receptacles		Dura Art Stone	TR-D Round Fed. Std. 595B 20059 Lid: bronze
TS-1	Tub Surround Solid Surfacing	Wilsonart SSV	9073-ML, 1/8″ Calypso Melange
VCT-1	Vinyl Comp.	Mannington Essentials	127 Warm Beige
VCT-2	Vinyl Comp.	Mannington Essentials	118 Adobe
VCT-3	Vinyl Comp.	Mannington Essentials	258 Redwood
VCT-4	Vinyl Comp.	Mannington Essentials	200 Navy
WC-1	Wallcoating	Polomyx Waterbase	PL-00853G
WC-2	Wallcoating	Polomyx	PC-530103

		Waterbase	
WS-1	Wood Stain	Sherwin-Williams	SW 3117 Golden Oak
WS-2	Wood Stain	Sherwin-Williams	SW 3109 Bright Cherry

1.4 EXTERIOR COLOR/FINISH INSTRUCTIONS

1.4.1 EFIS

Shall match Fed. Std. 595B 23617.

1.4.2 Brick/Brick Mortar

1.4.2.1 Barracks: All field brick on the barracks buildings including brick soldier coursing and brick rowlocks shall be Brick-1.

1.4.2.2 Battalion HQ’s and COF’s: The field brick including the brick soldier coursing on the Battalion Headquarters buildings and the Company Operations Facilities shall be Brick-1. The brick accent coursing shall be Brick-2.

1.4.2.3 Brick Mortar: shall be standard gray.

1.4.3 Not Used

1.4.4 Trash Receptacles

Trash receptacles shall match Dura Art Stone, color: Fed. Standard 595B 23617d. The receptacle shall be a combination ash tray with trash opening on the side. The lid shall be bronze.

1.4.5 Doors and Frames

1.4.5.1 Aluminum: Medium anodized bronze finish.

1.4.5.2 Steel: Painted to match Fed. Std. 595B 24084.

1.4.5.3 Steel: (at Barracks): Painted to match Fed. Std. 595B 23617.

1.4.6 Glazing

Glazing is specified in Section 08810 GLASS AND GLAZING.

1.4.7 Handrails/Guardrails

1.4.7.1 Guardrails at Balconies: Handrails/guardrails shall be painted to match Fed. Std. 595B 14062.

1.4.7.2 Handrails/guardrails at stairs: shall match Fed. Std. 595B 14062.

1.4.7.3 Handrails/guardrails on site: shall match Fed. Std. 595B 20059.

1.4.7.4 Stringers/stair framing: shall match Fed. Std. 595B 14062.

1.4.7.4.1 At Barracks only, tube steel at finished floor elevation supporting stair framing shall be painted to match Fed. Std.595B 23617. All other stair framing including stair runs and landing shall be painted to match Fed. Std. 595B 14062.

1.4.8 Roof Shingles

Color finish shall match GAF, Weatherwood.

1.4.9 Sheet Metalwork

1.4.9.1 Coping

Shall match medium anodized bronze.

1.4.9.2 Fascia

Shall match medium anodized bronze.

1.4.9.3 Gutters and Downspouts

shall match medium anodized bronze.

1.4.9.4 Louvers

Louvers shall be a medium anodized bronze. Louvers at Barracks doors shall match adjacent finish.

*4

1.4.9.5 Exposed Flashings

Color shall match adjacent finish.

1.4.10 Cast Stone

Cast stone shall match Conart Inc., Buff.

1.4.11 Windows

1.4.11.1 Aluminum: Manufacturer's standard medium anodized bronze finish.

1.4.12 Exterior Linear Metal Ceiling

Color shall match Hunter-Douglas, Luxalon, tone white.

1.4.13 Fire Extinguisher Cabinets

Exterior fire extinguisher cabinets shall match a medium anodized bronze.

1.4.14 Trim color

Trim color shall match Fed. Std. 595B 24084.

1.4.14.1 Miscellaneous Metals on Building

1.4.14.2 All penetrations through the roof shall match the shingle roof color.

1.4.14.3 Miscellaneous metals on building shall match adjacent finish.

1.4.14.4 Steel closer plates at openings shall match Fed. Std. 595B 24084.

1.4.15 Miscellaneous Metals on Site

Miscellaneous metals on site shall match Fed. Std. 595B 20059, unless otherwise noted.

1.4.16 Control Joints

CMU control joints and brick expansion joints shall match mortar in color.

1.4.17 Expansion Joint and/or Covers

Expansion joint and/or covers shall match adjacent color, unless otherwise noted.

1.4.18 Exterior Electrical Items

See lighting schedules for color.

1.4.19 Medallions

1.4.19.1 All facilities,except Barracks – Medallions shall match Pineapple Grove, Quadrant, 08SM-027, color: Coastal Ivory.

1.4.19.2 Barracks – Medallions shall be cast stone, See Arch. Details.

1.4.20 Caulk and Sealant

Caulk and sealant shall match lightest adjacent color.

1.4.21 Picnic Tables

Picnic tables shall match The Plastic Lumber Company, #FP1020, color – Brown(C030).

1.4.22 Deck Liner Panels (Acoustic Cellular Desk)

Shall match Fed. Std. 595B 23617.

1.4.23 Picnic Shelters

Shall match Fed. Std. 595B 20059.

1.4.24 Exterior Benches

1.4.24.1 Flat Bench – Barracks, #FP2205, slatting, frame back shall be C010.

1.5 INTERIOR COLOR/FINISH INSTRUCTIONS

1.5.1 Cabinets/Reception Counters/Plastic Laminate/Solid Surfacing/Misc.Counters and Units with surfaces

1.5.1.1 Barracks Suites: Lavatory and service area cabinets shall have a plastic laminate finish to match PL-2. The counter top shall have a plastic laminate finish to match PL-1. Hardwood framing/edges shall be stained to match WS-1. Cabinet interior shall have a clear gloss polyurethane finish. The tub surrounds shall match SS-1.

1.5.1.2 Barracks Lobby Reception Desk: Desk facings shall have a plastic laminate finish to match PL-6. The counter top shall have a plastic laminate finish to match PL-5. Revels shall have an insert to match PL-Revel #1. The wood trim shall be stained to match WS-1. The base shall be black.

1.5.1.3 Barracks Kitchens: Cabinets shall have a plastic laminate finish to match PL-2. The counter top shall have a plastic laminate finish to match PL-1. Hardwood framing/edges shall be stained to match WS-1. Cabinet interior shall have a clear gloss polyurethane finish. The wall area between the lower and upper cabinets shall have a finish to PL-1.

1.5.1.4 Barracks Laundry Rooms: Counter tops shall match PL-4.

1.5.1.5 Barracks Lobby/Activity Toilet Areas: In toilet rooms A108, A204, counter tops shall match PL-4.

1.5.1.6 Battalion Headquarters Reception Counter: The reception counter shall have a counter top to match PL-3. All visible wood surfaces shall be stained to match WS-2. The base shall match PV-1. The interior of the cabinets shall have a clear polyurethane finish.

1.5.1.7 Battalion Headquarters Toilet Areas: In the men’s and women’s toilet rooms on the first floor, the plastic laminate finish on the counter tops shall match PL-1.

1.5.1.8 Company Operations Facilities Reception Counter: The reception desk shall have a counter top to match PL-1. The bullnose hardwood edge and hardwood edge shall be stained to match WS-1. All exposed surfaces, desk facing, door and drawer facings shall have a plastic laminate finish to match PL-2. The interior of the cabinets shall have a clear polyurethane finish.

1.5.1.9 Company Operations Facilities Individual Toilet Areas: Counter tops shall match SS-1.

1.5.2 Ceramic Tile/Ceramic Tile Grout

1.5.2.1 Barracks Modules: The bath areas shall have a ceramic tile floor with a standard pattern to match Dal-Tile 5003, using CT-5 as 95%, CT-6 as 4%, and CT-7 as 1%. Grout to match GRT-1 shall be used.

1.5.2.2 Barracks Toilets A108 and A204: The bath areas shall have a ceramic tile floor with a standard pattern to match Dal-tile 5003, using CT-

5 as 95%, CT-6 as 4%, and CT-7 as 1%. The ceramic wall tile shall match CT-2. The ceramic tile cove base and the ceramic tile bullnose edge at the top of the wainscot shall match CT-4. Grout to match GRT-2 shall be used on the floors and a grout to match GRT-1 shall be used on the walls.

1.5.2.3 Battalion Hdqtrs.: The ceramic wall tile shall match CT-2. The ceramic tile cove base and the ceramic tile bullnose edge at the top of the wainscot shall match CT-3. The ceramic floor tile shall have a standard pattern to match Dal-Tile 3013, using CT-5 as 50% and CT-8 as 50%. Grout to match GRT-1 shall be used.

1.5.2.4 Company Operation Facilities:

1.5.2.4.1 Men’s/Women’s Individual Toilet Rooms: The ceramic wall tile shall match CT-2. The ceramic tile cove base and the ceramic tile bullnose edge at the top of the wainscot shall match CT-4. The ceramic floor tile shall have a standard pattern to match Dal-Tile 5003 using CT-5 as 95%, CT-6 as 4%, and CT-7 as 1%. A grout to match GRT-2 shall be used on the floors and walls.

1.5.2.4.2 Toilet/Shower Areas: The ceramic floor tile shall have a standard checked pattern of twelve (12”) inch squares using 2” x 2” size tiles with CT-5 as 50% and CT-8 as 50%. Shower spaces shall have SR-1 as a floor finish, and the interior wall of the shower spaces shall be CT-1 without accent tile (CT-4). Ceramic tile walls shall have a pattern using CT-1, CT-2, and CT-4. Cove base shall match CT-9. See I-Plates, Pattern Plans for placement of tiles. A grout to match GRT-2 shall be used on floors and walls.

1.5.3 Doors

1.5.3.1 Steel Doors:

1.5.3.1.1 All facilities shall be painted in color to match P-2, unless otherwise indicated.

1.5.3.2 Wood Doors:

1.5.3.2.1 Barracks/COF’s: Shall be stained to match WS-1.

1.5.3.2.2 Battalion Hdqrts: Shall be stained to match WS-2.

1.5.4 Door Hardware

Door hardware finish is specified in Section 08700 BUILDERS' HARDWARE.

1.5.5 Mail Boxes

Mail boxes shall match medium anodized bronze.

1.5.6 Folding Partitions

Folding partitions shall match FP-1.

1.5.7 Handrails

1.5.7.1 Battallion Hqtrs., interior handrails shall be painted to match P-4.

1.5.7.2 Company Operations Facilities, interior handrails shall be painted to match P-3.

1.5.8 HVAC Equipment

1.5.8.1 Grills or Diffusers

Paint all supply and return air mechanical grills or diffusers on gypsum board ceiling and walls to match adjacent color.

1.5.8.2 Ducts

1.5.8.2.1 All facilities: Ducts shall be P-1.

1.5.9 Lockers

1.5.9.1 All facilities: Lockers shall match LK-1.

1.5.10 Window Blinds

All exterior windows shall receive blinds to match: (excluding storefronts to lobbies, vestibules, and corridors)

1.5.10.1 All Facilities: Horizontal, Levolor 308.

1.5.11 Porcelain Paver Grout

1.5.11.1 Battalion Headquarters: Grout shall match GRT-1.

1.5.12 Wood Stain

1.5.12.1 Barracks, COF: Stain shall match WS-1.

1.5.12.2 Battalion Headquarters: Stain shall match WS-2.

1.5.13 Not Used

1.5.14 Shelving

Interior shelving shall match adjacent wall.

1.5.15 Signs

1.5.15.1 Interior signs in Section 10440 INTERIOR SIGNAGE. See Section 10440 for exterior door signs for the Barracks(BB5)for color and specifications.

1.5.16 Suspended Ceiling Grid/Luminous Ceiling Suspension System/Luminous Panels

1.5.16.1 Suspended Ceiling Grid shall match ceiling tiles and shall be 15/16-inch grid to match Armstrong, Prelude XL, exposed tee system.

1.5.16.2 Luminous Ceiling Suspension System: A roll-formed, steel tee suspension system to match USG, TRDXT system, with a white textured, painted face to simulate mortar shall be installed as shown on the Arch. Drwgs. to receive the transparent panels. Flanges of all runners shall be 1/16″ in height and 9/16″ in width. All exposed surfaces of grid member shall be finished in a color and texture to match the finish between the cells of the 24″ x 24″ panel.

1.5.16.3 Luminous Panels: Acrylic USG, Transparencies panels shall be designed to lay-in and conceal the suspension system. The panel shall consist of a 24″ x 24″ matrix in a white opaque color with a textured finish on the exposed surface to match the USG, TRDXT System finish. Clear 100% acrylic block insert molded in a pattern to match USG, Ice Cube shall be attached the matrix.

1.5.17 Stairwells

Stairwells shall have a 4'-0" high, painted wainscot to match P-2.

1.5.18 Toilet Partitions

1.5.18.1 All facilities (excluding Dining Facility): Toilet Partitions shall match TP-1.

1.5.19 Walls

1.5.19.1 All facilities: All interior walls of gypsum board and underside of stairs shall be painted to match P-1 unless otherwise indicated.

1.5.20 Window Frames (Interior, Glazing)

1.5.20.1 Steel, painted to match adjacent walls in color.

1.5.20.2 Aluminum, shall be a medium anodized bronze.

1.5.20 Switch/Outlet Plates

1.5.20.1 All facilities: All switch/outlet plates shall be ivory, devices shall be ivory.

1.5.21 Fire Extinguisher Cabinets

All fire extinguisher cabinets shall have a medium anodized bronze finish.

1.5.22 Miscellaneous Metals

1.5.22.1 Metal housings on ceiling/mounted exit lights shall be black.

1.5.22.2 Metal access panels shall match the ceiling in color.

1.5.22.3 Miscellaneous metals on walls shall match the adjacent color.

1.5.22.4 Electrical panels shall match the adjacent color.

1.5.23 Metal Ladders

All metal ladders shall be painted to match Fed. Std. 20059.

1.5.24 Marble Thresholds

1.5.24.1 All facilities: white

1.5.25 Speciality Luminous Ceiling (ceiling cavity)

The cavity area above the diffusers shall be painted to match P-8 for light reflectance.

1.5.26 Trophy Case

In the Battalion Headquarters, the trophy case shall be stained to match WS-2. The aluminum sliding door tracks, shelf brackets, and standards shall have an anodized medium bronze finish.

1.5.27 Wire Mesh Cages

Wire mesh cages shall be finished to match P-2.

1.5.28 Vinyl Resilient Base/Resilient Transition Strip

1.5.28.1 Vinyl Resilient Base: shall be applied on all gypsum board walls that have carpet, vinyl comp. Tile, or concrete floors. If only one wall is gyp board, and the others are masonry units, then all walls shall receive a resilient base around the perimeter of the room. The resilient base shall match colors indicated in Part 1.6 of this specification.

1.5.28.2 Resilient Transition Strip: shall be applied on all areas where porcelain pavers, vinyl compostion tile, and carpet butt against the adjoining finish. The strip shall match resilient base in color.

1.5.28.3 The vinyl resilient base and the door frame paint color shall match in color.

1.5.29 Wood Benches in Toilet/Shower Rooms

Seat shall have a clear sealer. Steel parts shall match P-3. See Arch. Drwgs. for details.

1.5.30 Quad. Medium COF Alternate Tread Device

Shall be painted Fed. Std. 595B 38907. (Safety Color)

1.5.31 Folding Shower Seats

The folding shower seats in the Battalion Headquarters shall match Bradley, model 9563/9564 and have a seat finish to match Wilsonart, Beige Nebula. The frame shall be stainless steel.

1.6 ROOM COLOR AND FINISH SCHEDULE

1.6.1 320 Man Barracks/224 Man Barracks - Typical

1.6.1.1 Typical Room Module – Floors 1 thru 4

Area: Living/Sleeping

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	P-5

Area: Closet

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	P-5

Area: Service Area

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	WC-1	WC-1	WC-1	WC-1	ATC-1

Note: Paint furrdown over cabinets to match P-3.

Area: Lavatory

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: Bath

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-5	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-6	SS-1		SS-1	SS-1	
		CT-7					

Note: SS-1 is used as a tub surround. See Arch. Drwgs. See 1.5.2 for tile instructions. See I-7, Pattern Plans for tile placement.

Area: Mechanical Closet

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

1.6.1.2 Additional Barracks Rooms

Area: A100 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	ATC-1
		VCT-2	P-7	P-7	P-7	P-7	P-7

Note: Corridor shall have a chair rail to match CR-1. See Arch. Drwgs.

Area: A101 Vestibule

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	RM-1	Brick	P-1	Brick	P-1	P-5

Area: A102 Lobby

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	ATC-1
		VCT-2					P-5
		VCT-3					SC-1
		VCT-4					

Note: See I-7, Pattern Plans for vinyl tile placement. See Arch. Drwgs., Reflected Ceiling plan for ceiling finish placement.

Area: A103 Seating

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	-	P-1	P-1	ATC-1

Area: A104 Mail Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	ATC-1

Area: A105 Mail Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	ATC-1

Area: A106 Vending/Recycling

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	ATC-1
							P-5

Area: A107 Mailroom

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	P-5

Area: A108 Toilet

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	CT-2	CT-2	CT-2	CT-2	P-5
		CT-6	CT-3	CT-3	CT-3	CT-3	
		CT-7	P-1	P-1	P-1	P-1	

Note: See I-7,Pattern Plans for tile placement. See 1.5.2 for tile instructions.

Area: A109 Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	P-5

Area: A110 Communication Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: A111 Janitor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: A112 Elec. Closet

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: A113 Mechanical Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: A200 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	ACT-1
		VCT-2	P-7	P-7	P-7	P-7	

Area: A201 Activity Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
		VCT-3					
		VCT-4					

Note: See I-7, Pattern Plans, for vinyl tile placement, painted accent wall(P-3 & P-4)locations, and sisal wallcovering (SWC-1 & SWC-2)locations.

Area: A202 Seating

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	P-5

Area: A203 Kitchen

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	ATC-1

Area: A204 Toilet

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	CT-2	CT-2	CT-2	CT-2	P-5
		CT-6	CT-3	CT-3	CT-3	CT-3	
		CT-7	P-1	P-1	P-1	P-1	

Area: A210 Communications Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: A211 Janitor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: A213 Mechanical Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: A300 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	ACT-1
		VCT-2	P-7	P-7	P-7	P-7	

Area: A301 Activity Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: A302 Laundry

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-4	ATC-1

Area: A310 Communications Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: A311 Janitor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	-	-	-	-	-

Area: A313 Mechanical Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	-	-	-	-	-

Area: A400 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	ACT-1
		VCT-2	P-7	P-7	P-7	P-7	

Area: A401 Activity Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: A402 Laundry

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-4	ATC-1

Area: A410 Communications Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: A411 Janitor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: A412 Electrical Closet

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: A413 Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Note: 224 Barracks does not have “C” rooms, only 320 Barracks.

Area: B100/C100 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	ACT-1
		VCT-2	P-7	P-7	P-7	P-7	

Area: B101/C101 Mechanical Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: B102/C102 Communications Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: B103/C103 Electrical Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: B104/C104 Laundry

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-4	ATC-1

Area: B200/C200 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	ACT-1
		VCT-2	P-7	P-7	P-7	P-7	

Area: B201/C201 Mechanical Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: B202/C202 Communications Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: B203/C203 Janitor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: B204/C204 Laundry

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-4	ATC-1

Area: B300/C300 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	ACT-1
		VCT-2	P-7	P-7	P-7	P-7	

Area: B301/C301 Mechanical Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: B302/C302 Communications Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: B303/C303 Janitor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: B304/C304 Laundry

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-4	ATC-1

Area: B400/C400 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-1	P-1	P-1	P-1	P-1	ACT-1
		VCT-2	P-7	P-7	P-7	P-7	

Area: B401/C401 Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-4	P-5

Area: B402/C402 Communications Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: B403/C403 Electrical Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-4	P-5

Area: B404/C404 Laundry

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-4	ATC-1

1.6.2 Large Battalion HQ – 82 SIG

Area: 100 Vestibule

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	P-5
		RM-1					

Area: 101 Stair #1

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	P-1	P-1	P-1	P-1	P-5
	RB-1	RFT-1					

Note: Handrails shall be painted to match P-4.
Risers and stringers shall be painted to match P-2.
Landings/Stair treads shall have resilient tile applied to the surface.

Area: 102 Resource Center

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 103 Tele/Elec.

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	ATC-1

Area: 104 Women

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 105 Vending

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1
		PV-2					

Area: 106 Men

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 107 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 108 Janitor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 109 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 110 Classroom

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
		VCT-3		P-4			P-5

Note: The vertical furred down area over the folding panels shall be painted to match P-4.

Area: 111 Classroom

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
		VCT-3		P-4		P-4	P-5

Note: The vertical furred down area over the folding panels shall be painted to match P-4.

Area: 112 Classroom

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
		VCT-3				P-4	P-5

Note: The vertical furred down area over the folding panels shall be painted to match P-4.

Area: 113 Mechanical

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: 114 Stair #2

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	P-1	P-1	P-1	P-1	P-5
	RB-1	RFT-1					

Note: Handrails shall be painted to match P-4.
Risers and stringers shall be painted to match P-2.
Landings/Stair treads shall have resilient tile applied to the surface.

Area: 115 Lobby

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1 PV-2	WC-1	WC-1	WC-1	WC-1	ATC-1

Note: See pattern plans in the Arch. Drwgs. (I-Plates) for porcelain paver tile placement.

Area: 116 Supplies and Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 117 S-4 Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 118 Clerical/Central Files

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 119 COMSEC Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 120 DCOR Vault

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 121 Duty Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1 P-5

Area: 122 Clerical/Central Files

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 123 PAC Officr

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 124 Chaplin’s Asst.

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 125 Chaplin

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 200 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 201 Stair #1

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	P-1	P-1	P-1	P-1	P-5

RB-1 RFT-1

Note: Resilient treads shall match the resilient base in color.
Handrails/risers, stringers, guardrails shall be painted to match P-2.
Landings/Stair treads shall have resilient tile applied to the surface.

Area: 202 Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	P-5

Area: 203 Tele/Elec.

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	ATC-1

Area: 204 Men

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 204A Men Shower

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 205 Women

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 205A Women Shower

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 206 Elevator Equipment

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 207 Mechanical

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: 208 Stair #2

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	P-1	P-1	P-1	P-1	P-5
	RB-1	RFT-1					

Note: Handrails shall be painted to match P-4.
Risers and stringers shall be painted to match P-2.
Landings/Stair treads shall have resilient tile applied to the surface.

Area: 209 Clerical/Central Files

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 210 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 211 S-2 Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 212 Secured Documents

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 213 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 214 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 215 S-3 Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 216 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 217 Command Suite/Reception

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 218 S-1 Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 219 Commanding Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 220 Toilet

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 221 Exec. Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 222 Sgt. Major

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 223 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 224 Conference

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

1.6.3 Large Battalion HQ – 313 MI

Area: 100 Vestibule

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	P-5
		RM-1					

Area: 101 Stair #1

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	P-1	P-1	P-1	P-1	P-5
	RB-1	RFT-1					

Note: Handrails shall be painted to match P-4.
Risers and stringers shall be painted to match P-2.
Landings/Stair treads shall have resilient tile applied to the surface.

Area: 102 Resource Center

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 103 Tele/Elec.

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	ATC-1

Area: 104 Women

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 105 Vending

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1
		PV-2					

Area: 106 Men

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 107 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 108 Janitor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 109 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 110 Classroom

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
		VCT-3		P-4			P-5

Note: The vertical furred down area over the folding panels shall be painted to match P-4.

Area: 111 Classroom

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
		VCT-3		P-4		P-4	P-5

Note: The vertical furred down area over the folding panels shall be painted to match P-4.

Area: 112 Classroom

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
		VCT-3				P-4	P-5

Note: The vertical furred down area over the folding panels shall be painted to match P-4.

Area: 113 Mechanical

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: 114 Stair #2

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	P-1	P-1	P-1	P-1	P-5
	RB-1	RFT-1					

Note: Handrails shall be painted to match P-4.
Risers and stringers shall be painted to match P-2.
Landings/Stair treads shall have resilient tile applied to the surface.

Area: 115 Lobby

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1
		PV-2					

Note: See pattern plans in the Arch. Drwgs. (I-Plates) for porcelain paver tile placement.

Area: 116 Supplies and Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 117 S-4 Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 118 Clerical/Central Files

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 119 MSG. CTR./Mail Sort

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 120 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 121 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 122 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 123 Duty Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1
							P-5

Area: 124 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 125 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 126 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 127 Clerical/Central Files

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 128 PAC Officr

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 129 Chaplin’s Asst.

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 130 Chaplin

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 200 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 201 Stair #1

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	P-1	P-1	P-1	P-1	P-5
	RB-1	RFT-1					

Note: Resilient treads shall match the resilient base in color.
Handrails/risers, stringers, guardrails shall be painted to match P-2.
Landings/Stair treads shall have resilient tile applied to the surface.

Area: 202 Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	P-5

Area: 203 Tele/Elec.

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	ATC-1

Area: 204 Men

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 204A Men Shower

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 205 Women

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 205A Women Shower

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 206 Elevator Equipment

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 207 Mechanical

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: 208 Stair #2

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	P-1	P-1	P-1	P-1	P-5
	RB-1	RFT-1					

Note: Handrails shall be painted to match P-4.
Risers and stringers shall be painted to match P-2.
Landings/Stair treads shall have resilient tile applied to the surface.

Area: 209 Clerical/Central Files

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 210 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 211 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 212 Secured Documents

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 213 S-2 Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 214 OMITTED

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 215 Clerical/Central Files

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 216 S-3 Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 217 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 218 Command Suite/Reception

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 219 S-1 Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 220 Commanding Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 221 Toilet

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 222 Sgt. Major

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 223 Executive Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 224 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 225 Conference

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

1.6.4 Large Battalion HQ w/Troop Aid – 307th EN

Area: 100 Vestibule

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1 RM-1	WC-1	WC-1	WC-1	WC-1	P-5

Area: 101 Stair #1

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1 RB-1	PV-1 RFT-1	P-1	P-1	P-1	P-1	P-5

Note: Handrails shall be painted to match P-4.
Risers and stringers shall be painted to match P-2.
Landings/Stair treads shall have resilient tile applied to the surface.

Area: 102 Resource Center

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 103 Tele/Elec.

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	ATC-1

Area: 104 Women

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5 CT-8	P-1 CT-2 CT-3	P-1 CT-2 CT-3	P-1 CT-2 CT-3	P-1 CT-2 CT-3	P-5

Note: See 1.5.2 for wall and floor tile instructions.

Area: 105 Vending

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1 PV-2	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 106 Men

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5

CT-8	CT-2	CT-2	CT-2	CT-2
	CT-3	CT-3	CT-3	CT-3

Note: See 1.5.2 for wall and floor tile instructions.

Area: 107 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 108 Janitor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 109 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 110 Classroom

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
		VCT-3				P-4	P-5

Note: The vertical furred down area over the folding panels shall be painted to match P-4.

Area: 111 Classroom

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
		VCT-3		P-4		P-4	P-5

Note: The vertical furred down area over the folding panels shall be painted to match P-4.

Area: 112 Classroom

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
		VCT-3		P-4			P-5

Note: The vertical furred down area over the folding panels shall be painted to match P-4.

Area: 113 Mechanical

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: 114 Stair #2

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	P-1	P-1	P-1	P-1	P-5
	RB-1	RFT-1					

Note: Handrails shall be painted to match P-4.
Risers and stringers shall be painted to match P-2.
Landings/Stair treads shall have resilient tile applied to the surface.

Area: 115 Lobby

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1
		PV-2					

Note: See pattern plans in the Arch. Drwgs. (I-Plates) for porcelain paver tile placement.

Area: 116 Supplies and Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 117 S-4 Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 118 Clerical/Central Files

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 119 Msg. Ctr./Mail Sort

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 120 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 121 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 122 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 123 Duty Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1 P-5

Area: 124 NCOIC Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 125 Phys. Asst.

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 126 Doctor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 127 Medical Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 128 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 129 Chaplin's Asst.

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 130 Chaplin

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 131 Deploy Stock Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 132 Work'n Stock Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 200 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 201 Stair #1

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	P-1	P-1	P-1	P-1	P-5
	RB-1	RFT-1					

Note: Resilient treads shall match the resilient base in color.
Handrails/risers, stringers, guardrails shall be painted to match P-2.
Landings/Stair treads shall have resilient tile applied to the surface.

Area: 202 Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	P-5

Area: 203 Tele/Elec.

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	ATC-1

Area: 204 Men

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 204A Men Shower

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 205 Women

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 205A Women Shower

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 206 Elevator Equipment

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 207 Mechanical

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: 208 Stair #2

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	PV-1	PV-1	P-1	P-1	P-1	P-1	P-5
	RB-1	RFT-1					

Note: Handrails shall be painted to match P-4.
Risers and stringers shall be painted to match P-2.
Landings/Stair treads shall have resilient tile applied to the surface.

Area: 209 Clerical/Central Files

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 210 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 211 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 212 Secured Documents

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 213 S-2 Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 214 S-3 Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 215 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 216 Clerical/Central Files

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 217 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 218 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 219 PAC Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1

Area: 220 Command Suite/Reception

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 221 S-1 Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 222 Commanding Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 223 Toilet

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-3	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-3	CT-3	CT-3	CT-3	

Note: See 1.5.2 for wall and floor tile instructions.

Area: 224 Sgt. Major

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 225 Exec. Officer

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 226 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 227 Conference

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	CPT-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

1.6.5 Large Company Operations

Area: 001 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 002 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 101 Janitor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 102 Equipment Maintenance

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1 WMP	P-1	P-1 WMP	P-1 WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 103 COM Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	WMP	WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 104 NBC Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	WMP	WMP	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 105 Arms Vault

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 106 General Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1 WMP	WMP	WMP	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 107 Unit Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	WMP	WMP	P-1	WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 108 Toilet/Shower

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-16	CT-5 CT-8	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	P-5

Note: Shower spaces shall have CT-5 and Ct-7 as a floor finish. The interior walls of the individual shower stalls shall match CT-1 and will not have the accent tiles. See 1.5.2.2.2 for tile placement. See I-Plates for details.

Area: 109 Toilet/Shower

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-16	CT-5 CT-8	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	P-5

Note: Shower spaces shall have CT-5 and Ct-7 as a floor finish. The interior walls of the individual shower stalls shall match CT-1 and will not have accent tiles. See 1.5.2.2.2 for tile placement. See I-Plates for details.

Area: 110 Lockers

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-16	CT-5 CT-8	P-1	P-1	P-1	P-1	P-5

Area: 111 Vestibule

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-16	CT-5 CT-8	P-1	P-1	P-1	P-1	P-5

Area: 112 Lockers

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-16	CT-5 CT-8	P-1	P-1	P-1	P-1	P-5

Area: 113 Mechanical

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	-

Area: 201 Waiting

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 202 Admin Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 203 Training Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 204 First Sergeant

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 205 Commander

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 206 Executive Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 207 Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 208 Conference

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 209 Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 210 Men

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-4	CT-5 CT-6 CT-7	P-1 CT-2 CT-4	P-1 CT-2 CT-4	P-1 CT-2 CT-4	P-1 CT-2 CT-4	P-5

Area: 211 Women

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-4	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-6	CT-2	CT-2	CT-2	CT-2	
		CT-7	CT-4	CT-4	CT-4	CT-4	

Area: 212 IMS

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-6	P-6	P-6	P-6	ATC-1

Note: Paint in this room shall be fire-retardant to match P-6 in color.

Area: 213 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 214 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 215 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	-	ATC-1

Area: 216 Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 217 Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 218 Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 219 Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 220 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 221 TA-50 Gear

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

*5

1.6.6 Deleted ~~Quad Medium Company Ops. Facility - 307th EN~~

~~Area: 001 Stair~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

Note: A painted wainscot to match P-2 shall be applied to the height of 2" above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 002 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

Note: A painted wainscot to match P-2 shall be applied to the height of 2" above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 003 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

Note: A painted wainscot to match P-2 shall be applied to the height of 2" above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 004 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

Note: A painted wainscot to match P-2 shall be applied to the height of 2" above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 005 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

Note: A painted wainscot to match P-2 shall be applied to the height of 2" above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 006 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

Note: A painted wainscot to match P-2 shall be applied to the height of 2" above the handrail. The handrails shall be painted to match P-3. The metal

~~parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.~~

~~Area: 101 A,B,C Janitor~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

~~Area: 102 B Equipment Maintenance~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5
			WMP			WMP	

~~Note: The wire mesh partitions shall have a factory applied finish to match P-3.~~

~~Area: 102 A,C Equipment Maintenance~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5
			WMP	WMP			

~~Note: The wire mesh partitions shall have a factory applied finish to match P-3.~~

~~Area: 103 B COM Storage~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	WMP	WMP	P-5

~~Note: The wire mesh partitions shall have a factory applied finish to match P-3.~~

~~Area: 103 A,C COM Storage~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	WMP	WMP	P-1	P-5

~~Note: The wire mesh partitions shall have a factory applied finish to match P-3.~~

~~Area: 104 B NBC Storage~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	WMP	WMP	P-1	P-5

~~Note: The wire mesh partitions shall have a factory applied finish to match P-3.~~

~~Area: 104 A,C NBC Storage~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	WMP	WMP	P-5

~~Note: The wire mesh partitions shall have a factory applied finish to match P-3.~~

~~Area: 105 A,B,C Arms Vault~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-5

~~Area: 106 B General Storage~~

~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: RB-1 Conc. P-1 WMP WMP P-1 P-5~~
~~WMP~~

~~Note: The wire mesh partitions shall have a factory applied finish to match P-3.~~

~~Area: 106 A,C General Storage~~
~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: RB-1 Conc. P-1 P-1 WMP WMP P-5~~
~~WMP~~

~~Note: The wire mesh partitions shall have a factory applied finish to match P-3.~~

~~Area: 107 B Unit Storage~~
~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: RB-1 Conc. WMP WMP P-1 P-1 P-5~~

~~Note: The wire mesh partitions shall have a factory applied finish to match P-3.~~

~~Area: 107 A,C Unit Storage~~
~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: RB-1 Conc. WMP P-1 P-1 WMP P-5~~

~~Note: The wire mesh partitions shall have a factory applied finish to match P-3.~~

~~Area: 108 A,B,C Toilet/Shower~~
~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: CT-9 CT-5 CT-1 CT-1 CT-1 CT-1 P-5~~
~~CT-8 CT-2 CT-2 CT-2 CT-2~~
~~CT-4 CT-4 CT-4 CT-4~~

~~Note: Shower spaces shall have SR-1 as a floor finish. The interior walls of the individual shower stalls shall match CT-1 and will not have the accent tiles. See 1.5.2.2.2 for tile placement. See I-Plates for details.~~

~~Area: 109 A,B,C Toilet/Shower~~
~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: CT-9 CT-5 CT-1 CT-1 CT-1 CT-1 P-5~~
~~CT-8 CT-2 CT-2 CT-2 CT-2~~
~~CT-4 CT-4 CT-4 CT-4~~

~~Note: Shower spaces shall have SR-1 as a floor finish. The interior walls of the individual shower stalls shall match CT-1 and will not have accent tiles. See 1.5.2.2.2 for tile placement. See I-Plates for details.~~

~~Area: 110 A,B,C Lockers~~
~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: CT-9 CT-5 P-1 P-1 P-1 P-1 P-5~~
~~CT-8~~

~~Area: 111 A,B,C Vestibule~~

~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: CT-9 CT-5 P-1 P-1 P-1 P-1 P-5~~
~~CT-8~~

~~Area: 112 A,B,C Lockers~~
~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: CT-16 CT-5 P-1 P-1 P-1 P-1 P-5~~
~~CT-8~~

~~Area: 113 A,C Mechanical~~
~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: - Conc. P-1 P-1 P-1 P-1 -~~

~~Area: 114 A Electrical~~
~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: - Conc. P-1 P-1 P-1 P-1 P-5~~

~~Area: 114 B Mech.~~
~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: - Conc. P-1 P-1 P-1 P-1 P-5~~

~~Area: 001 Stair~~
~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: RB-1 VCT-3 P-1 P-1 P-1 P-1 P-5~~
~~P-2 P-2 P-2 P-2~~

~~Note: A painted wainscot to match P-2 shall be applied to the height of 2" above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.~~

~~Area: 002 Stair~~
~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: RB-1 VCT-3 P-1 P-1 P-1 P-1 P-5~~
~~P-2 P-2 P-2 P-2~~

~~Note: A painted wainscot to match P-2 shall be applied to the height of 2" above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.~~

~~Area: 003 Stair~~
~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: RB-1 VCT-3 P-1 P-1 P-1 P-1 P-5~~
~~P-2 P-2 P-2 P-2~~

~~Note: A painted wainscot to match P-2 shall be applied to the height of 2" above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.~~

~~Area: 004 Stair~~
~~Base Floor A Wall B Wall C Wall D Wall Ceiling~~
~~Matl.: RB-1 VCT-3 P-1 P-1 P-1 P-1 P-5~~
~~P-2 P-2 P-2 P-2~~

~~Note: A painted wainscot to match P-2 shall be applied to the height of 2" above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.~~

~~Area: 005 Stair~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

~~Note: A painted wainscot to match P-2 shall be applied to the height of 2" above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.~~

~~Area: 006 Stair~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

~~Note: A painted wainscot to match P-2 shall be applied to the height of 2" above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.~~

~~Area: 201 A,B,C Waiting~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

~~Area: 202 A,B,C Admin Office~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	WC-1	WC-1	WC-1	WC-1	ATC-1

~~Area: 203 A,B,C Storage~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

~~Area: 204 A,B,C Training Office~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

~~Area: 205 A,B,C First Sergeant~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

~~Area: 206 A,B,C Commander~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

~~Area: 207 A,B,C Executive Office~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

~~WC-1 WC-1 WC-1 WC-1~~

~~Area: 208 A,B,C Conference~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
~~Matl.:~~	~~RB-1~~	~~VCT-2~~	~~P-1~~	~~P-1~~	~~P-1~~	~~P-1~~	~~ATC-1~~
			~~WC-1~~	~~WC-1~~	~~WC-1~~	~~WC-1~~	

~~Area: 209 A,B,C Storage~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
~~Matl.:~~	~~RB-1~~	~~VCT-2~~	~~P-1~~	~~P-1~~	~~P-1~~	~~P-1~~	~~ATC-1~~

~~Area: 210 A,B,C Women~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
~~Matl.:~~	~~CT-4~~	~~CT-5~~	~~P-1~~	~~P-1~~	~~P-1~~	~~P-1~~	~~P-5~~
		~~CT-6~~	~~CT-2~~	~~CT-2~~	~~CT-2~~	~~CT-2~~	
		~~CT-7~~	~~CT-4~~	~~CT-4~~	~~CT-4~~	~~CT-4~~	

~~See 1.5.2.2.2 for tile placement. See I-Plates for details.~~

~~Area: 211 A,B,C Men~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
~~Matl.:~~	~~CT-4~~	~~CT-5~~	~~P-1~~	~~P-1~~	~~P-1~~	~~P-1~~	~~P-5~~
		~~CT-6~~	~~CT-2~~	~~CT-2~~	~~CT-2~~	~~CT-2~~	
		~~CT-7~~	~~CT-4~~	~~CT-4~~	~~CT-4~~	~~CT-4~~	

~~See 1.5.2.2.2 for tile placement. See I-Plates for details.~~

~~Area: 212 B IMS~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
~~Matl.:~~	~~RB-1~~	~~VCT-2~~	~~P-6~~	~~P-6~~	~~P-6~~	~~P-6~~	~~ATC-1~~

~~Note: Paint in this room shall be fire-retardant to match P-6 in color.~~

~~Area: 212 A,C IMS~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
~~Matl.:~~	~~RB-1~~	~~VCT-2~~	~~P-6~~	~~P-6~~	~~P-6~~	~~P-6~~	~~ATC-1~~

~~Note: Paint in this room shall be fire-retardant to match P-6 in color.~~

~~Area: 213 A,B,C Corridor~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
~~Matl.:~~	~~RB-1~~	~~VCT-2~~	~~P-1~~	~~P-1~~	~~P-1~~	~~-~~	~~ATC-1~~

~~Area: 214 A,B,C Corridor~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
~~Matl.:~~	~~RB-1~~	~~VCT-2~~	~~P-1~~	~~P-1~~	~~P-1~~	~~P-1~~	~~ATC-1~~

~~Area: 215 A,B,C Platoon Office~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
~~Matl.:~~	~~RB-1~~	~~VCT-2~~	~~P-1~~	~~P-1~~	~~P-1~~	~~P-1~~	~~ATC-1~~
			~~WC-1~~	~~WC-1~~	~~WC-1~~	~~WC-1~~	

~~Area: 216 A,B,C Platoon Office~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
~~Matl.:~~	~~RB-1~~	~~VCT-2~~	~~P-1~~	~~P-1~~	~~P-1~~	~~P-1~~	~~ATC-1~~
			~~WC-1~~	~~WC-1~~	~~WC-1~~	~~WC-1~~	

~~Area: 217 A,B,C Corridor~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	-	ATC-1

Area: 218 A,B,C Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 219 A,B,C Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 220 A,B,C Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 221 B TA-50 Gear

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 221 A,C TA-50 Gear

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 222 A Mechanical Mezzanine

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Grate	P-1	P-1	P-1	P-1	-

1.6.7 Medium/Medium Company Ops Facility

Area: 001 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

Note: A painted wainscot to match P-2 shall be applied to the height of 2" above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 002 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

Note: A painted wainscot to match P-2 shall be applied to the height of 2" above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 003 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 101, 101A Janitor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 102 Equipment Maintenance

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5
			WMP			WMP	

Area: 102A Equipment Maintenance

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5
			WMP	WMP			

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 103 COM Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	WMP	WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 103A COM Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	WMP	WMP	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 104 NBC Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	WMP	WMP	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 104A NBC Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	WMP	WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 105, 105A Arms Vault

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 106 General Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1 WMP	WMP	WMP	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 106A General Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1 WMP	P-1	WMP	WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 107 Unit Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	WMP	WMP	P-1	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 107A Unit Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	WMP	P-1	P-1	WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 108, 108A Toilet/Shower

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-16	CT-5 CT-8	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	P-5

Note: Shower spaces shall have CT-5 and Ct-7 as a floor finish. The interior walls of the individual shower stalls shall match CT-1 and will not have the accent tiles. See 1.5.2.2.2 for tile placement. See I-Plates for details.

Area: 109,109A Toilet/Shower

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-16	CT-5 CT-8	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	P-5

Note: Shower spaces shall have CT-5 and Ct-7 as a floor finish. The interior walls of the individual shower stalls shall match CT-1 and will not have accent tiles. See 1.5.2.2.2 for tile placement. See I-Plates for details.

Area: 110, 110A Lockers

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-16	CT-5 CT-8	P-1	P-1	P-1	P-1	P-5

Area: 111,111A Vestibule

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-16	CT-5 CT-8	P-1	P-1	P-1	P-1	P-5

Area: 112,112A Lockers

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-16	CT-5 CT-8	P-1	P-1	P-1	P-1	P-5

Area: 113,113A Mechanical

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	-

Area: 201,201A Waiting

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 202,202A Admin Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 203,203A Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 204,204A Training Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 205,205A First Sergeant

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 206,206A Commander

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 207,207A Executive Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 208,208A Conference

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 209,209A Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 210,210A Women

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-4	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-6	CT-2	CT-2	CT-2	CT-2	
		CT-7	CT-4	CT-4	CT-4	CT-4	

Area: 211,211A Men

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-4	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-6	CT-2	CT-2	CT-2	CT-2	
		CT-7	CT-4	CT-4	CT-4	CT-4	

Area: 212 IMS

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-6	P-6	P-6	P-6	ATC-1

Note: Paint in this room shall be fire-retardant to match P-6 in color.

Area: 212A IMS

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-6	P-6	P-6	P-6	ATC-1

Note: Paint in this room shall be fire-retardant to match P-6 in color.

Area: 213 Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 213A Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 214,214A Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 215,215A Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 216,216A Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 217,217A Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 218,218A Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 219,219A Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 220,220A Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 221,221A TA-50 Gear

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

1.6.8 Quad Medium Company Ops. Facility – 313th MI

Area: 001 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 002 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 003 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 004 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 005 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 006 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 101, A,B,C Janitor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 102,B Equipment Maintenance

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1 WMP	P-1	P-1	P-1 WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 102 A,C Equipment Maintenance

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1 WMP	P-1 WMP	P-1	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 103,B COM Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	WMP	WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 103 A,C COM Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	WMP	WMP	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 104,B NBC Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	WMP	WMP	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 104 A,C NBC Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	WMP	WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 105, A,B,C Arms Vault

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 106,B General Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1 WMP	WMP	WMP	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 106 A,C General Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1 WMP	P-1	WMP	WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 107,B Unit Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	WMP	WMP	P-1	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 107 A,C Unit Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	WMP	P-1	P-1	WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 108,A,B,C Toilet/Shower

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-9	CT-5 CT-8	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	P-5

Note: Shower spaces shall have SR-1 as a floor finish. The interior walls of the individual shower stalls shall match CT-1 and will not have the accent tiles. See 1.5.2.2.2 for tile placement. See I-Plates for details.

Area: 109,A,B,C Toilet/Shower

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-9	CT-5 CT-8	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	CT-1 CT-2 CT-4	P-5

Note: Shower spaces shall have SR-1 as a floor finish. The interior walls of the individual shower stalls shall match CT-1 and will not have accent tiles. See 1.5.2.2.2 for tile placement. See I-Plates for details.

Area: 110,A,B,C Lockers

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-9	CT-5 CT-8	P-1	P-1	P-1	P-1	P-5

Area: 111,A,B,C Vestibule

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-9	CT-5 CT-8	P-1	P-1	P-1	P-1	P-5

Area: 112,A,B,C Lockers

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-9	CT-5 CT-8	P-1	P-1	P-1	P-1	P-5

Area: 113,A,C Mechanical

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	-

Area: 114 A Electrical

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-1

Area: 114 B Mechanical

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-1

Area: 001 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 002 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 003 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 004 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 005 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 006 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 201,A,B,C Waiting

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 202,A,B,C Admin Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 203,A,B,C Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 204,A,B,C Training Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 205,A,B,C First Sergeant

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 206,A,B,C Commander

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 207,A,B,C Executive Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 208,A,B,C Conference

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 209,A,B,C Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 210,A,B,C Women

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-4	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-6	CT-2	CT-2	CT-2	CT-2	
		CT-7	CT-4	CT-4	CT-4	CT-4	

Area: 211,A,B,C Men

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-4	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-6	CT-2	CT-2	CT-2	CT-2	
		CT-7	CT-4	CT-4	CT-4	CT-4	

Area: 212,A,B,C IMS

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-6	P-6	P-6	P-6	ATC-1

Note: Paint in this room shall be fire-retardant to match P-6 in color.

Area: 213,A,B,C Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 214,A,B,C Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 215,A,B,C Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 216,A,B,C Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 217,A,B,C Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 218,A,B,C Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 219,A,B,C Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1 WC-1	P-1 WC-1	P-1 WC-1	P-1 WC-1	ATC-1

Area: 220,A,B,C Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 221,B TA-50 Gear

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 221 A,C TA-50 Gear

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 222A Mechancial Mezzanine

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Grate	P-1	P-1	P-1	P-1	-

1.6.9 Quad Medium Company Ops. Facility – 82ND SIG

Area: 001 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 002 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal

parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 003 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 004 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 005 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 006 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1 P-2	P-1 P-2	P-1 P-2	P-1 P-2	P-5

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 101, A,B,C Janitor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 102,B Equipment Maintenance

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1 WMP	P-1	P-1	P-1 WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 102 A,C Equipment Maintenance

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1 WMP	P-1 WMP	P-1	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 103,B COM Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	WMP	WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 103 A,C COM Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	WMP	WMP	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 104,B NBC Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	WMP	WMP	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 104 A,C NBC Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	WMP	WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 105, A,B,C Arms Vault

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 106,B General Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1 WMP	WMP	WMP	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 106 A,C General Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1 WMP	P-1	WMP	WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 107,B Unit Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	WMP	WMP	P-1	P-1	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 107 A,C Unit Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	WMP	P-1	P-1	WMP	P-5

Note: The wire mesh partitions shall have a factory applied finish to match P-3.

Area: 108,A,B,C Toilet/Shower

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-9	CT-5	CT-1	CT-1	CT-1	CT-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-4	CT-4	CT-4	CT-4	

Note: Shower spaces shall have SR-1 as a floor finish. The interior walls of the individual shower stalls shall match CT-1 and will not have the accent tiles. See 1.5.2.2.2 for tile placement. See I-Plates for details.

Area: 109,A,B,C Toilet/Shower

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-9	CT-5	CT-1	CT-1	CT-1	CT-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-4	CT-4	CT-4	CT-4	

Note: Shower spaces shall have SR-1 as a floor finish. The interior walls of the individual shower stalls shall match CT-1 and will not have accent tiles. See 1.5.2.2.2 for tile placement. See I-Plates for details.

Area: 110,A,B,C Lockers

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-9	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8					

Area: 111,A,B,C Vestibule

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-9	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8					

Area: 112,A,B,C Lockers

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-9	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8					

Area: 113,A,C Mechanical

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	-

Area: 114,A Electrical

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-1

Area: 114,B Mechanical

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-1

Area: 001 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 002 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 003 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 004 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 005 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 006 Stair

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-3	P-1	P-1	P-1	P-1	P-5
			P-2	P-2	P-2	P-2	

Note: A painted wainscot to match P-2 shall be applied to the height of 2″ above the handrail. The handrails shall be painted to match P-3. The metal parts of the stairs shall be painted to match P-2. The stair landings shall have VCT-3 as a floor finish.

Area: 201,A,B,C Waiting

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 202,A,B,C Admin Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 203,A,B,C Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 204,A,B,C Training Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 205,A,B,C First Sergeant

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 206,A,B,C Commander

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 207,A,B,C Executive Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 208,A,B,C Conference

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 209,A,B,C Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 210,A,B,C Women

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-4	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-6	CT-2	CT-2	CT-2	CT-2	
		CT-7	CT-4	CT-4	CT-4	CT-4	

See 1.5.2.2 for tile placement. See I-Plates for details.

Area: 211,A,B,C Men

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-4	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-6	CT-2	CT-2	CT-2	CT-2	
		CT-7	CT-4	CT-4	CT-4	CT-4	

See 1.5.2.2 for tile placement. See I-Plates for details.

Area: 212,A,B,C IMS

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-6	P-6	P-6	P-6	ATC-1

Note: Paint in this room shall be fire-retardant to match P-6 in color.

Area: 213,A,B,C Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 214,A,B,C Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 215,A,B,C Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 216,A,B,C Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 217,A,B,C Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 218,A,B,C Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 219,A,B,C Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 220,A,B,C Corridor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 221,B TA-50 Gear

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 221 A,C TA-50 Gear

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 222A Mechancial Mezzanine

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Grate	P-1	P-1	P-1	P-1	-

1.6.10 Quad Medium Company Ops. Facility – 307EN LW

Area: 101, A,B,C Equipment Maintenance

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 102, A,B,C Unit Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 103,A,B,C General Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 104, A,B,C NBC Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 105, A,B,C Arms Vault

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 106 A Mechanical Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 107,A,B,C Elect. Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 108,A,B,C Comm.

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	p-1	P-5

Area: 201,A,B,C Waiting

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 202,A,B,C Admin Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	WC-1	WC-1	WC-1	WC-1	ATC-1

Area: 203,A,B,C Training Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 204,A,B,C Executive Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 205,A,B,C Commander Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 206,A,B,C First Sergeant

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 207,A,B,C Conference Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 208,A,B,C Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 209,A,B,C Comm. Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

*5

Area: 210,A,B,C Corridor~~Comm. Room~~

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 211,A,B,C Men Toilet

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-4	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-4	CT-4	CT-4	CT-4	

See I-Plates, Pattern Plans for details.

Area: 212,A,B,C Women Toilet

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-4	CT-5	P-1	P-1	P-1	P-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-4	CT-4	CT-4	CT-4	

See I-Plate, Pattern Plans for details.

Area: 213,A,B,C Janitor

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-4	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 214,A,B,C Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 215,A,B,C Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 216,A,B,C Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 217,A,B,C Platoon Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1
			WC-1	WC-1	WC-1	WC-1	

Area: 218,A,B,C Men’s Showers/Lockers

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-9	CT-5	CT-1	CT-1	CT-1	CT-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-4	CT-4	CT-4	CT-4	

Note: SR-1 is used in the shower unit; CT-9 is used at the shower curb and locker base. See I-Plates, Pattern Plans for details.

Area: 219,A,B,C Men’s Toilet

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-9	CT-5	CT-1	CT-1	CT-1	CT-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-4	CT-4	CT-4	CT-4	

Note: SR-1 is used in the shower unit; CT-9 is used at the shower curb and locker base. See I-Plates, Pattern Plans for details.

Area: 220,A,B,C Women Toilet/Showers/Lockers

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	CT-9	CT-5	CT-1	CT-1	CT-1	CT-1	P-5
		CT-8	CT-2	CT-2	CT-2	CT-2	
			CT-4	CT-4	CT-4	CT-4	

Note: SR-1 is used in the shower unit; CT-9 is used at the shower curb and locker base. See I-Plate, Pattern Plans for details.

Area: 221,A,B,C Supplies

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	RB-1	VCT-2	P-1	P-1	P-1	P-1	ATC-1

Area: 222A Mechancial Mezzanine

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Grate	P-1	P-1	P-1	P-1	-

1.6.11 Refuse Garbage Building

Area: 101 Shredder Room

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	---------	Existing Finishes----------			

Area: 102 Office

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 103 Toilet

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-5

Area: 104 Storage

	Base	Floor	A Wall	B Wall	C Wall	D Wall	Ceiling
Matl.:	-	Conc.	P-1	P-1	P-1	P-1	P-5

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UFGS-09250A (April 2001)

SECTION 09250A

GYPSUM WALLBOARD
04/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A108.11	(1992) Interior Installation of Cementitious Backup Units
ANSI A118.9	(1992) Test Methods and Specifications for Cementitious Backer Units

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 580/A 580M	(1998) Stainless Steel Wire
ASTM A 853	(1993; R 1998) Steel Wire, Carbon, for General Use
ASTM B 164	(1998) Nickel-Copper Alloy Rod, Bar, and Wire
ASTM C 36/C 36M	(1999) Gypsum Wallboard
ASTM C 475	(1994) Joint Compound and Joint Tape for Finishing Gypsum Board
ASTM C 514	(1996) Nails for the Application of Gypsum Board
ASTM C 557	(1999) Adhesive for Fastening Gypsum Wallboard to Wood Framing
ASTM C 630/C 630M	(2000) Water-Resistant Gypsum Backing Board
ASTM C 645	(2000) Nonstructural Steel Framing Members
ASTM C 754	(1999a) Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
ASTM C 840	(1999) Application and Finishing of Gypsum Board
ASTM C 955	(2000a) Load-Bearing (Transverse and

	Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases
ASTM C 1002	(2000) Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases
ASTM C 1047	(1999) Accessories for Gypsum Wallboard and Gypsum Veneer Base

GYPSUM ASSOCIATION (GA)

GA 214	(1996) Recommended Levels of Gypsum Board Finish
GA 216	(1996) Application and Finishing of Gypsum Board
GA 600	(1997) Fire Resistance Design Manual

UNDERWRITERS LABORATORIES (UL)

UL Fire Resist Dir	(1999) Fire Resistance Directory (2 Vol.)

1.2 SYSTEM DESCRIPTION

1.2.1 Fire-Rated Construction

Joints of fire-rated gypsum board enclosures shall be closed and sealed in accordance with UL test requirements or GA requirements, and as required to meet pressurization requirements. Penetrations through rated partitions and ceilings shall be sealed tight in accordance with tested systems. Fire ratings shall be as indicated.

1.2.2 Pressurized Enclosures

Pressurized fire-rated gypsum board enclosures shall allow the mechanical and electrical life-safety systems to operate in accordance with the design intent. Air pressure within elevator shaft shall be 7.5 psf. Air pressure within stair shaft shall be 5.0 psf. Maximum mid-span deflection shall be L/360.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Steel Framing
Control Joints
Fire-Resistant Assemblies

Drawings and installation details for ceiling framing, furring,

special wall framing, and framed openings in walls and ceilings.

SD-07 Certificates

Gypsum Board
Water-Resistant Gypsum Board
Exterior Gypsum Soffit Board
Steel Framing
Fire-Rated Gypsum Board
Cementitious Backer Units

Certificates stating that the steel framing and gypsum wallboard meet the specified requirements.

1.4 QUALIFICATIONS

Manufacturer shall specialize in manufacturing the types of material specified and shall have a minimum of 5 years of documented successful experience. Installer shall specialize in the type of gypsum board work required and shall have a minimum of 3 years of documented successful experience.

1.5 DELIVERY, STORAGE AND HANDLING

Materials shall be delivered in original containers bearing the name of manufacturer, contents, and brand name. Materials shall be stored off the ground in a weathertight structure for protection. Gypsum boards shall be stacked flat, off floor and supported to prevent sagging and warpage. Adhesives and joint materials shall be stored in accordance with manufacturer's printed instructions. Damaged or deteriorated materials shall be removed from jobsite.

1.6 ENVIRONMENTAL CONDITIONS

Environmental conditions for application and finishing of gypsum board shall be in accordance with ASTM C 840. During the application of gypsum board without adhesive, a room temperature of not less than 40 degrees F shall be maintained. During the application of gypsum board with adhesive, a room temperature of not less than 50 degrees F shall be maintained for 48 hours prior to application and continuously afterwards until completely dry. Building spaces shall be ventilated to remove water not required for drying joint treatment materials. Drafts shall be avoided during dry hot weather to prevent materials from drying too rapidly.

PART 2 MATERIALS

2.1 NON-LOADBEARING STUD WALLS

2.1.1 Studs

Studs for non-loadbearing walls shall conform to ASTM C 645. Studs shall be C-shaped, roll formed steel with minimum uncoated design thickness of 0.0329 inch unless otherwise indicated on drawings, made from G40 hot-dip galvanized coated sheet.

2.1.2 Runner Tracks

Floor and ceiling runner tracks shall conform to ASTM C 645. Tracks shall be prefabricated, U-shaped with minimum 1 inch flanges, unpunched web,

thickness to match studs, made from G40 hot-dip galvanized coated sheet.

2.2 LOADBEARING STUD WALLS

2.2.1 Studs

Studs for loadbearing walls shall conform to ASTM C 955. Studs shall be C-shaped roll formed steel made from minimum G60 hot-dip galvanized coated sheet. Stud sizes and base metal design thickness shall be as shown.

2.2.2 Runner Tracks

Floor and ceiling runner tracks shall conform to ASTM C 955. Runners shall be prefabricated, U-shaped with minimum 3/4 inch flanges, unpunched web, thickness to match studs, made from G60 hot-dip galvanized coated sheet.

2.2.3 Bridging

Bridging for loadbearing walls shall conform to ASTM C 955. Bridging shall be minimum 3/4 x 3/4 inch cold-rolled steel channel with weld attachment clips at each stud or V-bar type weld or screw attached to each stud flange. Bridging shall be adequate to provide lateral support for the stud.

2.3 SUSPENDED CEILING FRAMING

Suspended ceiling framing system shall have the capability to support the finished ceiling, light fixtures, air diffusers, and accessories, as shown. The suspension system shall have a maximum deflection of L/240. Carrying channels shall be formed from minimum 0.0548 inch thick cold-rolled steel, 1-1/2 x 3/4 inch. Furring members shall be formed from cold-rolled steel, 7/8 x 2-9/16 inch. Carrying channels and furring members shall be made from hot-dip galvanized coated sheet.

2.4 GYPSUM BOARD

Gypsum board shall be asbestos-free. Gypsum board shall have square-cut ends, tapered or beveled edges and shall be maximum possible length. Gypsum board thickness shall be as shown.

2.4.1 Standard Gypsum Board

Regular gypsum board shall conform to ASTM C 36/C 36M, and shall be 48 inches wide.

2.4.2 Fire-Rated Gypsum Board

Fire-rated gypsum board shall conform to ASTM C 36/C 36M, and shall be Type X or Type C as required, 48 inches wide.

2.4.3 Water-Resistant Gypsum Board

Water-resistant gypsum board shall conform to ASTM C 630/C 630M, regular or Type X as indicated, with water-resistant paper faces, paintable surfaces, and shall be 48-inch width and maximum permissible length.

2.4.4 Omitted
2.4.5 Omitted

2.4.6 Shaftwall Liner Panel

Shaftwall liner panel shall conform to UL listing. Liner Panel shall be specifically manufactured for cavity shaftwall system, with water-resistant paper faces, bevel edges, single lengths to fit required conditions, 1 inch thick, by 24 inches wide.

2.4.7 Omitted
2.4.8 Omitted
2.4.9 Omitted

2.4.10 Abuse-Resistant Gypsum Board

Abuse-resistant gypsum board shall be designed to offer greater resistance to surface indentation and through penetration than standard gypsum board and shall be 48 inches wide, 5/8 inch thick, tapered edges. Reinforced gypsum panel with imbedded fiber mesh or lexan backing testing in accordance with the following tests. Provide fasteners that meet manufacturer requirements and specifications stated within this section.

2.4.10.1 Structural Failure Test

ASTM E 695 or ASTM D 2394 for structural failure (drop penetration). ASTM E 695 using a 60-pound sand-filled leather bag, resisting no less than 300 foot pounds before failure or ASTM D 2394 using 5.5 inches hemispherical projectile resisting no less than 264 foot pounds before failure.

2.4.10.2 Indentation Test

ASTM D 5420 or ASTM D 1037 for indentation resistance. ASTM D 5420 using a 32-ounce weight dropped 3 feet creating not more than a 0.137 inch identation or ASTM D 1037 using no less than a 470-pound weight applied to the 0.438 inch diameter ball to create not more than a 0.0197 inch indentation depth.

2.5 TRIM, MOLDINGS, AND ACCESSORIES

2.5.1 Taping and Embedding Compound

Taping and embedding compound shall conform to ASTM C 475. Compound shall be specifically formulated and manufactured for use in embedding tape at gypsum wallboard joints and fastener heads, and shall be compatible with tape and substrate.

2.5.2 Finishing or Topping Compound

Finishing or topping compound shall conform to ASTM C 475. Compound shall be specifically formulated and manufactured for use as a finishing compound for gypsum board.

2.5.3 All-Purpose Compound

All-purpose compound shall be specifically formulated and manufactured to use as a taping and finishing compound, and shall be compatible with tape and substrate.

2.5.4 Joint Tape

Joint tape shall conform to ASTM C 475 and shall be as recommended by gypsum board manufacturer.

2.5.5 Trim, Control Joints, Beads, Stops and Nosings

Items used to protect edges, corners, and to provide architectural features shall be in accordance with ASTM C 1047.

2.6 FASTENINGS AND ADHESIVES

2.6.1 Nails

Nails shall conform to ASTM C 514. Nails shall be hard-drawn low or medium-low carbon steel, suitable for intended use.

2.6.2 Screws

Screws shall conform to ASTM C 1002. Screws shall be self-drilling and self-tapping steel, Type G for gypsum board to gypsum board or Type S for wood or light-gauge steel framing.

2.6.3 Adhesives

Adhesives shall conform to ASTM C 557. Adhesives shall be formulated to bond gypsum board to wood framing members. For securing gypsum board to metal framing, adhesive shall be as recommended by gypsum board manufacturer.

2.6.4 Hangers

Suspended ceiling runner channel hangers shall be soft, annealed steel wire not less than No. 8 SWG, conforming to ASTM A 853 or flat iron or steel straps, at least 3/32 x 7/8 inch size, coated with zinc, cadmium, or rust-inhibiting paint.

2.6.5 Wire and Clip Type Fastenings

Tie wire, clips, rings, and other fastenings shall be corrosion-resisting steel conforming to ASTM A 580/A 580M, composition 302, 304, or 316, Condition A, or nickel-copper alloy conforming to ASTM B 164, annealed condition except that walls, partitions, and other vertical surfaces not incorporated in ceiling construction may be erected with soft, annealed steel conforming to ASTM A 853.

2.6.5.1 Tie Wire

Tie wire for constructing partitions and vertical furring, for securing metal lath to supports, and for lacing shall be not less than No. 18 SWG. Tie wire for other applications shall be not less than No. 16 SWG.

2.6.5.2 Clips

Clips used in lieu of tie wire for securing the furring channels to the runner channels in ceiling construction shall be made from strip not less than 1/8 inch thick or shall be hairpin clip, formed of wire not less than 0.01620 inch nominal diameter. Other clips and rings or fastenings of similar materials shall be equivalent in holding power to that provided by tie wire for the specific application.

2.7 CEMENTITIOUS BACKER UNITS

Cementitious backer units shall comply with ANSI A118.9.

PART 3 EXECUTION

3.1 INTERIOR WALL FRAMING

Steel framing and furring members shall be installed in accordance with ASTM C 754. Members shall be in alignment with spacings not to exceed the maximum spacings indicated on drawings. Runners shall be aligned accurately at the floor and ceiling and securely anchored.

3.1.1 Wall Openings

The framing system shall provide for the installation and anchorage of the required subframes or finish frames for wall openings at doors, pass-through openings, and access panels. Partitions abutting continuous suspended ceilings shall be strengthened for rigidity at rough openings of more than 30 inches wide. Studs at openings shall be 0.0329 inch minimum bare metal thickness and spot grouted at jamb anchor inserts. Double studs shall be fastened together with screws and secured to floor and overhead runners. Two studs shall be used for framing solid-core doors and doors over 36 inches wide.

3.1.2 Wall Control Joints

Control joints for expansion and contraction in the walls shall be constructed with double studs installed 1/2 inch apart in interior walls or wall furrings where indicated on drawings. Control joint spacing shall not exceed 30 feet. Ceiling-height door frames may be used as vertical control joints. Door frames of less than ceiling height may be used as control joints only if standard control joints extend to ceiling from both corners of top of door frame. Control joints between studs shall be filled with firesafing insulation in fire rated partitions.

3.1.3 Blocking

Blocking shall be provided as necessary for mounted equipment. Blocking shall be metal or wood and shall be cut to fit between framing members. Blocking shall be rigidly anchored to the framing members. Under no circumstances will accessories or other wall mounted equipment be anchored directly to gypsum wallboard.

3.2 SHAFT WALL FRAMING

The shaft wall system shall be installed in accordance with the system manufacturer's published instructions. Bucks, anchors, blocking and other items placed in or behind shaft wall framing shall be coordinated with electrical and mechanical work. Fireproofing materials which are damaged or removed during shaft wall construction shall be patched or replaced.

3.3 SUSPENDED CEILING FRAMING

Suspended ceiling system framing shall be installed in accordance with ASTM C 754.

3.3.1 Hangers

Hangers shall be spaced not more than 48 inches along runner channels and 36 inches in the other direction or 42 inches in both directions unless

otherwise indicated. Locations of hanger wires shall be coordinated with other work. Hangers at ends of runner channels shall be located not more than 6 inches from wall. Hanger wire shall be looped around bottom chord of open-web steel joists, or secured to structural elements with suitable fasteners. Sags or twists which develop in the suspended system shall be adjusted. Damaged or faulty parts shall be replaced.

3.3.2 Main Runners

Main runner channels shall be installed in accordance with ASTM C 754. Hanger wires shall be double strand saddle-tied to runner channels and the ends of hanger wire shall be twisted three times around itself. Main runners shall be located to within 6 inches of the paralleling wall to support the ends of cross furring. Main runners shall not come in contact with abutting masonry or concrete walls. Where main runners are spliced, ends shall be overlapped 12 inches with flanges of channels interlocked, and shall be securely tied at each end of splice with wire looped twice around the channels.

3.3.3 Furring Channels

Furring channels shall be spaced in accordance with ASTM C 754. Furring channels shall be secured to the runner channels and to structural supports at each crossing with tie wire, hairpin clips, or equivalent fastenings. Furring channels shall be located within 2 inches of parallel walls and beams, and shall be cut 1/2 inch short of abutting walls.

3.3.4 Ceiling Openings

Support members shall be provided as required at ceiling openings for access panels, recessed light fixtures, and air supply or exhaust. Support members shall be not less than 1-1/2 inch main runner channels and vertically installed suspension wires or straps shall be located to provide at least the minimum support specified herein for furring and wallboard attachment. Intermediate structural members not a part of the structural system, shall be provided for attachment or suspension of support members.

3.3.5 Light Fixtures and Air Diffusers

Light fixtures and air diffusers shall be supported directly from suspended ceiling runners. Wires shall be provided at appropriate locations to carry the weight of recessed or surface mounted light fixtures and air diffusers.

3.3.6 Control Joints

Ceiling control joints for expansion and contraction shall be located where indicated on drawings. A control joint or intermediate blocking shall be installed where ceiling framing members change direction.

3.3.6.1 Interior Ceilings With Perimeter Relief

Control joints shall be installed so that linear dimensions between control joints shall not exceed 50 feet in either direction nor more than 2500 square feet.

3.3.6.2 Interior Ceilings Without Perimeter Relief

Control joints shall be installed so that linear dimensions between control joints shall not exceed 30 feet in either direction nor more than 900

square feet.

3.4 APPLICATION OF GYPSUM BOARD

Gypsum board shall be installed in accordance with ASTM C 840, GA 214 and GA 216 and as specified. Edges and ends of gypsum boards shall be cut to obtain neat fitting joints. End joints of adjoining boards shall be staggered, and shall be staggered on opposite sides of wall. Boards shall be applied with moderate contact without forcing in place. Holes for pipes, fixtures or other small openings shall be cut with a tool which will provide a neat fit. Screws shall be driven so that the heads are slightly below the plane of paper face. Fracturing the paper face or damaging the core shall be avoided. Trim shall be installed at external and internal angles formed by the intersecting gypsum board surfaces with other surfaces. Corner beads shall be installed to vertical and horizontal corners in accordance with manufacturer's published instructions. Boards of maximum practical length shall be used so that an absolute minimum number of end joints occur. Gypsum board partitions in rooms with ceiling heights less than 10 feet shall have full height boards installed vertically with no end joints in the gypsum installation.

3.4.1 Two-Ply Gypsum Board

Second layer of gypsum board shall be applied perpendicular to first layer with joints staggered and secured with mechanical fasteners or adhesive. The use of adhesive shall be in accordance with ASTM C 840.

3.4.2 Omitted

3.4.3 Water-Resistant Gypsum Board

Water-resistant gypsum board shall be installed at the locations indicated.

3.4.4 Adhesively-Applied Gypsum Board

Walls scheduled to receive adhesively-applied gypsum board shall be dry, free of dust, oil, or form release agents, protrusions or voids, or foreign matter that would affect a proper bond.

3.5 TRIM, MOLDINGS, AND ACCESSORIES INSTALLATION

Trim, moldings and accessories shall be installed in accordance with GA 216.

3.6 GYPSUM BOARD FINISH

Gypsum board shall be finished in accordance with ASTM C 840, GA 214 and GA 216. Plenum areas above ceilings shall be finished to Level 1 in accordance with GA 214. Water resistant gypsum backing board, ASTM C 630/C 630M, to receive ceramic tile shall be finished to Level 2 in accordance with GA 214. Walls and ceilings to receive a heavy-grade wall covering or heave textured finish before painting shall be finished to Level 3 in accordance with GA 214. Walls and ceilings without critical lighting to receive flat paints, light textures, or wall coverings shall be finished to Level 4 in accordance with GA 214. Unless otherwise specified, all gypsum board walls, partitions and ceilings shall be finished to Level 5 in accordance with GA 214.

3.7 APPLICATION OF CEMENTITIOUS BACKER UNITS

Cementitious backer units shall be installed in accordance with ANSI A108.11. Fasteners shall be the type designed for cement board application.

3.8 FIRE-RESISTANT ASSEMBLIES

Gypsum wallboard construction for fire-rated assemblies shall be in accordance with UL Fire Resist Dir, or GA 600 for the design number indicated on drawings.

3.9 PATCHING

Surface defects and damage shall be corrected as required to leave gypsum board smooth, uniform in appearance, and ready to receive finish as specified.

-- End of Section --

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SECTION 09310A

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10/01

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UFGS-09310A (October 2001)

SECTION 09310A

CERAMIC TILE
10/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A108.1A	(1992) Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar
ANSI A108.1B	(1992) Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar
ANSI A108.4	(1992) Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile Setting Epoxy Adhesive
ANSI A108.5	(1992) Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar
ANSI A108.10	(1992) Installation of Grout in Tilework
ANSI A118.1	(1992) Dry-Set Portland Cement Mortar
ANSI A118.4	(1992) Latex-Portland Cement Mortar
ANSI A118.6	(1992) Ceramic Tile Grouts
ANSI A136.1	(1992) Organic Adhesives for Installation of Ceramic Tile
ANSI A137.1	(1988) Ceramic Tile

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 185	(1997) Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM C 33	(1999ael) Concrete Aggregates
ASTM C 144	(1999) Aggregate for Masonry Mortar
ASTM C 150	(1999a) Portland Cement

ASTM C 206	(1984; R 1997) Finishing Hydrated Lime
ASTM C 207	(1991; R 1997) Hydrated Lime for Masonry Purposes
ASTM C 241	(1997) Abrasion Resistance of Stone Subjected to Foot Traffic
ASTM C 373	(1988; R 1994) Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products
ASTM C 482	(1981; R 1996) Bond Strength of Ceramic Tile to Portland Cement
ASTM C 501	(1984; R 1996) Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser
ASTM C 648	(1998) Breaking Strength of Ceramic Tile
ASTM C 847	(1995) Metal Lath
ASTM C 1026	(1987; R 1996) Measuring the Resistance of Ceramic Tile to Freeze-Thaw Cycling
ASTM C 1027	(1999) Determining Visible Abrasion Resistance of Glazed Ceramic Tile
ASTM C 1028	(1996) Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method

MARBLE INSTITUTE OF AMERICA (MIA)

MIA Design Manual	(1991) Design Manual IV Dimensional Stone

TILE COUNCIL OF AMERICA (TCA)

TCA Hdbk	(1997) Handbook for Ceramic Tile Installation

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Tile
Setting-Bed
Mortar, Grout, and Adhesive

Manufacturer's catalog data.

Tile
Mortar and Grout

Manufacturers preprinted installation and cleaning instructions.

SD-04 Samples

Tile
Accessories
Marble Thresholds

Samples of sufficient size to show color range, pattern, type and joints.

SD-07 Certificates

Tile
Mortar, Grout, and Adhesive

Certificates indicating conformance with specified requirements. A master grade certificate shall be furnished for tile.

1.3 DELIVERY AND STORAGE

Materials shall be delivered to the project site in manufacturer's original unopened containers with seals unbroken and labels and hallmarks intact. Materials shall be kept dry, protected from weather, and stored under cover in accordance with manufacturer's instructions.

1.4 ENVIRONMENTAL REQUIREMENTS

Ceramic tile work shall not be performed unless the substrate and ambient temperature is at least 50 degrees F and rising. Temperature shall be maintained above 50 degrees F while the work is being performed and for at least 7 days after completion of the work. When temporary heaters are used they shall be vented to the outside to avoid carbon dioxide damage to new tilework.

1.5 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1-year period shall be provided.

PART 2 PRODUCTS

2.1 TILE

Tile shall be standard grade conforming to ANSI A137.1. Containers shall be grade sealed. Seals shall be marked to correspond with the marks on the signed master grade certificate. Tile shall be impact resistant with a minimum breaking strength for wall tile of 90 lbs and 250 lbs for floor

tile in accordance with ASTM C 648. Tile for cold climate projects shall be rated frost resistant by the manufacturer as determined by ASTM C 1026. Water absorption shall be 0.50 maximum percent in accordance with ASTM C 373. Floor tile shall have a minimum coefficient of friction of 0.50 wet and dry in accordance with ASTM C 1028. Floor tile shall be Class III-Medium Heavy traffic for barracks buildings and IV-Heavy Traffic for other buildings, durability classification as rated by the manufacturer when tested in accordance with ASTM C 1027 for abrasion resistance as related to foot traffic.

2.1.1 Mosaic Tile

Ceramic mosaic tile and trim shall be unglazed with cushion edges. Tile sizes, patterns and color shall be in accordance with Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

2.1.2 Omitted
2.1.3 Omitted

2.1.4 Porcelain Tile

Porcelain tile and trim shall be unglazed with the color extending uniformly through the body of the tile. Tile shall be nominal by 5/16 inch thick. Tile shall meet or exceed the following criteria: Abrasive wear in accordance with ASTM C 501 and bonding strength in accordance with ASTM C 482. Tile shall comply with 36 CFR 1191 for coefficient of friction for interior floors. Tile size, pattern and color shall be in accordance with Section 09000 BIUILDING COLOR AND FINISH SCHEDULE.

2.1.5 Glazed Wall Tile

Glazed wall tile and trim shall be cushion edged with matte glaze. Tile size and color shall be in accordance with Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

2.1.6 Accessories

Accessories shall be the built-in type of the same materials and finish as the wall tile. Accessories shall be provided as follows: Recessed soap and grab bar combination (SGR).

2.2 SETTING-BED

The setting-bed shall be composed of the following:

2.2.1 Aggregate for Concrete Fill

Aggregate shall conform to ASTM C 33. Maximum size of coarse aggregate shall not be greater than one-half the thickness of concrete fill.

2.2.2 Portland Cement

Cement shall conform to ASTM C 150, Type I, white for wall mortar and gray for other uses.

2.2.3 Sand

Sand shall conform to ASTM C 144.

2.2.4 Hydrated Lime

Hydrated lime shall conform to ASTM C 206, Type S or ASTM C 207, Type S.

2.2.5 Metal Lath

Metal lath shall be flat expanded type conforming to ASTM C 847, and weighing not less than 2.5 pounds per square yard.

2.2.6 Reinforcing Wire Fabric

Wire fabric shall conform to ASTM A 185. Wire shall be either 2 x 2 inch mesh, 16/16 wire or 1-1/2 x 2 inch mesh, 16/13 wire.

2.3 WATER

Water shall be potable.

2.4 MORTAR, GROUT, AND ADHESIVE

Mortar, grout, and adhesive shall conform to the following:

2.4.1 Dry-Set Portland Cement Mortar

ANSI A118.1.

2.4.2 Omitted

2.4.3 Latex-Portland Cement Mortar

ANSI A118.4.

2.4.4 Ceramic Tile Grout

ANSI A118.6; sand portland cement grout, dry-set grout, latex-portland cement grout, commercial portland cement grout, or silicone rubber grout.

2.4.5 Organic Adhesive

ANSI A136.1, Type I.

2.5 MARBLE THRESHOLDS

Marble thresholds shall be of size required by drawings or conditions. Marble shall be Group A as classified by MIA Design Manual. Marble shall have a fine sand-rubbed finish and shall be white or gray in color as approved by the Contracting Officer. Marble abrasion shall be not less than 12.0 when tested in accordance with ASTM C 241.

PART 3 EXECUTION

3.1 PREPARATORY WORK AND WORKMANSHIP

Surface to receive tile shall be inspected and shall conform to the requirements of ANSI A108.1A or ANSI A108.1B for surface conditions for the type setting bed specified and for workmanship. Variations of surface to be tiled shall fall within maximum values shown below:

TYPE	WALLS	FLOORS
Dry-Set Mortar	1/8 inch in 8 ft.	1/8 inch in 10 ft.
Organic Adhesives	1/8 inch in 8 ft.	1/16 inch in 3 ft.
Latex portland cement mortar	1/8 inch in 8 ft.	1/8 inch in 10 ft.
Epoxy	1/8 inch in 8 ft.	1/8 inch in 10 ft.

3.2 GENERAL INSTALLATION REQUIREMENTS

Tile work shall not be started until roughing in for mechanical and electrical work has been completed and tested, and built-in items requiring membrane waterproofing have been installed and tested. Floor tile installation shall not be started in spaces requiring wall tile until after wall tile has been installed. Tile in colors and patterns indicated shall be applied in the area shown on the drawings. Tile shall be installed with the respective surfaces in true even planes to the elevations and grades shown. Special shapes shall be provided as required for sills, jambs, recesses, offsets, external corners, and other conditions to provide a complete and neatly finished installation. Tile bases and coves shall be solidly backed with mortar.

3.3 INSTALLATION OF WALL TILE

Wall tile shall be installed in accordance with the TCA Hdbk, method as indicated on the drawings.

3.3.1 Workable or Cured Mortar Bed

Tile shall be installed over a workable mortar bed or a cured mortar bed at the option of the Contractor. A 4 mil polyethylene membrane, metal lath, and scratch coat shall also be installed. Workable mortar bed, materials, and installation of tile shall conform to ANSI A108.1A. Cured mortar bed and materials shall conform to ANSI A108.1B.

3.3.2 Dry-Set Mortar and Latex-Portland Cement Mortar

Dry-set or latex-portland cement shall be used to install tile in accordance with ANSI A108.5. Latex portland cement shall be used when installing porcelain ceramic tile.

3.3.3 Organic Adhesive

Organic adhesive installation of ceramic tile shall conform to ANSI A108.4.

3.4 INSTALLATION OF FLOOR TILE

Floor tile shall be installed in accordance with TCA Hdbk, method as indicated on the drawings. Shower receptors shall be installed in accordance with TCA Hdbk, method B414 or B415, as indicated on the drawings.

3.4.1 Workable or Cured Mortar Bed

Floor tile shall be installed over a workable mortar bed or a cured mortar bed at the option of the Contractor. Workable mortar bed materials and installation shall conform to ANSI A108.1A. Cured mortar bed and materials shall conform to ANSI A108.1B.

3.4.2 Dry-Set and Latex-Portland Cement

Dry-set or latex-portland cement mortar shall be used to install tile directly over properly cured, plane, clean concrete slabs in accordance with ANSI A108.5. Latex portland cement shall be used when installing porcelain ceramic tile.

3.4.3 Omitted

3.4.4 Ceramic Tile Grout

Ceramic tile grout shall be prepared and installed in accordance with ANSI A108.10.

3.4.5 Waterproofing

Shower pans are specified in Section 15400 PLUMBING, GENERAL PURPOSE. Waterproofing under second floor shower receptors shall conform to the requirements of Section 07131 ELASTOMERIC MEMBRANE WATERPROOFING.

3.4.6 Concrete Fill

Concrete fill shall be composed by volume of 1 part portland cement to 3 parts fine aggregate to 4 parts coarse aggregate, and mixed with water to as dry a consistency as practicable. The fill shall be spread, tamped, and screeded to a true plane, and pitched to drains or leveled as shown. Concrete fill shall be thoroughly damp cured before application of setting-bed material . Concrete fill shall be reinforced with one layer of reinforcement, with the uncut edges lapped the width of one mesh and the cut ends and edges lapped not less than 2 inches. Laps shall be tied together with 18 gauge wire every 10 inches along the finished edges and every 6 inches along the cut ends and edges. The reinforcement shall be supported and secured in the centers of concrete fills. The mesh shall be continuous; except where expansion joints occur, mesh shall be cut and discontinued across such joints. Reinforced concrete fill shall be provided under the setting-bed where the distance between the under-floor surface and the finished tile floor surface is 2 inches or greater, and shall be of such thickness that the mortar setting-bed over the concrete fill shall be not less nor more than the thickness required in the specified TCA Hdbk methods.

3.5 OMITTED

3.6 INSTALLATION OF MARBLE THRESHOLDS

Thresholds shall be installed where indicated in a manner similar to that of the ceramic tile floor. Thresholds shall be the full width of the opening. Head joints at ends shall not exceed 1/4 inch in width and shall be grouted full as specified for ceramic tile.

3.7 OMITTED

3.8 EXPANSION JOINTS

Joints shall be formed as indicated and sealed as specified in Section 07900 JOINT SEALING.

3.8.1 Walls

Expansion joints shall be provided at control joints in backing material.

Wherever backing material changes, an expansion joint shall be installed to separate the different materials.

3.8.2 Floors

Expansion joints shall be provided over construction joints, control joints, and expansion joints in concrete slabs. Expansion joints shall be provided where tile abuts restraining surfaces such as perimeter walls, curbs and columns and at intervals of 24 to 36 feet each way in large interior floor areas and 12 to 16 feet each way in areas exposed to moisture. Expansion joints shall extend through setting-beds and fill.

3.9 CLEANING AND PROTECTING

Upon completion, tile surfaces shall be thoroughly cleaned in accordance with manufacturer's approved cleaning instructions. Acid shall not be used for cleaning glazed tile. After the grout has set, tile wall surfaces shall be given a protective coat of a noncorrosive soap or other approved method of protection. Tiled floor areas shall be covered with building paper before foot traffic is permitted over the finished tile floors. Board walkways shall be laid on tiled floors that are to be continuously used as passageways by workmen. Damaged or defective tiles shall be replaced.

-- End of Section --

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SECTION 09510A

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10/01

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UFGS-09510A (October 2001)

SECTION 09510A

ACOUSTICAL CEILINGS
10/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 635	(2000) Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings
ASTM C 636	(1996) Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
ASTM E 580	(2000) Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Moderate Seismic Restraint
ASTM E 1264	(1998) Standard Classification for Acoustical Ceiling Products
ASTM E 1414	(2000) Standard Test for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum

U.S. ARMY CORPS OF ENGINEERS (USACE)

TI 809-04	(1998) Seismic Design for Buildings

UNDERWRITERS LABORATORIES (UL)

UL Fire Resist Dir	(1999) Fire Resistance Directory (2 Vol.)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Approved Detail Drawings

Drawings showing suspension system, method of anchoring and fastening, details, and reflected ceiling plan.

SD-03 Product Data

Acoustical Ceiling Systems

Manufacturer's descriptive data, catalog cuts, and installation instructions. Submittals which do not provide adequate data for the product evaluation will be rejected.

SD-04 Samples

Acoustical Units

Two samples of each type of acoustical unit and each type of suspension grid tee section showing texture, finish, and color.

SD-06 Test Reports

Ceiling Attenuation Class and Test

Reports by an independent testing laboratory attesting that acoustical ceiling systems meet specified sound transmission requirements. Data attesting to conformance of the proposed system to Underwriters Laboratories requirements for the fire endurance rating listed in UL Fire Resist Dir may be submitted in lieu of test reports.

SD-07 Certificates

Acoustical Units

Certificate attesting that the mineral based acoustical units furnished for the project contain recycled material and showing an estimated percent of such material.

1.3 GENERAL REQUIREMENTS

Acoustical treatment shall consist of sound controlling units mechanically mounted on a ceiling suspension system. The unit size, texture, finish, and color shall be as specified. The location and extent of acoustical treatment shall be as shown on the approved detail drawings. Reclamation of mineral fiber acoustical ceiling panels to be removed from the job site shall be in accordance with paragraph RECLAMATION PROCEDURES.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the site in the manufacturer's original unopened containers with brand name and type clearly marked. Materials shall be carefully handled and stored in dry, watertight enclosures. Immediately before installation, acoustical units shall be stored for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed in order to assure proper temperature and moisture acclimation.

1.5 ENVIRONMENTAL REQUIREMENTS

A uniform temperature of not less than 60 degrees F nor more than 85 degrees F and a relative humidity of not more than 70 percent shall be maintained before, during, and after installation of acoustical units.

1.6 SCHEDULING

Interior finish work such as concrete work shall be complete and dry before installation. Mechanical, electrical, and other work above the ceiling line shall be completed and heating, ventilating, and air conditioning systems shall be installed and operating in order to maintain temperature and humidity requirements.

1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided. Standard performance guarantee or warranty shall contain an agreement to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to, sagging and warping of panels; rusting and manufacturers defects of grid system.

1.8 EXTRA MATERIALS

Spare tiles of each color shall be furnished at the rate of 5 tiles for each 1000 tiles installed. Tiles shall be from the same lot as those installed.

PART 2 PRODUCTS

2.1 ACOUSTICAL UNITS

Contractor shall comply with EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS. Acoustical units shall conform to ASTM E 1264, Class A, and the following requirements:

2.1.1 Units for Exposed-Grid System ATC-1

Type: III (mineral fiber with painted finish). Type III acoustical units shall have a minimum recycled material content of 18 percent. Units shall withstand minimum 90 percent continuous humidity without sagging.

Minimum NRC: 0.70 when tested on mounting No. E-400

Pattern: C.

Nominal size: 24 by 24 inches.

Edge detail: Angled tegular.

Finish: Factory-applied standard finish.

Minimum LR coefficient: 0.84.

Minimum CAC: 35.

2.1.2 Units for Exposed-Grid System ATC-2

Type: III (mineral fiber with painted finish). Acoustical units shall have a minimum recycled material content of 18 percent.

Minimum NRC: 0.50 when tested on mounting No. E-400.

Pattern: C.

Nominal size: 24 by 24 inches.

Edge detail: square.

Finish: Factory-applied standard finish.

Minimum LR coefficient: 0.85.

Minimum CAC: 35.

2.2 SUSPENSION SYSTEM

Suspension system shall be standard exposed-grid standard width flange, and shall conform to ASTM C 635 for intermediate-duty systems. Surfaces exposed to view shall be aluminum or steel with a factory-applied white baked-enamel finish. Wall molding shall have a flange of not less than 15/16 inch. Inside and outside corner caps shall be provided. Suspended ceiling framing system shall have the capability to support the finished ceiling, light fixtures, air diffusers, and accessories, as shown. The suspension system shall have a maximum deflection of 1/360 of span length. Seismic details shall conform to the guidance in TI 809-04 and ASTM E 580.

2.3 HANGERS

Hangers shall be galvanized steel wire. Hangers and attachment shall support a minimum 300 pound ultimate vertical load without failure of supporting material or attachment.

2.4 ACCESS PANELS

Access panels shall match adjacent acoustical units and shall be designed and equipped with suitable framing and fastenings for removal and replacement without damage. Panel shall be not less than 12 by 12 inches or more than 12 by 24 inches. An identification plate of 0.032 inch thick aluminum, 3/4 inch in diameter, stamped with the letters "AP" and finished the same as the unit, shall be attached near one corner on the face of each access panel.

2.5 OMITTED

2.6 FINISHES

Acoustical units and suspension system members shall have manufacturer's standard textures, patterns and finishes as specified. Ceiling suspension system components shall be treated to inhibit corrosion.

2.7 COLORS AND PATTERNS

Colors and patterns for acoustical units and suspension system components shall be as specified in Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

2.8 CEILING ATTENUATION CLASS AND TEST

Ceiling attenuation class (CAC) range of acoustical units, when required,

shall be determined in accordance with ASTM E 1414. Test ceiling shall be continuous at the partition and shall be assembled in the suspension system in the same manner that the ceiling will be installed on the project. System shall be tested with all acoustical units installed.

PART 3 EXECUTION

3.1 INSTALLATION

Acoustical work shall be provided complete with necessary fastenings, clips, and other accessories required for a complete installation. Mechanical fastenings shall not be exposed in the finished work. Hangers shall be laid out for each individual room or space. Hangers shall be placed to support framing around beams, ducts, columns, grilles, and other penetrations through ceilings. Main runners and carrying channels shall be kept clear of abutting walls and partitions. At least two main runners shall be provided for each ceiling span. Wherever required to bypass an object with the hanger wires, a subsuspension system shall be installed, so that all hanger wires will be plumb.

3.1.1 Suspension System

Suspension system shall be installed in accordance with ASTM C 636 and as specified herein. There shall be no hanger wires or other loads suspended from underside of steel decking.

3.1.1.1 Plumb Hangers

Hangers shall be plumb and shall not press against insulation covering ducts and pipes.

3.1.1.2 Splayed Hangers

Where hangers must be splayed (sloped or slanted) around obstructions, the resulting horizontal force shall be offset by bracing, countersplaying, or other acceptable means.

3.1.2 Wall Molding

Wall molding shall be provided where ceilings abut vertical surfaces. Wall molding shall be secured not more than 3 inches from ends of each length and not more than 16 inches on centers between end fastenings.

3.1.3 Acoustical Units

Acoustical units shall be installed in accordance with the approved installation instructions of the manufacturer. Edges of acoustical units shall be in close contact with metal supports, with each other, and in true alignment. Acoustical units shall be arranged so that units less than one-half width are minimized. Units in exposed-grid system shall be held in place with manufacturer's standard hold-down clips, if units weigh less than 1 psf.

3.2 CEILING ACCESS PANELS

Ceiling access panels shall be located directly under the items which require access.

3.3 CLEANING

Following installation, dirty or discolored surfaces of acoustical units shall be cleaned and left free from defects. Units that are damaged or improperly installed shall be removed and new units provided as directed.

3.4 RECLAMATION PROCEDURES

Ceiling tile, designated for recycling by the Contracting Officer, shall be neatly stacked on 4- by 4-foot pallets not higher than 4 foot. Panels shall be completely dry. Pallets shall then be shrink wrapped and symmetrically stacked on top of each other without falling over. Disposal shall be as directed.

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SECTION 09520

LINEAR METAL CEILINGS

04/99

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-- End of Section Table of Contents --

SAVH-09520 (April 1999)

SECTION 09520

LINEAR METAL CEILINGS
04/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 635	(1995) Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings
ASTM C 636	(1996) Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
ASTM E 84	(1995a) Surface Burning Characteristics of Building Materials

UNDERWRITERS LABORATORIES (UL)

UL Fire Resist Dir	(1997) Fire Resistance Directory (2 Vol)

1.2 GENERAL REQUIREMENTS

Linear metal ceiling system shall consist of metal panels and metal reveal strips mechanically mounted on a ceiling suspension system suitable for exterior use and includes all trim and accessories for a complete finished appearance. The unit size, texture, finish, and color shall be as specified. System shall be Class A flame spread 0-25 in accordance with ASTM E 84 and shall resist both positive and negative wind uplift design pressures of 35 psf. The Contractor shall coordinate the whole ceiling system with other details, like the location of access panels and ceiling penetrations, etc., shown on the drawings. The location and extent of linear metal ceilings shall be as shown on the drawings.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Ceiling System

Drawings showing suspension system, method of anchoring and fastening, details, and reflected ceiling plan.

SD-03 Product Data

Ceiling System

Manufacturer's descriptive data, catalog cuts, and installation instructions.

Fire Resistive Ceilings
Wind Uplift

Reports by an independent testing laboratory attesting that ceiling systems meet specified fire endurance and wind uplift requirements. Data attesting to conformance of the proposed system to Underwriters Laboratories requirements for the fire endurance rating listed in UL Fire Resist Dir may be submitted in lieu of test reports.

SD-04 Samples

Metal Ceiling and Reveal Panels; GA

Two samples of each type of metal panel showing texture, finish, and color.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the site in the manufacturer's original unopened containers with brand name and type clearly marked. Materials shall be carefully handled and stored in dry, watertight enclosures. Immediately before installation, panels shall be stored for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed in order to assure proper temperature and moisture acclimation.

1.5 OMITTED

1.6 SCHEDULING

Mechanical, electrical, and other work above the ceiling line shall be completed prior to ceiling panel installation.

1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

PART 2 PRODUCTS

2.1 CEILING PANELS

Metal ceiling panels shall be factory fabricated of .032 inch thick aluminum with factory painted finish. Metal reveal strips shall be factory painted .032 inch thick aluminum. Both ceiling panels and reveal strips shall be brake formed from a single sheet and shall be factory cut to required length. Panels and strips shall be one piece full length. Seams will be permitted only when required length of span exceeds 16 feet. Panels and strips shall be secured to suspension system so that there are no exposed fasteners. Interlocking panels shall not be permitted. Profile

of system shall be square edged panels with approximately 1/2 inch box depth and reveal strip with reveal strip between all ceiling panels. Combined width of one panel and one reveal strip shall form a 8-inch module. Reveal strip shall be approximately 3/4 inch wide and shall be recessed from the finish ceiling horizontal plane minimum 1/4 inch.

2.2 SUSPENSION SYSTEM

Suspension system shall be manufacturer's standard concealed-grid, and shall conform to ASTM C 635 for intermediate-duty systems. Surfaces exposed to view shall be aluminum with a factory-applied white baked-enamel finish. Mitered corner trim pieces shall be provided. Suspended ceiling framing system shall have the capability to support the finished ceiling, light fixtures, air diffusers, and accessories, as shown. The suspension system shall have a maximum deflection of 1/360 of span length.

2.3 HANGERS

Hangers shall be galvanized steel wire. Rigid bracing struts shall be galvanized steel. Hangers, bracing, and attachment shall support a minimum 300 pound ultimate vertical load without failure of supporting material or attachment and resist anticipated wind uplift.

2.4 ACCESS PANELS

Hinged locking access panels shall match adjacent ceiling panels and shall be designed and equipped with suitable framing and fastenings for operation without damage. Panels shall be size and construction as indicated. Lock shall be of a type that cannot be opened with a screwdriver.

2.5 OMITTED

2.6 FINISHES

Ceiling panels and suspension system members shall have manufacturer's standard textures, patterns and finishes as specified. Ceiling suspension system components shall be treated to inhibit corrosion.

2.7 COLORS AND PATTERNS

Colors and patterns for suspension system components shall be as specified in Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

PART 3 EXECUTION

3.1 INSTALLATION

Work shall be provided complete with necessary fastenings, clips, and other accessories required for a complete installation. Mechanical fastenings shall not be exposed in the finished work. Hangers shall be laid out for each individual room or space. Hangers shall be placed to support framing around beams, ducts, columns, grilles, and other penetrations through ceilings. Main runners and carrying channels shall be kept clear of abutting walls and partitions. At least two main runners shall be provided for each ceiling span. Wherever required to bypass an object with the hanger wires, a subsuspension system shall be installed, so that all hanger wires will be plumb.

3.1.1 Suspension System

Suspension system shall be installed in accordance with ASTM C 636 and as specified herein. There shall be no hanger wires or other loads suspended from underside of steel decking.

3.1.1.1 Plumb Hangers

Hangers shall be plumb and shall not press against insulation covering ducts and pipes.

3.1.1.2 Splayed Hangers

Where hangers must be splayed (sloped or slanted) around obstructions, the resulting horizontal force shall be offset by bracing, countersplaying, or other acceptable means.

3.1.2 Wall Molding

Wall molding shall be provided where ceilings abut vertical surfaces. Wall molding shall be secured not more than 3 inches from ends of each length and not more than 16 inches on centers between end fastenings.

3.1.3 Acoustical Units

Metal panels shall be installed in accordance with the approved installation instructions of the manufacturer. Edges of panels shall be in close contact with metal supports, with each other, and in true alignment.

3.2 CEILING ACCESS PANELS

Ceiling access panels shall be located directly under the items which require access.

3.3 CLEANING

Following installation, dirty or discolored surfaces of acoustical units shall be cleaned and left free from defects. Units that are damaged or improperly installed shall be removed and new units provided as directed.

-- End of Section --

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SAVH-09550 (June 2001)

SECTION 09550

LUMINOUS CEILING
06/01

PART 1 GENERAL

1.1 REFERENCES (Not Applicable)
1.2 GENERAL REQUIREMENTS (Not Applicable)

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Luminous Ceiling

Drawings shall show ceiling plan, material's member size and shape, installation details, suspension system, and method of anchoring and fastening.

SD-03 Product Data

Luminous Ceiling

Manufacturer's descriptive data, catalog cuts indicating materials, fasteners and installation procedures.

SD-04 Samples

Luminous Ceiling

Two 12-inch long samples of main tees, cross tees, perimeter and ridge sections showing finish and color.

1.4 DELIVERY AND STORAGE

All materials shall be delivered to the site free of blemishes, scratches, breakage or other damage. Materials shall be carefully handled and stored in a dry, weathertight enclosure.

PART 2 PRODUCTS

2.1 CEILING STRUCUTRES

Ceiling structure shall consist of prefabricated extruded steel main tees, cross tees, wall angles and perimeter sections. Finished ceiling assembly shall provide a flush ceiling surface to support lighting diffusers.

2.1.1 Main and Cross Tees

Main and cross tees shall be factory fabricated, prepunched and precut tee shaped members.

2.1.2 Wall Angles

Wall angles shall be steel.

2.1.3 Perimeter Sections

Perimeter sections shall be steel.

2.1.4 Hanging Wire

Hanging wire shall be of the material and gauge as recommended by the luminous ceiling manufacturer.

2.2 LIGHTING DIFFUSERS

Lighting diffusers shall be white translucent virgin acrylic. One side of diffuser shall be textured to reduce glare and increase uniform light diffusion. Diffusers shall be factory cut to the proper size.

2.3 FINISH

All exposed steel parts shall be factory finished. Color and finish shall be as indicated in Section 09000 BUILDING FINISH AND COLOR SCHEDULE.

PART 3 EXECUTION

3.1 INSTALLATION

Luminous ceiling installation shall be in accordance with the detailed drawings and the manufacturer's installation instructions. The Contractor shall furnish and install the luminous ceiling assembly including all connector clips, splice plates, fasteners, hangers, brackets or anchorages incidental to or necessary for a complete ceiling installation.

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07/96

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CEGS-09650 (July 1996)

Includes changes through Notice 4 (June 1998)

SECTION 09650

RESILIENT FLOORING
07/96

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4078	(1992; R 1996) Water Emulsion Floor Polish
ASTM E 648	(1997) Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
ASTM E 662	(1995) Specific Optical Density of Smoke Generated by Solid Materials
ASTM F 1066	(1995a) Vinyl Composition Floor Tile
ASTM F 1344	(1993) Rubber Floor Tile

1.2 FIRE RESISTANCE REQUIREMENTS

Flooring in corridors and exits shall have a minimum average critical radiant flux of 0.22 watt in all buildings except in barracks 0.45 watt per square centimeter when tested in accordance with ASTM E 648. The smoke density rating shall be less than 450 when tested in accordance with ASTM E 662.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Resilient Flooring and Accessories

Manufacturer's descriptive data and installation instructions including cleaning and maintenance instructions.

SD-04 Samples

Flooring

Three samples of each indicated color and type of flooring and base. Sample size shall be minimum 2-1/2 x 4 inches.

SD-06 Test Reports

Moisture Test

Copies of test reports showing that representative product samples of the flooring proposed for use have been tested by an independent testing laboratory within the past three years or when formulation change occurred and conforms to the requirements specified.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the building site in original unopened containers bearing the manufacturer's name, project identification, and handling instructions. Materials shall be stored in a clean dry area with temperature maintained above 70 degrees F for 2 days prior to installation, and shall be stacked according to manufacturer's recommendations. Materials shall be protected from the direct flow of heat from hot-air registers, radiators and other heating fixtures and appliances.

1.5 ENVIRONMENTAL REQUIREMENTS

Areas to receive resilient flooring shall be maintained at a temperature above 70 degrees F and below 100 degrees F for 2 days before application, during application and 2 days after application. A minimum temperature of 55 degrees F shall be maintained thereafter.

1.6 SCHEDULING

Resilient flooring application shall be scheduled after the completion of other work which would damage the finished surface of the flooring.

1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

1.8 EXTRA MATERIALS

Extra flooring material of each color and pattern shall be furnished at the rate of five tiles for each 1000 tiles installed. Extra materials shall be from the same lot as those installed. Extra base material composed of 20 linear feet of each color shall be furnished.

PART 2 PRODUCTS

2.1 VINYL-COMPOSITION TILE

*3

Vinyl-composition tile shall conform to ASTM F 1066, Class 2,(through pattern tile), Composition 1, asbestos-free, and shall be 12 inches square ~~and 3/32 inch thick minimum in barracks living/sleeping rooms~~ and 1/8 inch

thick~~ in all other spaces~~. Tile shall have the color and pattern uniformly distributed throughout the thickness of the tile. Flooring in any one continuous area shall be from the same lot and shall have the same shade and pattern.

2.2 OMITTED
2.3 OMITTED

2.4 RUBBER FLOORING

2.4.1 Rubber Tile

Rubber tile shall conform to ASTM F 1344 Class 1 homogeneous construction, Type A (solid color) 18 inches square. Surface shall be raised square studs with chamfered edges. Stud profile shall be low. Overall thickness shall be 1/8 inch thick.

2.5 STAIR TREADS

Treads shall conform to composition vinyl compounded from virgin polymer or copolymer of vinyl chloride resin, plasticized with phosphate or phthalate esters. Overall thickness shall be not less than 3/32 inch. Design shall be either a one piece nosing/tread. Surface of treads shall be raised ribbed pattern.

2.6 RESILIENT BASE

Base shall be manufacturers standard rubber or vinyl, straight style (installed with carpet), coved style (installed with resilient flooring). Base shall be 4 inches high and a minimum 1/8 inch thick. Job formed corners shall be furnished.

2.7 OMITTED
2.8 OMITTED

2.9 TRANSITION STRIP

A vinyl or rubber transition strip tapered to meet abutting material shall be provided.

2.10 ADHESIVE

Adhesive for flooring and wall base shall be as recommended by the flooring manufacturer.

2.11 POLISH

Polish shall conform to ASTM D 4078.

2.12 CAULKING AND SEALANTS

Caulking and sealants shall be in accordance with Section 07900 JOINT SEALING.

2.13 MANUFACTURER'S COLOR AND TEXTURE

Color and texture shall be in accordance with Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

PART 3 EXECUTION

3.1 EXAMINATION/VERIFICATION OF CONDITIONS

The Contractor shall examine and verify that site conditions are in agreement with the design package and shall report all conditions that will prevent a proper installation. The Contractor shall not take any corrective action without written permission from the Government.

3.2 SURFACE PREPARATION

Flooring shall be in a smooth, true, level plane, except where indicated as sloped. Before any work under this section is begun, all defects such as rough or scaling concrete, low spots, high spots, and uneven surfaces shall have been corrected, and all damaged portions of concrete slabs shall have been repaired as recommended by the flooring manufacturer. Concrete curing compounds, other than the type that does not adversely affect adhesion, shall be entirely removed from the slabs. Paint, varnish, oils, release agents, sealers, waxers, and adhesives shall be removed, as recommended by the flooring manufacturer.

3.3 MOISTURE TEST

The suitability of the concrete subfloor for receiving the resilient flooring with regard to moisture content shall be determined by a moisture test as recommended by the flooring manufacturer.

3.4 INSTALLATION OF VINYL-COMPOSITION TILE

Tile flooring shall be installed with adhesive in accordance with the manufacturer's installation instructions. Tile lines and joints shall be kept square, symmetrical, tight, and even. Edge width shall vary as necessary to maintain full-size tiles in the field, but no edge tile shall be less than one-half the field tile size, except where irregular shaped rooms make it impossible. Flooring shall be cut to, and fitted around, all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Edge tile shall be cut, fitted, and scribed to walls and partitions after field flooring has been applied.

3.5 OMITTED
3.6 OMITTED
3.7 OMITTED

3.8 INSTALLATION OF RESILIENT BASE

Wall base shall be installed with adhesive in accordance with the manufacturer's written instructions. Base joints shall be tight and base shall be even with adjacent resilient flooring. Voids along the top edge of base at masonry walls shall be filled with caulk.

3.9 INSTALLATION OF TREADS

Stair treads shall be installed with adhesive in accordance with the manufacturer's written installation instructions. Treads and risers shall cover the full width of the stairs. Stairs wider than manufacturer's standard lengths shall have equal length pieces butted together to cover the treads.

3.10 OMITTED

3.11 CLEANING

Immediately upon completion of installation of tile in a room or an area, flooring and adjacent surfaces shall be cleaned to remove all surplus adhesive. After installation, flooring shall be washed with a cleaning solution, rinsed thoroughly with clear cold water, and, except for raised pattern rubber flooring and rubber stair treads, given two coats of polish in accordance with manufacturers written instructions. After each polish coat, floors shall be buffed to an even luster with an electric polishing machine. Raised pattern rubber flooring and rubber stair treads shall be cleaned and maintained as recommended by the manufacturer.

3.12 PROTECTION

From the time of laying until acceptance, flooring shall be protected from damage as recommended by the flooring manufacturer. Flooring which becomes damaged, loose, broken, or curled shall be removed and replaced.

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CARPET

05/01

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UFGS-09680A (May 2001)

SECTION 09680A

CARPET
05/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC TM 16	(1998) Test Method: Colorfastness to Light
AATCC TM 134	(1996) Test Method: Electrostatic Propensity of Carpets
AATCC TM 165	(1999) Test Method: Colorfastness to Crocking: Carpets - AATCC Crockmeter Method

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 418	(1993; R 1997) Pile Yarn Floor Covering Construction
ASTM D 1423	(1999) Twist in Yarns by the Direct-Counting Method
ASTM D 3278	(1996el) Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus
ASTM D 5252	(1998a) Practice for the Operation of the Hexapod Tumble Drum Tester
ASTM D 5417	(1999) Practice for Operation of the Vettermann Drum Tester
ASTM E 648	(2000) Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

CARPET AND RUG INSTITUTE (CRI)

CRI 104	(1996) Commercial Carpet Installation Standard

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR 1630	Standard for the Surface Flammability of Carpet and Rugs (FF 1-70)

40 CFR 247 Comprehensive Procurement Guideline for Products Containing Recovered Materials

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation
Molding

Three copies of drawings indicating areas receiving carpet, carpet types, textures and patterns, direction of pile, location of seams, and locations of edge molding.

SD-03 Product Data

Carpet

Manufacturer's catalog data and printed documentation stating physical characteristics, durability, resistance to fading, and flame resistance characteristics for each type of carpet material and installation accessory.

Surface Preparation
Installation

Three copies of the manufacturer's printed installation instructions for the carpet, including preparation of substrate, seaming techniques, and recommended adhesives and tapes.

Regulatory Requirements

Three copies of report stating that carpet contains recycled materials and/or involvement in a recycling or reuse program. Report shall include percentage of recycled material.

SD-04 Samples

Carpet; G, ED
Molding

a. Carpet: Two "Production Quality" samples 18 x 18 inches of each carpet proposed for use, showing quality, pattern, and color specified.

b. Vinyl Moldings: Two pieces of each type at least 12 inches long.

c. Special Treatment Materials: Two samples showing system and installation method.

SD-06 Test Reports

Moisture and Alkalinity Tests

Three copies of test reports of moisture and alkalinity content of concrete slab stating date of test, person conducting the test, and the area tested.

SD-07 Certificates

Carpet

Certificates of compliance from a laboratory accredited by the National Laboratory Accreditation Program of the National Institute of Standards and Technology attesting that each type of carpet and carpet with cushion material conforms to the standards specified.

Regulatory Requirements

Report stating that the carpet contains recycled materials and indicating the actual percentage of recycled material.

SD-10 Operation and Maintenance Data

Carpet
Cleaning and Protection

Three copies of carpet manufacturer's maintenance instructions describing recommended type of cleaning equipment and material, spotting and cleaning methods, and cleaning cycles.

1.3 REGULATORY REQUIREMENTS

Carpet and adhesives shall bear the Carpet and Rug Institute (CRI) Indoor Air Quality (IAQ) label or demonstrate compliance with testing criteria and frequencies through independent laboratory test results. Carpet type bearing the label will indicate that the carpet has been tested and meets the criteria of the CRI IAQ Carpet Testing Program, and minimizes the impact on indoor air quality. Contractor shall procure carpet in accordance with 40 CFR 247. Carpet shall conform to EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS. Where possible, product shall be purchased locally to reduce emissions of fossil fuels from transporting.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the site in the manufacturer's original wrappings and packages clearly labeled with the manufacturer's name, brand name, size, dye lot number, and related information. Materials shall be stored in a clean, dry, well ventilated area, protected from damage and soiling, and shall be maintained at a temperature above 60 degrees F for 2 days prior to installation.

1.5 ENVIRONMENTAL REQUIREMENTS

Areas in which carpeting is to be installed shall be maintained at a temperature above 60 degrees F for 2 days before installation, during installation, and for 2 days after installation. A minimum temperature of 55 degrees F shall be maintained thereafter for the duration of the

contract. Traffic or movement of furniture or equipment in carpeted area shall not be permitted for 24 hours after installation. Other work which would damage the carpet shall be completed prior to installation of carpet.

1.6 WARRANTY

Manufacturer's standard performance guarantees or warranties including minimum 10-year wear warranty, 2-year material and workmanship and 10-year tuft bind and delamination.

1.7 EXTRA MATERIAL

Extra material from same dye lot consisting of full width continuous broadloom shall be provided for future maintenance. A minimum of 1 percent of total square yards of each carpet type, pattern, and color shall be provided.

PART 2 PRODUCTS

2.1 CARPET TYPE CPT-1

Carpet shall be first quality; free of visual blemishes, streaks, poorly dyed areas, fuzzing of pile yarn, spots or stains, and other physical and manufacturing defects. Carpet materials and treatments shall be reasonably nonallergenic and free of other recognized health hazards. All grade carpets shall have a static control construction which gives adequate durability and performance.

2.1.1 Physical Characteristics

Carpet shall comply with the following:

a. Omitted.

b. Carpet Construction: Tufted.

c. Type: Broadloom 12 feet minimum usable carpet width with exception of corridors.

d. Pile Type: Level-loop.

e. Pile Fiber: Commercial 100% branded (federally registered trademark) nylon continuous filament type 6.6.

f. Pile or Wire Height: Minimum 0.114 inch in accordance with ASTM D 418.

g. Yarn Ply: Minimum 2 in accordance with ASTM D 1423.

h. Gauge or Pitch: Minimum 1/10 inch in accordance with ASTM D 418.

i. Omitted.

j. Finished Pile Yarn Weight: Minimum 26 ounces per square yard. This does not include weight of backings. Weight shall be determined in accordance with ASTM D 418.

k. Pile Density: Minimum 8,211.

l. Dye Method: Yarn (or Skein) dyed.

m. Backing Materials: Primary backing materials shall be those customarily used and accepted by the trade for each type of carpet. Secondary backing to suit project requirements shall be those customarily used and accepted by the trade for each type of carpet, except when a special unitary back designed for gluedown is provided.

2.1.2 Performance Requirements

a. ARR (Appearance Retention Rating): Carpet shall be tested and have the minimum 3.5-4.0 (Severe) ARR when tested in accordance with either the ASTM D 5252 (Hexapod) or ASTM D 5417 (Vettermann) test methods using the number of cycles for short and long term tests as specified.

b. Static Control: Static control shall be provided to permanently control static buildup to less than 3.5 kV when tested at 20 percent relative humidity and 70 degrees F in accordance with AATCC TM 134.

c. Flammability and Critical Radiant Flux Requirements: Carpet shall comply with 16 CFR 1630. Carpet in corridors and exits shall have a minimum average critical radiant flux of 0.22 watts per square centimeter when tested in accordance with ASTM E 648.

d. Tuft Bind: Tuft bind force required to pull a tuft or loop free from carpet backing shall be a minimum 10 pound average force for loop pile.

e. Colorfastness to Crocking: Dry and wet crocking shall comply with AATCC TM 165 and shall have a Class 4 minimum rating on the AATCC Color Transference Chart for all colors.

f. Colorfastness to Light: Colorfastness to light shall comply with AATCC TM 16, Test Option E "Water-Cooled Xenon-Arc Lamp, Continuous Light" and shall have a minimum 4 grey scale rating after 40 hours.

g. Delamination Strength: Delamination strength for tufted carpet with a secondary back shall be minimum of 2.5 lbs./inch.

2.1.3 Carpet Type CPT-2

Carpet shall be first quality; free of visual blemishes, streaks, poorly dyed areas, fuzzing of pile yarn, spots or stains, and other physical and manufacturing defects. Carpet materials and treatments shall be reasonably nonallergenic and free of other recognized health hazards. All grade carpets shall have a static control construction which gives adequate durability and performance.

2.1.3.1 Physical Characteristics

Carpet shall comply with the following:

a. Omitted.

b. Carpet Construction: Tufted.

c. Type: Broadloom 12 feet minimum usable carpet width with exception of corridors.

d. Pile Type: Level-loop.

e. Pile Fiber: Commercial 100% branded (federally registered trademark) nylon continuous filament type 6, 6.

f. Pile or Wire Height: Minimum 0.154 inch in accordance with ASTM D 418.

g. Yarn Ply: Minimum 2 in accordance with ASTM D 1423.

h. Gauge or Pitch: Minimum 1/10 inch in accordance with ASTM D 418.

i. Stitches or Rows/Wires: Minimum 10 per square inch.

j. Finished Pile Yarn Weight: Minimum 28 ounces per square yard. This does not include weight of backings. Weight shall be determined in accordance with ASTM D 418.

k. Pile Density: Minimum 6.545 oz/sq^2.

l. Dye Method: Solution dyed.

m. Backing Materials: Primary backing materials shall be those customarily used and accepted by the trade for each type of carpet. Secondary backing to suit project requirements shall be those customarily used and accepted by the trade for each type of carpet, except when a special unitary back designed for gluedown is provided.

2.1.3.2 Performance Requirements

a. ARR (Appearance Retention Rating): Carpet shall be tested and have the minimum 3.5-4.0 (Severe) ARR when tested in accordance with either the ASTM D 5252 (Hexapod) or ASTM D 5417 (Vettermann) test methods using the number of cycles for short and long term tests as specified.

b. Static Control: Static control shall be provided to permanently control static buildup to less than 3.5 kV when tested at 20 percent relative humidity and 70 degrees F in accordance with AATCC TM 134.

c. Flammability and Critical Radiant Flux Requirements: Carpet shall comply with 16 CFR 1630. Carpet in corridors and exits shall have a minimum average critical radiant flux of 0.22 watts per square centimeter when tested in accordance with ASTM E 648.

d. Tuft Bind: Tuft bind force required to pull a tuft or loop free from carpet backing shall be a minimum 10 pound average force for loop pile.

e. Colorfastness to Crocking: Dry and wet crocking shall comply with AATCC TM 165 and shall have a Class 4 minimum rating on the AATCC Color Transference Chart for all colors.

f. Colorfastness to Light: Colorfastness to light shall comply with AATCC TM 16, Test Option E "Water-Cooled Xenon-Arc Lamp, Continuous Light" and shall have a minimum 4 grey scale rating after 40 hours.

g. Delamination Strength: Delamination strength for tufted carpet with a secondary back shall be minimum of 2.5 lbs./inch.

2.2 ADHESIVES AND CONCRETE PRIMER

Adhesives and concrete primers for installation of carpet shall be waterproof, nonflammable, meet local air-quality standards, and shall be as required by the carpet manufacturer. Seam adhesive shall be waterproof, nonflammable, and nonstaining as recommended by the carpet manufacturer. Adhesives flashpoint shall be minimum 140 degrees F in accordance with ASTM D 3278.

2.3 MOLDING

Vinyl molding shall be heavy-duty and designed for the type of carpet being installed. Floor flange shall be a minimum 2 inches wide.

2.4 TAPE

Tape for seams shall be as recommended by the carpet manufacturer for the type of seam used in installation.

2.5 COLOR, TEXTURE, AND PATTERN

Color, texture, and pattern shall be in accordance with Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Carpet shall not be installed on surfaces that are unsuitable and will prevent a proper installation. Holes, cracks, depressions, or rough areas shall be repaired using material recommended by the carpet or adhesive manufacturer. Floor shall be free of any foreign materials and swept broom clean. Before beginning work, subfloor shall be tested with glue and carpet to determine "open time" and bond.

3.2 MOISTURE AND ALKALINITY TESTS

Concrete slab shall be tested for moisture content and excessive alkalinity in accordance with CRI 104.

3.3 PREPARATION OF CONCRETE SUBFLOOR

Installation of the carpeting shall not commence until concrete substrate is at least 90 days old. The concrete surfaces shall be prepared in accordance with instructions of the carpet manufacturer. Type of concrete sealer, when required, shall be compatible with the carpet.

3.4 INSTALLATION

All work shall be performed by installers who are CFI certified (International Certified Floorcovering Installer Association), or

manufacturer's approved installers. Installation shall be in accordance with the manufacturer's instructions and CRI 104. Edges of carpet meeting hard surface flooring shall be protected with molding; installation shall be in accordance with the molding manufacturer's instructions.

3.4.1 Broadloom Installation

Broadloom carpet shall be installed direct glue down and shall be smooth, uniform, and secure, with a minimum of seams. Seams shall be uniform, unnoticeable, and treated with a seam adhesive. Side seams shall be run toward the light where practical and where such layout does not increase the number of seams. Breadths shall be installed parallel, with carpet pile in the same direction. Patterns shall be accurately matched. Cutouts, as at door jambs, columns and ducts shall be neatly cut and fitted securely. Seams at doorways shall be located parallel to and centered directly under doors. Seams shall not be made perpendicular to doors or at pivot points. Seams at changes in directions of corridors shall follow the wall line parallel to the carpet direction. Corridors with widths less than 6 feet shall have the carpet laid lengthwise down the corridors.

3.5 CLEANING AND PROTECTION

3.5.1 Cleaning

After installation of the carpet, debris, scraps, and other foreign matter shall be removed. Soiled spots and adhesive shall be removed from the face of the carpet with appropriate spot remover. Protruding face yarn shall be cut off and removed. Carpet shall be vacuumed clean.

3.5.2 Protection

The installed carpet shall be protected from soiling and damage with heavy, reinforced, nonstaining kraft paper, plywood, or hardboard sheets. Edges of kraft paper protection shall be lapped and secured to provide a continuous cover. Traffic shall be restricted for at least 45 hours. Protective covering shall be removed when directed by the Contracting Officer.

3.6 REMNANTS

Remnants remaining from the installation, consisting of scrap pieces more than 2 feet in dimension with more than 6 square feet total, shall be provided. Non-retained scraps shall be removed from site and recycled appropriately.

-- End of Section --

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SECTION 09720A

WALLCOVERINGS

04/01

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PART 3 EXECUTION

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3.3.2 Fabric Wallcovering
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-- End of Section Table of Contents --

UFGS-09720A (April 2001)

SECTION 09720A

WALLCOVERINGS
04/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 84	(1999) Surface Burning Characteristics of Building Materials

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Wallcoverings
Manufacturer's Instructions

Manufacturer's descriptive data, documentation stating physical characteristics, flame resistance, mildew and germicidal characteristics.

Installation

Preprinted installation instructions for wallcovering and accessories.

Maintenance
Clean-Up

Preprinted cleaning and maintenance instructions for wallcovering and accessories.

SD-04 Samples

Wallcoverings; G, ED

Three samples of each indicated type, pattern, and color of wallcovering. Samples of wall covering shall be minimum 5 x 7 inches and of sufficient size to show pattern repeat. Three samples of each indicated type corner guard and wainscot cap.

SD-07 Certificates

Wallcoverings

Manufacturer's statement attesting that the product furnished meets or exceeds specification requirements. The statement must; be dated after the award of the contract, state Contractor's name and address, name the project and location, and list the requirements being certified.

1.3 DELIVERY AND STORAGE

Materials shall be delivered to the site in manufacturers original unopened containers labeled with manufacturers name, pattern, texture, size and related information. Materials shall be stored in accordance with the manufacturer's instructions in a clean dry ventilated area with temperature maintained above 60 degrees F for two days prior to installation.

1.4 ENVIRONMENTAL REQUIREMENTS

Areas to receive wallcovering shall be maintained at a temperature above 60 degrees F for 7 days before, during, and 7 days after application.

1.5 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one-year period shall be provided.

1.6 EXTRA MATERIALS

Extra material from the same dye lot consisting of 0.5 yard of full-width wallcovering for each 30 linear yards of wallcovering installed shall be provided for maintenance.

PART 2 PRODUCTS

2.1 WALLCOVERINGS

Wallcoverings shall be material designed specifically for the specified use. The wallcovering shall contain a non-mercury based mildewcide. The wallcovering shall be type made without the use of cadmium based stabilizers. Wallcovering shall have a Class A flame spread rating of 0-25 and smoke development rating of 0-50 when tested in accordance with ASTM E 84.

2.1.1 Omitted
2.1.2 Omitted
2.1.3 Omitted
2.1.4 Omitted

2.1.5 Sisal Wallcovering

Sisal wallcovering shall be composed of 100 percent natural sisal yarn of woven boucle style construction. Pile height shall be minimum 3/16 inch and the weight shall be minimum 48 ounces per square yard. Widths shall be 96 inches, 108 inches and 144 inches. Wallcovering shall be Class A in accordance with ASTM E 84 with minimum flame spread rating of 25 and minimum smoke developed rating of 50.

2.2 OMITTED
2.3 OMITTED

2.4 WAINSCOT CAP

Wainscot cap shall be wood as detailed on drawings.

2.5 PRIMER AND ADHESIVE

Primer and adhesive shall be of a type recommended by the wallcovering manufacturer and shall contain a non-mercury based mildewcide. Adhesive shall be strippable type. Adhesive to install cap shall be of a type recommended by the manufacturer of the wainscot cap.

2.6 COLOR, TEXTURE, AND PATTERN

Color, texture, and pattern shall be in accordance with Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

PART 3 EXECUTION

3.1 EXAMINATION

Contractor shall inspect all areas and conditions under which wallcoverings are to be installed. Contractor shall notify in writing of any conditions detrimental to the proper and timely completion of the installation. Work will proceed only when conditions have been corrected and accepted by the installer.

3.2 SURFACE PREPARATION

Wallcovering shall not be applied to surfaces that are rough, that contain stains that will bleed through the wallcovering, or that are otherwise unsuitable for proper installation. Cracks and holes shall be filled and rough spots shall be sanded smooth. Surfaces to receive wallcovering shall be thoroughly dry. Surface of walls shall be primed as required by manufacturer's instructions to permit ultimate removal of wallcovering from the wall surface. Primer shall be allowed to completely dry before adhesive application.

3.3 INSTALLATION

3.3.1 Omitted

3.3.2 Fabric Wallcovering

Wallcovering shall be installed in accordance with the manufacturer's installation instructions. Glue and adhesive spillage shall be immediately removed from wallcovering face and seams with a remover recommended by the manufacturer. After the installation is complete, the fabric wallcovering shall be vacuumed with a ceiling to floor motion.

3.3.3 Wainscot Cap

Wainscot cap shall be installed where shown on the drawings and in accordance with the manufacturer's printed instructions.

3.4 CLEAN-UP

Upon completion of the work, wallcovering shall be left clean and free of dirt or soiling. Surplus materials, rubbish, and debris resulting from the wallcovering installation shall be removed and area shall be left clean.

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SECTION 09836

MULTI-COLOR TEXTURED INTERIOR COATING
02/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1308	(1987) Effect of Household Chemicals on Clear and Pigmented Organic Finishes

FEDERAL STANDARD (FED-STD)

FED-STD 141	(Rev. C) Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling, and Testing (Test Methods No. 6141.1 (Washability), No. 6142 (Scrub Resistance), and No. 6271.2 (Mildew Resistance)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Manufacturer's Catalog Data

Furnish manufacturer's catalog data describing all materials, coating mixing and preparation, and substrate preparation and application instructions for each type of substrate. Data shall include evidence of performance of ASTM D 1308 and FED-STD 141 tests.

SD-04 Samples

Color Samples; G

Color samples, minimum 6 inches square, of each color, texture, and pattern specified.

Sample Panel; G

Prepare a mock-up area not to exceed 100 square feet for each coating on each type of substrate specified for approval. The approved mock-up shall establish a quality of work for the color, pattern, and texture, and will be used in judging the completed work. Mockup(s) shall be retained and protected in undisturbed condition until the work is completed and approved. Mockups may be a part of the completed work provided their locations are noted on the drawings.

SD-07 Certificates

Qualifications

Certification that the applicator is duly trained by the manufacturer in the application of the product to be installed and that the applicator has worked on installations of comparable type and size.

SD-10 Operation and Maintenance Data

Maintenance Data

Preprinted general maintenance and cleaning instructions for the finished coating(s).

1.3 QUALITY ASSURANCE

Each coat shall be inspected and accepted by the Contracting Officer prior to the application of succeeding coats. The Contracting Officer will determine whether full-coat coverage (film continuity) has been achieved and that the coating is pin-hole free.

1.3.1 Sample Panel Testing

After the coating system has dried but not less than 48 hours after application of the final coat, and in the presence of the Contracting Officer, the Contractor shall perform, at the direction of the Contracting Officer, one or both of the following tests:

a. Test No. 1: The Contractor shall wipe an area with a cloth saturated with mercurochrome solution. After the mercurochrome has dried, remove the resulting stain with liquid household cleaner. Any deficiencies in the coating film will be marked by residual mercurochrome.

b. Test No. 2: The Contractor shall draw a 6 inch line with a water-based felt pen across the coated surface and then wipe it off. Formation of small dots on the wall by the ink reveals that only the pattern coat had been applied.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

Deliver the products in the original containers, with seals unbroken, bearing factory-applied labels intact. Store the materials in the designated locations. Keep these areas well ventilated and observe precautions to avoid danger of fire. Provide approved type fire extinguishers. Maintain temperature of storage areas at not less than 50 degrees F. for at least 48 hours prior to application. Products shall not be exposed to freezing temperatures.

1.5 JOB CONDITIONS AND COORDINATION

1.5.1 Temperature of Work Area

Maintain temperature of work areas between 50 degrees F and 95 degrees F, 24 hours before the application of the material and until the finish has cured and set. Provide adequate ventilation to prevent mildew and improper drying. Prevent wide variation of temperature which might result in condensation on freshly coated surfaces.

1.5.2 Illumination

All applications of the coatings shall occur under the ambient illumination specified for the area.

1.5.3 Cleaning of Work Area

Before application is started in any area, broom clean and remove excessive dust from the area. After application is started, cleaning shall be done with vacuum cleaning equipment only.

1.5.4 Coordination

Schedule and coordinate the work with other trades. Application shall be scheduled after the completion of all other work which would damage the finished surfaces.

PART 2 PRODUCTS

2.1 MULTI-COLOR TEXTURED COATING MATERIAL

Multi-color tone-on-tone, textured, spray-on coating shall consist of two plastic copolymer coats incorporating a high resistance to fungus, mildew, alkalinity, soil and abrasion. The second coat shall be polychromatic, consisting of "beads" of copolymer pigments, suspended in a chemically treated aqueous solution, which rupture and splatter their contents upon contact with the surface. The coating shall have a flame spread of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with ASTM E 84. The coating system shall have been tested to and passed the tests specified in ASTM D 1308 and FED-STD 141, Test Methods 6141.1, 6142, and 6271. Provide ready mixed textured coating materials. Job tinting and mixing is not acceptable.

2.1.1 Color, Pattern, and Texture

Color, pattern, and texture of the background and pattern coats shall be as scheduled in Section 09000 BUILDING COLOR AND FINISH SCHEDULE. Sheen shall be eggshell.

2.2 PRIMER

Primer shall be as recommended by manufacturer.

PART 3 EXECUTION

3.1 INSPECTION AND ACCEPTANCE OF SURFACES

Follow manufacturer's instructions carefully and apply materials only to the surfaces which are acceptable. Application of the coating materials shall constitute acceptance of the surface, and shall obligate the

Contractor for any repairs that are necessary to repair any unsatisfactory finish.

3.2 PREPARATION OF SURFACES

3.2.1 Cleaning of Surfaces

Clean, dry, and adequately protect from dampness the surfaces to be coated. Remove and neutralize mildew. Surfaces shall be smooth, even, true to plane, and free of any flaking, unsound coatings, foreign material, or defects which will adversely affect adhesion or appearance of the applied coating. Fill cracks.

3.2.2 Adjacent Surfaces

Prior to surface preparation and application operations, completely mask, remove, or otherwise adequately protect hardware, accessories, machined surfaces, plates, lighting fixtures, and similar items in contact with the coated surfaces that are not scheduled to receive the textured coating.

3.3 EQUIPMENT

Conventional air spray gun(s) with an internal mix air nozzle assembly shall be used. Airless atomization and external mix air nozzles are not permitted. The compressor shall be of adequate size to provide the necessary volume of air to the spray gun on a continuous basis.

3.4 APPLICATION

Application shall be in accordance with the manufacturer's printed recommendations and instructions, this section, and Section 09900 PAINTING, GENERAL and shall be the same as that used for the approved sample panel. The multi-color textured coating system shall consist of a primer coat followed by a high pressure sprayed-on covering coat (background coat) and a final low-pressure coat (pattern coat) to achieve the multi-color final appearance. Primer coat shall be the type recommended by the manufacturer and shall be applied in as many coats as required to produce a uniform appearance. The high pressure sprayed-on covering coat shall be applied with air pressure higher than fluid pressure in a continuous uniform film to completely cover the primer. The lower pressure or pattern coat shall be applied immediately after the background coat with an air pressure lower than the fluid pressure. The finished appearance shall be equivalent to the approved samples and mock-up(s), free from sags, voids, and excessive tactile texture, and be uniform in pattern and sheen. All touch up and repair work shall be accomplished prior to final acceptance.

3.5 PROTECTION AND CLEAN UP

Protect the adjacent work and materials by suitable covering or other method, during application of the coating. Provide temporary closure as required to confine the spray operation to prevent air pollution of the surrounding environment. Upon completion of the work, remove spots of coating material from floors, glass, and other surfaces. Repair and recoat damaged surfaces.

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SECTION 09900

PAINTS AND COATINGS
09/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH TLV-BKLT	(1991-1992) Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)
ACGIH TLV-DOC	Documentation of Threshold Limit Values and Biological Exposure Indices

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 235	Standard Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)
ASTM D 523	(1999) Standard Test Method for Specular Gloss
ASTM D 2092	(1995) Preparation of Zinc-Coated (Galvanized) Steel Surfaces for Painting
ASTM D 4263	(1983; R 1999) Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM F 1869	(1998) Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.1000	Air Contaminants

FEDERAL STANDARDS (FED-STD)

FED-STD-313	(Rev. C) Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

MASTER PAINTERS INSTITUTE (MPI)

MPI 4	(2001) Interior/Exterior Latex Block Filler

MPI 13	(2001) Exterior Semi-Transparent Stain (Solvent Based)
MPI 23	(2001) Surface Tolerant Metal Primer
MPI 44	Interior Latex, Gloss Level 2
MPI 45	(2001) Interior Primer Sealer
MPI 47	(2001) Interior Alkyd, Semi-Gloss
MPI 50	(2001) Interior Latex Primer Sealer
MPI 52	(2001) Interior Latex, Gloss Level 3
MPI 57	(2001) Interior Oil Modified Clear Urethane, Satin
MPI 79	(2001) Marine Alkyd Metal Primer
MPI 90	(2001) Interior Wood Stain, Semi-Transparent
MPI 94	(2001) Exterior Alkyd, Semi-Gloss
MPI 95	(2001) Fast Drying Metal Primer
MPI 107	(2001) Rust Inhibitive Primer (Water-Based)
MPI 110	(2001) Interior/Exterior High Performance Acrylic
MPI 134	(2001) Waterborne Galvanized Primer
MPI 139	(2001) High Performance Latex, White and Tints - MPI Gloss Level 3
MPI 141	(2001) High Performance Semigloss Latex, White and Tints - Gloss Level 5

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS-EPP-SP01-01	(2001) Environmentally Preferable Product Specification for Architectural and Anti-Corrosive Paints

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC PA 1	(2000) Shop, Field, and Maintenance Painting
SSPC PA 3	(1995) Safety in Paint Application
SSPC VIS 1	(1989) Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs)
SSPC VIS 3	(1993) Visual Standard for Power- and

	Hand-Tool Cleaned Steel (Standard Reference Photographs)
SSPC VIS 4	(2001) Guide and Reference Photographs for Steel Surfaces Prepared by Waterjetting
SSPC SP 1	(1982) Solvent Cleaning
SSPC SP 2	(1995) Hand Tool Cleaning
SSPC SP 3	(1995) Power Tool Cleaning
SSPC SP 6	(1994) Commercial Blast Cleaning
SSPC SP 7	(1994) Brush-Off Blast Cleaning
SSPC SP 10	(1994) Near-White Blast Cleaning
SSPC SP 12	(1995) Surface Preparation and Cleaning of Steel and Other Hard Materials by High-and Ultra high-Pressure Water Jetting Prior to Recoating

1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

Samples of specified materials may be taken and tested for compliance with specification requirements.

In keeping with the intent of Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition", products certified by SCS as meeting SCS-EPP-SP01-01 shall be given preferential consideration over registered products. Products that are registered shall be given preferential consideration over products not carrying any EPP designation.

SD-02 Shop Drawings

Piping identification

Submit color stencil codes

SD-03 Product Data

Coating

Manufacturer's Technical Data Sheets

Sealant

SD-04 Samples

Color

Submit manufacturer's samples of paint colors. Cross reference color samples to color scheme as indicated.

SD-07 Certificates

Applicator's qualifications

Qualification Testing laboratory for coatings

SD-08 Manufacturer's Instructions

Application instructions

Mixing

Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats.

Manufacturer's Material Safety Data Sheets

Submit manufacturer's Material Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.

SD-10 Operation and Maintenance Data

Coatings

Preprinted cleaning and maintenance instructions for all coating systems shall be provided.

1.3 APPLICATOR'S QUALIFICATIONS

1.3.1 Contractor Qualification

Submit the name, address, telephone number, FAX number, and e-mail address of the contractor that will be performing all surface preparation and coating application. Submit evidence that key personnel have successfully performed surface preparation and application of coatings on a minimum of three similar projects within the past 3 years. List information by individual and include the following:

a. Name of individual and proposed position for this work.

b. Information about each previous assignment including:

Position or responsibility

Employer (if other than the Contractor)

Name of facility owner

Mailing address, telephone number, and telex number (if non-US) of

facility owner

Name of individual in facility owner's organization who can be contacted as a reference

Location, size and description of structure

Dates work was carried out

Description of work carried out on structure

1.4 QUALITY ASSURANCE

1.4.1 Field Samples and Tests

The Contracting Officer may choose up to two coatings that have been delivered to the site to be tested at no cost to the Government. Take samples of each chosen product as specified in the paragraph "Sampling Procedures." Test each chosen product as specified in the paragraph "Testing Procedure." Products which do not conform, shall be removed from the job site and replaced with new products that confrom to the referenced specification. Testing of replacement products that failed initial testing shall be at no cost to the Government.

1.4.1.1 Sampling Procedure

The Contracting Officer will select paint at random from the products that have been delivered to the job site for sample testing. The Contractor shall provide one quart samples of the selected paint materials. The samples shall be taken in the presence of the Contracting Officer, and labeled, identifying each sample. Provide labels in accordance with the paragraph "Packaging, Labeling, and Storage" of this specification.

1.4.1.2 Testing Procedure

Provide Batch Quality Conformance Testing for specified products, as defined by and performed by MPI. As an alternative to Batch Quality Conformance testing, the Contractor may provide Qualification Testing for specified products above to the appropriate MPI product specification, using the third-party laboratory approved under the paragraph "Qualification Testing" laboratory for coatings. The qualification testing lab report shall include the backup data and summary of the test results. The summary shall list all of the reference specification requirements and the result of each test. The summary shall clearly indicate whether the tested paint meets each test requirement. Note that Qualification Testing may take 4 to 6 weeks to perform, due to the extent of testing required.

Submit name, address, telephone number, FAX number, and e-mail address of the independent third party laboratory selected to perform testing of coating samples for compliance with specification requirements. Submit documentation that laboratory is regularly engaged in testing of paint samples for conformance with specifications, and that employees performing testing are qualified. If the Contractor chooses MPI to perform the Batch Quality Conformance testing, the above submittal information is not required, only a letter is required from the Contractor stating that MPI will perform the testing.

1.5 REGULATORY REQUIREMENTS

1.5.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Contracting Officer of any paint specified herein which fails to conform.

1.5.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

1.5.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

1.5.4 Asbestos Content

Materials shall not contain asbestos.

1.5.5 Mercury Content

Materials shall not contain mercury or mercury compounds.

1.5.6 Silica

Abrasive blast media shall not contain free crystilline silica.

1.5.7 Human Carcinogens

Materials shall not contain ACGIH TLV-BKLT and ACGIH TLV-DOC confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.6 PACKAGING, LABELING, AND STORAGE

Paints shall be in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name and address of manufacturer. Pigmented paints shall be furnished in containers not larger than 5 gallons. Paints and thinners shall be stored in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 40 to 95 degrees F.

1.7 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in Section 01525,"Safety Requirements" and in Appendix A of COE EM-385-1-1. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.7.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC PA 3.

1.7.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

a. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.

b. 29 CFR 1910.1000.

c. ACGIH TLV-BKLT, threshold limit values.

1.8 ENVIRONMENTAL CONDITIONS

1.8.1 Coatings

Do not apply coating when air or substrate conditions are:

a. Less than 5 degrees F above dew point;

b. Below 50 degrees F or over 95 degrees F, unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

1.9 COLOR SELECTION

Colors of finish coats shall be as indicated or specified. Where not indicated or specified, colors shall be selected by the Contracting Officer. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements.

Tint each coat progressively darker to enable confirmation of the number of coats.

Color, texture, and pattern of wall coating systems shall be in accordance with Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

1.10 LOCATION AND SURFACE TYPE TO BE PAINTED

1.10.1 Painting Included

Where a space or surface is indicated to be painted, include the following unless indicated otherwise.

a. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.

b. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.

c. Existing coated surfaces that are damaged during performance of the work.

1.10.1.1 Exterior Painting

Includes new surfaces, existing coated surfaces, and existing uncoated surfaces, of the buildings and appurtenances as indicated. Also included are existing coated surfaces made bare by cleaning operations.

1.10.1.2 Interior Painting

Includes new surfaces, existing uncoated surfaces, and existing coated surfaces of the buildings and appurtenances as indicated and existing coated surfaces made bare by cleaning operations. Where a space or surface is indicated to be painted, include the following items, unless indicated otherwise.

a. Exposed columns, girders, beams, joists, and metal deck; and

b. Other contiguous surfaces.

1.10.2 Painting Excluded

Do not paint the following unless indicated otherwise.

a. Surfaces concealed and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place.

b. Surfaces in concealed spaces. Concealed spaces are defined as enclosed spaces above suspended ceilings, furred spaces, attic spaces, crawl spaces, elevator shafts and chases.

c. Steel to be embedded in concrete.

d. Copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.

e. Hardware, fittings, and other factory finished items.

1.10.3 Mechanical and Electrical Painting

Includes field coating of interior and exterior new surfaces.

a. Where a space or surface is indicated to be painted, include the following items unless indicated otherwise.

(1) Exposed piping, conduit, and ductwork;

(2) Supports, hangers, air grilles, and registers;

(3) Miscellaneous metalwork and insulation coverings.

b. Do not paint the following, unless indicated otherwise:

(1) New zinc-coated, aluminum, and copper surfaces under insulation

(2) New aluminum jacket on piping

(3) New interior ferrous piping under insulation.

1.10.3.1 Fire Extinguishing Sprinkler Systems

Clean, pretreat, prime, and paint new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories. Apply coatings to clean, dry surfaces, using clean brushes. Clean the surfaces to remove dust, dirt, rust, and loose mill scale. Immediately after cleaning, provide the metal surfaces with one coat primer per schedules. Shield sprinkler heads with protective covering while painting is in progress. Upon completion of painting, remove protective covering from sprinkler heads. Remove sprinkler heads which have been painted and replace with new sprinkler heads. Provide primed surfaces with the following:

a. Piping in Unfinished Areas: Provide primed surfaces with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil in attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material. In lieu of red enamel finish coat, provide piping with 2 inch wide red enamel bands or self-adhering red plastic bands spaced at maximum of 20 foot intervals.

b. Piping in Finished Areas: Provide primed surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil. Provide piping with 2 inch wide red enamel bands or self-adhering red plastic bands spaced at maximum of 20-foot intervals throughout the piping systems.

1.10.4 Omitted

1.10.5 Definitions and Abbreviations

1.10.5.1 Qualification Testing

Qualification testing is the performance of all test requirements listed in the product specification. This testing is accomplished by MPI to qualify each product for the MPI Approved Product List, and may also be accomplished by Contractor's third party testing lab if an alternative to Batch Quality Conformance Testing by MPI is desired.

1.10.5.2 Batch Quality Conformance Testing

Batch quality conformance testing determines that the product provided is the same as the product qualified to the appropriate product specification. This testing shall only be accomplished by MPI testing lab.

1.10.5.3 Coating

A film or thin layer applied to a base material called a substrate. A coating may be a metal, alloy, paint, or solid/liquid suspensions on various substrates (metals, plastics, wood, paper, leather, cloth, etc.). They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendering, and roller coating. A coating may be applied for aesthetic or protective purposes or

both. The term "coating" as used herein includes emulsions, enamels, stains, varnishes, sealers, epoxies, and other coatings, whether used as primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

1.10.5.4 DFT or dft

Dry film thickness, the film thickness of the fully cured, dry paint or coating.

1.10.5.5 DSD

Degree of Surface Degradation, the MPI system of defining degree of surface degradation. Five (5) levels are generically defined under the Assessment sections in the MPI Maintenance Repainting Manual.

1.10.5.6 EPP

Environmentally Preferred Products, a standard for determining environmental preferability in support of Executive Order 13101.

1.10.5.7 EXT

MPI short term designation for an exterior coating system.

1.10.5.8 INT

MPI short term designation for an interior coating system.

1.10.5.9 Omitted

1.10.5.10 mil / mils

The English measurement for 0.001 in or one/one-thousandth of an inch.

1.10.5.11 Omitted

1.10.5.12 MPI Gloss Levels

MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.

Gloss levels are defined by MPI as follows:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat	0 to 5	10 max
G2	Velvet	0 to 10	10 to 35
G3	Eggshell	10 to 25	10 to 35
G4	Satin	20 to 35	35 min
G5	Semi-Gloss	35 to 70	
G6	Gloss	70 to 85	
G7	High Gloss		

Gloss is tested in accordance with ASTM D 523. Historically, the Government has used Flat (G1 / G2), Eggshell (G3), Semi-Gloss (G5), and

Gloss (G6).

1.10.5.13 MPI System Number

The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT/REX) or interior system (INT/RIN). The Division number follows the CSI Master Format.

1.10.5.14 Paint

See Coating definition.

1.10.5.15 REX

MPI short term designation for an exterior coating system used in repainting projects or over existing coating systems.

1.10.5.16 RIN

MPI short term designation for an interior coating system used in repainting projects or over existing coating systems.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.2 OMITTED
3.3 OMITTED

3.4 SURFACE PREPARATION

Remove dirt, splinters, loose particles, grease, oil, and other foreign matter and substances deleterious to coating performance as specified for each substrate before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, shall be spot-primmed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

3.5 PREPARATION OF METAL SURFACES

3.5.1 New Ferrous Surfaces

a. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean or detergent wash in accordance with SSPC SP 1 to remove oil and grease. Where shop coat is missing or damaged, clean according to SSPC SP 2, SSPC SP 3, SSPC SP 6, or SSPC SP 10. Brush-off blast remaining surface in accordance with SSPC SP 7; water jetting to SSPC SP 12 WJ-4 may be used to remove loose coating and other loose materials. Use inhibitor as recommended by coating manufacturer to prevent premature rusting. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.

b. Surfaces With More Than 20 Percent Rust, Mill Scale, and Other Foreign Substances: Clean entire surface in accordance with SSPC SP 6/SSPC SP 12 WJ-3.

3.5.2 Final Ferrous Surface Condition:

For tool cleaned surfaces, the requirements are stated in SSPC SP 2 and SSPC SP 3. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 3.

For abrasive blast cleaned surfaces, the requirements are stated in SSPC SP 7, SSPC SP 6, and SSPC SP 10. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 1.

For waterjet cleaned surfaces, the requirements are stated in SSPC SP 12. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 4.

3.5.3 Galvanized Surfaces

New Galvanized Surfaces With Only Dirt and Zinc Oxidation Products: Clean with solvent, steam, or non-alkaline detergent solution in accordance with SSPC SP 1. If the galvanized metal has been passivated or stabilized, the coating shall be completely removed by brush-off abrasive blast. New galvanized steel to be coated shall not be "passivated" or "stabilized" If the absence of hexavalent stain inhibitors is not documented, test as described in ASTM D 2092, Appendix X2, and remove by one of the methods described therein.

3.5.4 Non-Ferrous Metallic Surfaces

Aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces.

a. Surface Cleaning: Solvent clean in accordance with SSPC SP 1 and wash with mild non-alkaline detergent to remove dirt and water soluble contaminants.

3.5.5 Terne-Coated Metal Surfaces

Solvent clean surfaces with mineral spirits, ASTM D 235. Wipe dry with clean, dry cloths.

3.6 PREPARATION OF CONCRETE AND CEMENTITIOUS SURFACE

3.6.1 Concrete and Masonry

a. Curing: Concrete and masonry surfaces shall be allowed to cure at least 30 days before painting, except concrete slab on grade, which shall be allowed to cure 90 days before painting.

b. Surface Cleaning: Remove the following deleterious substances.

(1) Dirt, Chalking, Grease, and Oil: Wash new surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cup household detergent, and 4 quarts of warm water. Then rinse thoroughly with fresh water. For large areas water blasting may be used.

(2) Fungus and Mold: Wash new surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cup household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.

(3) Loose Particles: Remove by wire brushing.

(4) Efflorescence: Remove by scraping or wire brushing followed by washing with a 5 to 10 percent by weight aqueous solution of hydrochloric (muriatic) acid. Do not allow acid to remain on the surface for more than five minutes before rinsing with fresh water. Do not acid clean more than 4 square feet of surface, per workman, at one time.

c. Cosmetic Repair of Minor Defects: Repair or fill mortar joints and minor defects, including but not limited to spalls, in accordance with manufacturer's recommendations and prior to coating application.

d. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not to surfaces with droplets of water. Do not apply epoxies to damp vertical surfaces as determined by ASTM D 4263 or horizontal surfaces that exceed 3 lbs of moisture per 1000 square feet in 24 hours as determined by ASTM F 1869. In all cases follow manufacturers recommendations. Allow surfaces to cure a minimum of 30 days before painting.

3.6.2 Gypsum Board

a. Surface Cleaning: Gypsum board shall be dry. Remove loose dirt and dust by brushing with a soft brush, rubbing with a dry cloth, or vacuum-cleaning prior to application of the first coat material. A damp cloth or sponge may be used if paint will be water-based.

b. Repair of Minor Defects: Prior to painting, repair joints, cracks, holes, surface irregularities, and other minor defects with patching plaster or spackling compound and sand smooth.

c. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not surfaces with droplets of water. Do not apply epoxies to damp surfaces as determined by ASTM D 4263.

3.7 PREPARATION OF WOOD SURFACES

3.7.1 New Wood Surfaces

a. Wood surfaces shall be cleaned of foreign matter.

Surface Cleaning: Surfaces shall be free from dust and other deleterious substances and in a condition approved by the Contracting Officer prior to receiving paint or other finish. Do not use water to clean uncoated wood.

b. Omitted.

c. Moisture content of the wood shall not exceed 12 percent as measured by a moisture meter in accordance with ASTM D 4444, Method A, unless otherwise authorized.

d. Wood surfaces adjacent to surfaces to receive water-thinned paints shall be primed and/or touched up before applying water-thinned paints.

e. Cracks and Nailheads: Set and putty stop nailheads and putty cracks after the prime coat has dried.

f. Cosmetic Repair of Minor Defects:

(1) Knots and Resinous Wood: Prior to application of coating, cover knots and stains with two or more coats of 3-pound-cut shellac varnish, plasticized with 5 ounces of castor oil per gallon. Prime before applying any putty over shellacked area.

(2) Open Joints and Other Openings: Fill with whiting putty, linseed oil putty. Sand smooth after putty has dried.

(3) Checking: Where checking of the wood is present, sand the surface, wipe and apply a coat of pigmented orange shellac. Allow to dry before paint is applied.

3.7.2 Omitted

3.7.3 Interior Wood Surfaces, Stain Finish

Interior wood surfaces to receive stain shall be sanded. Oak and other open-grain wood to receive stain shall be given a coat of wood filler not less than 8 hours before the application of stain; excess filler shall be removed and the surface sanded smooth.

3.8 APPLICATION

3.8.1 Coating Application

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates, except as modified herein.

At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application.

Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated.

Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete.

Touch up damaged coatings before applying subsequent coats. Interior areas shall be broom clean and dust free before and during the application of coating material.

Apply paint to new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metal work, and accessories. Shield sprinkler heads with protective coverings while painting is in progress. Remove sprinkler heads which have been painted and replace with new sprinkler heads. For piping in unfinished spaces, provide primed surfaces with one coat of red alkyd gloss enamel to a minimum dry film thickness of 1.0 mil. Unfinished spaces include attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and space where walls or ceiling are not painted or not constructed of a prefinished material. For piping in finished areas, provide prime surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel. Upon completion of painting, remove protective covering from sprinkler heads.

a. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.

b. Primers, and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover surface of preceding coat or surface completely, and there shall be a visually perceptible difference in shades of successive coats.

c. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

d. Thermosetting Paints: Topcoats over thermosetting paints (epoxies and urethanes) should be applied within the overcoating window recommended by the manufacturer.

3.8.2 Mixing and Thinning of Paints

Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. The written permission shall include quantities and types of thinners to use.

When thinning is allowed, paints shall be thinned immediately prior to application with not more than 1 pint of suitable thinner per gallon. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

3.8.3 Two-Component Systems

Two-component systems shall be mixed in accordance with manufacturer's instructions. Any thinning of the first coat to ensure proper penetration and sealing shall be as recommended by the manufacturer for each type of substrate.

3.8.4 Coating Systems

a. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

Table

Division 5. Exterior Metal, Ferrous and Non-Ferrous Paint Table

Division 3. Interior Concrete Paint Table
Division 4. Interior Concrete Masonry Units Paint Table
Division 5. Interior Metal, Ferrous and Non-Ferrous Paint Table
Division 6. Interior Wood Paint Table
Division 9: Interior Gypsum Board, Surfaces Paint Table

b. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.

c. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.

3.9 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Exterior and Interior.

a. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.

b. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.

c. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.

d. Omitted.

e. Pipes and Tubing: The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat, but shall be overcoated with the specified ferrous-metal primer prior to application of finish coats.

f. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces. On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer MPI 107.

3.10 COATING SYSTEMS FOR CONCRETE AND CEMENTITIOUS SUBSTRATES

Apply coatings of Tables in Division 3, 4 and 9 for Exterior and Interior.

3.11 COATING SYSTEMS FOR WOOD

a. Apply coatings of Tables in Division 6 for Interior.

b. Prior to erection, apply two coats of specified primer to treat and prime wood surfaces which will be inaccessible after erection.

c. Apply stains in accordance with manufacturer's printed instructions.

3.12 PIPING IDENTIFICATION

3.12.1 Pipe Color Code Marking

Pipes in exposed areas and in accessible pipe spaces shall be provided with color band and titles adjacent to all valves, except those provided at plumbing fixtures, at not more than 40 foot spacing on straight pipe runs, adjacent to change in direction, and on both sides where pipes pass through walls or floors. Color code marking shall be of the color listed in TABLE I and the size listed in TABLE II. The arrows shall be installed adjacent to each band to indicate the direction of flow in the pipe. The legends shall be printed in upper-case black letters as listed in TABLE I. Letter sizes shall be as listed in TABLE II. Marking shall be painted or applied using colored, pressure-sensitive adhesive markers of standard manufacture. Paint shall be as specified for insulated and uninsulated piping.

TABLE I. COLOR CODES FOR MARKING PIPE

Material	Band	Letters and Arrow*	Legend
Cold water (potable)	Green	White	POTABLE WATER
Fire protection water	Red	White	FIRE PR. WATER
Fire Sprinkler Water	Red	White	FIRE SPR. WATER
Hot water (domestic)	Green	White	H.W.
Hot water recirculating (domestic)	Green	White	H.W.R.
Boiler feed water	Yellow	Black	B.F.
Low temp. water supply (heating)	Yellow	Black	L.T.W.S.
Low temp. water return (heating)	Yellow	Black	L.T.W.R.

TABLE I. COLOR CODES FOR MARKING PIPE

Material	Band	Letters and Arrow*	Legend
Condenser water supply	Green	White	COND. W.S.
Condenser water return	Green	White	COND. W.R.
Chilled water supply	Green	White	C.H.W.S.
Chilled water return	Green	White	C.H.W.R.
Chemical feed	Yellow	Black	CH. FEED
Compressed air	Blue	White	COMP. AIR
Natural gas	Yellow	Black	NAT. GAS
Refrigerants	Blue	White	REFRIGERANT
Fuel oil	Yellow	Black	FUEL OIL
Hydraulic fluid under 600 psi	Green	White	HYDRAULIC FLUID-_____PSI
Hydraulic fluid 600 psi and Greater	Yellow	Black	HYDRAULIC FLUID-_____PSI

_____

TABLE II. COLOR CODE MARKING SIZES

Outside Diameter of Pipe Covering (Inches)	Length of Color Band (inches)	Arrow Length x Width (Inches)	Size of Legend Letters and Numerals (Inches)
Less than 1-1/2	8	8 x 2-1/4	1/2
1-1/2 to 2-3/8	8	8 x 2-1/4	3/4
2-1/2 to 7-7/8	12	8 x 2-1/4	1-1/4
8 to 10	24	12 x 4-1/2	2-1/2
Over 10	32	12 x 4-1/2	3-1/2

3.13 INSPECTION AND ACCEPTANCE

In addition to meeting previously specified requirements, demonstrate mobility of moving components, including swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Contracting Officer. Perform this demonstration after appropriate curing and drying times of coatings have elapsed and prior to invoicing for final payment.

3.14 PAINT TABLES

All DFT's are minimum values.

3.14.1 EXTERIOR PAINT TABLES

DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

STEEL / FERROUS SURFACES

A. New Steel that has been hand or power tool cleaned to SSPC SP 2 or SSPC SP 3

1. Alkyd

STEEL / FERROUS SURFACES

New; MPI EXT 5.1Q-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 23	MPI 94	MPI 94

System DFT: 5.25 mils

B. Omitted
C. Omitted
D. Omitted
E. Omitted

EXTERIOR GALVANIZED SURFACES

F. New Galvanized surfaces:

1. Omitted
2. Omitted

3. Waterborne Primer / Waterborne Light Industrial Coating

MPI EXT 5.3J-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 134	MPI 110-G5	MPI 110-G5

System DFT: 4.5 mils

G. Omitted
H. Omitted

EXTERIOR SURFACES, OTHER METALS (NON-FERROUS)

I. Aluminum, aluminum alloy and other miscellaneous non-ferrous metal items not otherwise specified except hot metal surfaces, roof surfaces, and new prefinished equipment. Match surrounding finish:

1. Omitted

2. Waterborne Light Industrial Coating

MPI EXT 5.4G-G5(Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 95	MPI 110-G5	MPI 110-G5

System DFT: 5 mils

J. Surfaces adjacent to painted surfaces; Mechanical, Electrical, Fire extinguishing sprinkler systems including valves, conduit, hangers, supports, and miscellaneous metal items not otherwise specified except new prefinished equipment. Match surrounding finish:

1. Omitted

2. Waterborne Light Industrial Coating

MPI EXT 5.1C-G5(Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 110-G5	MPI 110-G5

System DFT: 5 mils

DIVISION 6: EXTERIOR WOOD; DRESSED LUMBER, DECKING, PAINT TABLE

A. Omitted

DIVISION 6: EXTERIOR WOOD; DRESSED LUMBER, DECKING, PAINT TABLE
B. Omitted
C. Omitted

D. New, Uncoated wood:

1. Semi-Transparent Stain
MPI EXT 6.3D

Spot Primer:	Intermediate:	Topcoat:
N/A	MPI 13	MPI 13

System DFT: N/A

3.14.2 INTERIOR PAINT TABLES

DIVISION 3: INTERIOR CONCRETE PAINT TABLE

A. New Concrete surfaces, not specified otherwise:

1. Latex
New; MPI INT 3.1A-G2 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 44	MPI 44

System DFT: 4 mils

DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

A. New Concrete masonry:

1. MPI INT 4.2D-G3 (Eggshell)

Filler	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 139	MPI 139

System DFT: 11 mils

MPI INT 4.2D-G5 (Semigloss)

Filler	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 141	MPI 141

System DFT: 11 mils

Fill all holes in masonry surface

DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

INTERIOR STEEL / FERROUS SURFACES

A. Metal, mechanical, electrical, fire extinguishing sprinkler systems including valves, conduit, hangers, supports, surfaces adjacent to painted surfaces (match surrounding finish), and miscellaneous metal items not otherwise specified, and new prefinished equipment:

1. Omitted

2. Alkyd
MPI INT 5.1E-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 47	MPI 47

System DFT: 5.25 mils

B. Omitted

INTERIOR STEEL / FERROUS SURFACES

C. Metal in toilets, restrooms, laundry areas, shower areas, and other high-humidity areas not otherwise specified except new prefinished equipment:

1. Alkyd
MPI INT 5.1E-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 47	MPI 47

System DFT: 5.25 mils

D. Omitted

E. Miscellaneous non-ferrous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment. Match surrounding finish:

1. Omitted

2. Alkyd
MPI INT 5.4J-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 95	MPI 47	MPI 47

System DFT: 5 mils

DIVISION 6: INTERIOR WOOD PAINT TABLE

A. New Wood not otherwise specified:

1. Omitted

2. Alkyd
MPI INT 6.4B-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 45	MPI 47	MPI 47

System DFT: 4.5 mils

B. Omitted

C. New Wood; natural finish or stained:

1. Omitted

2. Stained, oil-modified polyurethane
New; MPI INT 6.4E-G4

Stain:	Primer:	Intermediate:	Topcoat:
MPI 90	MPI 57	MPI 57	MPI 57

System DFT: 4 mils

DIVISION 9: INTERIOR GYPSUM BOARD, SURFACES PAINT TABLE

A. New Wallboard not otherwise specified:

1. Latex
New; MPI INT 9.2A-G2 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 44	MPI 44

System DFT: 4 mils

DIVISION 9: INTERIOR GYPSUM BOARD, SURFACES PAINT TABLE

New; MPI INT 9.2A-G3 (Eggshell)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 52	MPI 52

System DFT: 4 mils

2. High Performance Architectural Latex - High Traffic Areas
New; MPI INT 9.2B-G3 (Eggshell)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 139	MPI 139

System DFT: 4 mils

B. New Wallboard in toilets, food-preparation, restrooms, laundry areas, shower areas, service areas not otherwise specified.:

1. Omitted

2. Alkyd
New; MPI INT 9.2C-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 47	MPI 47

System DFT: 4 mils

-- End of Section --

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DIVISION 10 - SPECIALTIES

SECTION 10100A

VISUAL COMMUNICATIONS SPECIALTIES

11/00

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UFGS-10100A (November 2000)

SECTION 10100A

VISUAL COMMUNICATIONS SPECIALTIES
11/00

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z97.1	(1984; R 1994) Performance Specifications and Methods of Testing for Safety Glazing Materials Used In Buildings

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 221	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM C 1048	(1997b) Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass
ASTM F 148	(1995) Binder Durability of Cork Composition Gasket Materials
ASTM F 152	(1995) Tension Testing of Nonmetallic Gasket Materials

1.2 GENERAL REQUIREMENTS

The term visual display board when used herein includes presentation boards, marker boards, tackboards, board cases, display track system and horizontal sliding units. Visual display boards shall be from manufacturer's standard product line.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Visual Display Boards

Manufacturer's descriptive data and catalog cuts. Manufacturer's installation instructions, and cleaning and maintenance instructions.

SD-04 Samples

Aluminum

Sections of frame, map rail, and chalktray, and two map hooks.

Porcelain Enamel

Section showing porcelain enamel coating, steel, core material and backing.

Materials

Section of core material showing the lamination of colored cork, natural cork, woven fabric, non-woven fabric, and vinyl wall covering. Sample of hardwood and plastic laminate finish, and glass type. Samples shall be minimum 4 by 4 inches and show range of color.

07 Certificates

Visual Display Boards

Certificate of compliance signed by Contractor attesting that visual display boards conform to the requirements specified.

1.4 DELIVERY, STORAGE AND HANDLING

Materials shall be delivered to the building site in the manufacturer's original unopened containers and shall be stored in a clean dry area with temperature maintained above 50 degrees F. Materials shall be stacked according to manufacturer's recommendations. Visual display boards shall be allowed to acclimate to the building temperature for 24 hours prior to installation.

1.5 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

PART 2 PRODUCTS

2.1 COLOR

Finish colors for required items shall be as specified in Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

2.2 MATERIALS

2.2.1 Porcelain Enamel

Marker board writing surface shall be composed of porcelain enamel fused to a nominal 28 gauge (0.0149 inch) thick steel, laminated to a minimum 1/4 inch thick core material with a steel or foil backing sheet. Writing surface shall be capable of supporting paper by means of magnets. Marker

board surface for display track system may be a powder paint dry erase surface adhered to a nominal 18 gauge (0.0478 inch) thick steel.

2.2.2 Cork

Cork shall be a continuous resilient sheet made from soft, clean, granulated cork relatively free from hardback and dust and bonded with a binder suitable for the purpose intended. The wearing surface shall be free from streaks, spots, cracks or other imperfections that would impair its usefulness or appearance. The material shall be seasoned, and a clean cut made not less than 1/2 inch from the edge shall show no evidence of soft sticky binder.

2.2.2.1 Colored Cork

Colored cork shall be composed of pure cork and natural color pigments that are combined under heat and pressure with linseed oil. Colored cork shall be colored throughout and shall be washable. The burlap backing shall be deeply imbedded and keyed to the work sheet being partially concealed in it and meeting the requirements of ASTM F 148.

2.2.2.2 Natural Cork

Material shall be a single layer of pure grain natural cork without backing or facing. The color shall be light tan. The cork sheet shall have a tensile strength of not less than 40 psi when tested in accordance with ASTM F 152.

2.2.3 Omitted
2.2.4 Omitted
2.2.5 Omitted

2.2.6 Aluminum

Aluminum frame extrusions shall be alloy 6063-T5 or 6063-T6, conform to ASTM B 221, and be a minimum 0.06 inch thick. Exposed aluminum shall have an anodized, satin finish. Straight, single lengths shall be used wherever possible. Joints shall be kept to a minimum. Corners shall be mitered and shall have a hairline closure.

2.2.7 Hardwood

Exposed hardwood for frames, cabinets, and cases shall be oak, walnut or mahogany. Hardwood shall be provided with a durable factory-applied stain and lacquer finish of a type standard with the manufacturer.

2.2.8 Glass

Glass shall be comprised of tempered glass in accordance with ANSI Z97.1 and shall conform to ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type I, Class I (clear), thickness as specified.

2.3 TACKSTRIP DISPLAY RAIL

Tackstrip display rail shall be extruded aluminum with cork insert and wood trim. Profile shall be as indicated. End caps shall be provided by manufacturer and shall match style, finish and color of unit.

2.4 MARKERBOARD

Markerboard shall have a porcelain enamel writing surface and a chalktray. Markerboard shall be a factory assembled unit complete in one piece, without joints whenever possible. When markerboard dimensions require delivery in separate sections, components shall be prefit at the factory, disassembled for delivery and jointed at the site. Frame shall be aluminum. Chalk tray shall be the same material as the frame and extend the full length of the liquid markerboard. The markerboard shall have a map rail. The map rail with a tackable insert shall extend the full length of the liquid chalkboard, and shall have map hooks with clips for holding sheets of paper. Two map hooks shall be provided for each 4 feet of map rail. Dry erase markings shall be removable with a felt eraser or dry cloth without ghosting. Each unit shall come complete with an eraser and four different color compatible dry erase markers. The size shall be as shown in the drawings.

2.5 TACKBOARDS

2.5.1 Cork

Tackboard shall consist of a minimum 1/4 inch thick natural cork laminated to a minimum 1/4 inch thick hardboard, and shall have an aluminum frame. The size shall be as shown in the drawings.

2.6 CASE FOR BOARD UNIT

The case for the board unit shall be surface mounted and have hinged minimum 3/16 inch thick tempered glass doors that are lockable. Case shall be aluminum. Mitered corners shall be reinforced for rigidity. Doors shall be equipped with continuous piano hinges. Door glass shall be framed with the case material, and be reinforced at all corners. Door framing shall not depend upon the glass for rigidity. Multiple door cases shall have an elbow catch. The interior side of the back panel shall be tackable and shall be composed of a minimum 1/4 inch natural cork laminated to a minimum 1/4 inch fiberboard. Two keys shall be provided for each unit. The size shall be as shown on the drawings.

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2.7 PROJECTION SCREEN

Projection screen shall be manually operated spring roller projection screen in prefinished steel case. Unit shall have mounting brackets for wall mounting. Viewing surface shall be seamless fiberglass matte white and shall be washable and flame and mildew-resistant. Brightness shall be gain of 1.0 at viewing angle from 0 degree to 70 degrees. Viewing surface size shall be 6 feet 0 inch high, 8 feet 0 inch wide. Steel case shall be 22 gauge thick and steel end caps with integral roller brackets shall be 12 gauge thick. Case and endcaps shall be prefinished black. Viewing surface shall be securely mounted on 3-inch rigid steel roller. Bottom of viewing surface shall be securely mounted on black tubular steel slat with protective vinyl end caps and metal handle. Each screen shall be provided with manufacturer's aluminum hooked operating pole 48 inches long.

PART 3 EXECUTION

3.1 PLACEMENT SCHEDULE

Location and mounting height of visual display boards shall be as shown on the drawings.

3.2 INSTALLATION

Installation and assembly shall be in accordance with manufacturer's printed instructions. Concealed fasteners shall be used. Visual display boards shall be attached to the walls with suitable devices to anchor each unit. The Contractor shall furnish and install trim items, accessories and miscellaneous items in total, including but not limited to hardware, grounds, clips, backing materials, adhesives, brackets, and anchorages incidental to or necessary for a sound, secure, complete and finished installation. Installation shall not be initiated until completion of room painting and finishing operations. Visual display boards shall be installed in locations and at mounting heights indicated. Visual display boards shall be installed level and plumb, and if applicable doors shall be aligned and hardware shall be adjusted. Damaged units shall be repaired or replaced by the Contractor as directed by the Contracting Officer.

3.3 CLEANING

Writing surfaces shall be cleaned in accordance with manufacturer's instructions.

-- End of Section --

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SECTION 10160

TOILET PARTITIONS

07/98

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CEGS-10160 (July 1998)

SECTION 10160

TOILET PARTITIONS
07/98

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

COMMERCIAL ITEM DESCRIPTIONS (CID)

CID A-A-60003 Partitions, Toilet, Complete

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Approved Detail Drawings

Drawings showing plans, elevations, details of construction, hardware, reinforcing, fittings, mountings, and anchorings.

SD-03 Product Data

Toilet Partition System

Manufacturer's technical data and catalog cuts including installation and cleaning instructions.

SD-04 Samples

Toilet Partition System

Manufacturer's standard color charts and color samples.

1.3 SYSTEM DESCRIPTION

Toilet partition system, including toilet enclosures, room entrance screens, and urinal screens, shall be a complete and usable system of panels, hardware, and support components. The partition system shall be provided by a single manufacturer and shall be a standard product as shown in the most recent catalog data. The partition system shall be as shown on the approved detail drawings.

1.4 DELIVERY, STORAGE, AND HANDLING

Components shall be delivered to the jobsite in the manufacturer's original packaging with the brand, item identification, and project reference clearly marked. Components shall be stored in a dry location that is adequately ventilated; free from dust, water, or other contaminants; and shall have easy access for inspection and handling.

1.5 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 TOILET ENCLOSURES

Toilet enclosures shall conform to CID A-A-60003, Type I, Style A, floor supported. Width, length, and height of toilet enclosures shall be as shown. Finish surface of panels shall be painted metal, Finish 1. Panels indicated to receive toilet paper holders or grab bars as specified in Section 10800A TOILET ACCESSORIES, shall be prepared for mounting of the items required. Grab bars shall withstand a bending stress, shear stress, shear force, and a tensile force induced by 250 lbf. Grab bars shall not rotate within their fittings.

2.2 OMITTED

2.3 URINAL SCREENS

Urinal screens shall conform to CID A-A-60003, Type III, Style A, floor supported. Finish surface of screens shall be painted metal, Finish 1. Width and height of urinal screens shall be as shown.

2.4 HARDWARE

Hardware for the toilet partition system shall conform to CID A-A-60003 for the specified type and style of partitions. Hardware finish shall be highly resistant to alkalies, urine, and other common toilet room acids.

2.5 COLORS

Color of finishes for toilet partition system components shall be manufacturer's standard as specified in Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

PART 3 EXECUTION

3.1 INSTALLATION

Toilet partitions shall be installed straight and plumb in accordance with approved manufacturer's instructions with horizontal lines level and rigidly anchored to the supporting construction. Anchorage to walls shall be by screws into blocking. Drilling and cutting for installation of anchors shall be at locations that will be concealed in the finished work. Urinal screen shall be mounted with bottom edge 12 inches above finished floor. Stud walls shall have solid blocking at urinal screen and toilet enclosure connections. Urinal screens shall be secured to wall with full length angle frames prefinished to match toilet enclosure hardware at each

side fastened to wall at 6 inches o.c.

3.2 ADJUSTING AND CLEANING

Doors shall have a uniform vertical edge clearance of approximately 3/16 inch and shall rest open at approximately 30 degrees when unlatched. Baked enamel finish shall be touched up with the same color of paint that was used for the finish. Toilet partitions shall be cleaned in accordance with approved manufacturer's instructions and shall be protected from damage until accepted.

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WALL AND CORNER PROTECTION

12/95

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CEGS-10260 (December 1995)

Includes changes through Notice 2 (October 1999)

SECTION 10260

WALL AND CORNER PROTECTION
12/95

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF-45	(1997) Designation System for Aluminum Finishes

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 221	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM D 256	(1997) Determining the IZOD Pendulum Impact Resistance of Plastics
ASTM D 635	(1998) Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
ASTM E 84	(19998e1) Surface Burning Characteristics of Building Materials

SOCIETY OF AMERICAN AUTOMOTIVE ENGINEERS (SAE)

SAE J1545	(1986) Instrumental Color Difference Measurement for Exterior Finishes, Textiles and Color Trim

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Corner Guards

Drawings indicating locations and typical elevations of each type of item. Drawings shall show vertical and horizontal dimensions, full size sections, thickness of materials, and fastening details.

SD-03 Product Data

Corner Guards

Manufacturer's descriptive data, catalog cuts, installation instructions, and recommended cleaning instructions.

SD-04 Samples

Finish

Manufacturer's standard samples indicating color and texture of materials requiring color and finish selection.

SD-07 Certificates

Corner Guards

Statements attesting that the items comply with specified fire and safety code requirements.

1.3 DELIVERY AND STORAGE

Materials shall be delivered to the project site in manufacturer's original unopened containers with seals unbroken and labels and trademarks intact. Materials shall be kept dry, protected from weather and damage, and stored under cover. Materials shall be stored at approximately 70 degrees F for at least 48 hours prior to installation.

1.4 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 GENERAL

To the maximum extent possible, corner guards and wall guards (bumper guards) shall be the standard products of a single manufacturer and shall be furnished as detailed. Drawings show general configuration of products required, and items differing in minor details from those shown will be acceptable.

2.1.1 Resilient Material

Resilient material shall consist of high impact resistant extruded acrylic vinyl, polyvinyl chloride, or injection molded thermal plastic and shall conform to the following:

2.1.1.1 Minimum Impact Resistance

Minimum impact resistance shall be 18 ft. lbs/sq. inch when tested in accordance with ASTM D 256, (Izod impact, ft. lbs per sq inch notched).

2.1.1.2 Fire Rating

Fire rating shall be Class 1 when tested in accordance with ASTM E 84, having a maximum flame spread of 25 and a smoke developed rating of 450 or less. Material shall be rated self extinguishing when tested in accordance with ASTM D 635. Material shall be labeled and tested by an approved nationally known testing laboratory. Test results of material tested on any other combination of door/frame assembly will not be acceptable.

2.1.1.3 Integral Color

Colored components shall have integral color and shall be matched in accordance with SAE J1545 to within plus or minus 1.0 on the CIE-LCH scales.

2.2 CORNER GUARDS

2.2.1 Resilient Corner Guards

Corner guard units shall be flush mounted type, radius formed to profile shown. Corner guards shall extend to height indicated. Mounting hardware, cushions, and base plates shall be furnished. Assembly shall consist of a snap-on corner guard formed from high impact resistant resilient material, minimum 0.078 inch thick, mounted on a continuous aluminum retainer. Extruded aluminum retainer shall conform to ASTM B 221, alloy 6063, temper T5 or T6. Flush mounted type guards shall act as a stop for adjacent wall finish material. Factory fabricated end closure caps shall be furnished for top and bottom of surface mounted corner guards. Flush mounted corner guards installed in fire rated wall shall maintain the rating of the wall. Insulating materials that are an integral part of the corner guard system shall be provided by the manufacturer of the corner guard system. Exposed metal portions of fire rated assemblies shall have a paintable surface.

2.3 WALL GUARDS (BUMPER GUARDS)

2.3.1 Wall Guards

Wall guards shall be provided with prefabricated end closure caps, inside and outside corners, concealed splices, cushions, mounting hardware and other accessories standard with the manufacturer. Extruded aluminum retainers shall conform to ASTM B 221, alloy 6063, temper T5 or T6. End caps and corners shall be field adjustable to assure close alignment with handrails and wall guards. Wall guards shall be profile as shown.

2.3.1.1 Wall Guards

Wall guards shall consist of snap-on covers of high impact resistant resilient material mounted over aluminum retainer, anchored to wall at maximum 24 inches on center.

2.4 OMITTED
2.5 OMITTED

2.6 TRIM, FASTENERS AND ANCHORS

Vinyl trim, fasteners and anchors shall be provided for each specific installation as shown.

2.7 FINISH

2.7.1 Aluminum Finish

Finish for aluminum shall be in accordance with AA DAF-45. Exposed aluminum shall be designation AA-C22A32 chemically etched medium matte with integrally colored anodic coating class II architectural coating 0.4 mil thick. Concealed aluminum shall be mill finish.

2.7.2 Omitted

2.7.3 Resilient Material Finish

Finish for resilient material shall be stipple texture with colors in accordance with SAE J1545.

2.8 ADHESIVES

Adhesive for resilient material shall be in accordance with manufacturers recommendations.

2.9 COLOR

Color shall be in accordance with Section 09000 BUILDING FINISH AND COLOR SCHEDULE.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Corner Guards and Wall Guards (Bumper Guards)

Material shall be mounted at location indicated in accordance with manufacturer's recommendations.

3.1.2 Wall Panels

Surfaces to receive protection shall be clean, smooth, and free of obstructions. Adhesives shall be applied in controlled environment in accordance with manufacturer's recommendations.

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EXTERIOR SIGNAGE
07/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(2000) Carbon Structural Steel
ASTM A 123/A 123M	(2000) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 570/A 570M	(1998) Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
ASTM A 653/A 653M	(2000) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 924/A 924M	(1999) General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B 26/B 26M	(1999) Aluminum-Alloy Sand Castings
ASTM B 108	(1999) Aluminum-Alloy Permanent Mold Castings
ASTM B 209	(1996) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(2000) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM E 84	(2000a) Surface Burning Characteristics of Building Materials

AMERICAN WELDING SOCIETY (AWS)

AWS C1.1M/C1.1	(2000) Recommended Practices for Resistance Welding
AWS D1.1	(2000) Structural Welding Code - Steel
AWS D1.2	(1997) Structural Welding Code - Aluminum

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM AMP 505 (1988) Metal Finishes Manual for Architectural and Metal Products

1.2 GENERAL

All exterior signage shall be provided by a single manufacturer. Exterior signage shall be of the design, detail, sizes, types, and message content shown on the drawings, shall conform to the requirements specified, and shall be provided at the locations indicated. Signs shall be complete with lettering, framing as detailed, and related components for a complete installation. Recyclable materials shall conform to EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS.

1.3 WIND LOAD REQUIREMENTS

Exterior signage shall be designed to withstand 100 mph wind load.

1.4 CHARACTER PROPORTIONS AND HEIGHTS

Letters and numbers on indicated signs for handicapped-accessible buildings shall have a width-to-height ratio between 3:5 and 1:1 and a stroke-width-to-height ratio between 1:5 and 1:10. Characters and numbers on indicated signs shall be sized as indicated. The minimum height is measured using an upper case letter "X". Lower case characters are permitted where approved by PWBC.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Approved Detail Drawings

Drawings showing elevations of each type of sign; dimensions, details, and methods of mounting or anchoring; shape and thickness of materials; and details of construction. A schedule showing the location, each sign type, and message shall be included.

SD-03 Product Data

Installation

Manufacturer's installation instructions and cleaning instructions.

Exterior Signs

Exterior signage schedule in electronic media with spread sheet format. Spread sheet shall include sign location, sign type, and message.

Wind Load Requirements

Design analysis and supporting calculations performed in support of specified signage.

SD-04 Samples

Exterior Signs

One sample of each type of sign. Each sample shall consist of a complete sign panel with letters and symbols. Samples may be installed in the work, provided each sample is identified and location recorded. Two samples of manufacturer's standard color chips for each material requiring color selection and 12 inch square sample of sign face color sample.

SD-10 Operation and Maintenance Data

Protection and Cleaning

1.6 QUALIFICATIONS

Signs, plaques, and dimensional letters shall be the standard product of a manufacturer regularly engaged in the manufacture of the products. Items of equipment shall essentially duplicate equipment that has been in satisfactory use at least 2 years prior to bid opening.

1.7 DELIVERY AND STORAGE

Materials shall be wrapped for shipment and storage, delivered to the jobsite in manufacturer's original packaging, and stored in a clean, dry area in accordance with manufacturer's instructions.

1.8 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 MODULAR EXTERIOR SIGNAGE SYSTEM

Exterior signage shall consist of a system of identification type signs located where shown. Dimensions, details, materials, message content, and design of signage shall be as indicated.

2.1.1 Omitted

2.1.2 Panel and Post/Panel Type Signs

2.1.2.1 Posts

One-piece aluminum or pressure treated wood posts shall be provided as indicated. Posts shall be designed to accept panel framing system described. Caps shall be provided for each post.

2.1.2.2 Panel Framing System

Panel framing consisting of aluminum sections and interlocking track components shall be designed to interlock with posts with concealed

fasteners.

2.1.2.3 Panels

Modular message panels shall be provided in sizes shown on drawings. Panels shall be fabricated a minimum of 0.080 inch aluminum.

2.1.2.4 Finishes

Post finish shall be painted as indicated. Metal panel system finish shall be baked enamel.

2.1.2.5 Mounting

Permanent mounting shall be provided by embedding posts in concrete foundation as shown.

2.2 OMITTED

2.3 GRAPHICS FOR EXTERIOR SIGNAGE SYSTEMS

2.3.1 Graphics

Signage graphics shall conform to the following:

Pressure sensitive precision cut vinyl letters with reflecting surface shall be provided.

2.3.2 Messages

Coordinate with the Contracting Officer and PWBC for message content. Typeface: Helvetica medium. Type size as indicated.

2.4 OMITTED
2.5 OMITTED

2.6 ALUMINUM ALLOY PRODUCTS

Aluminum alloy products shall conform to ASTM B 209 for sheet or plate, ASTM B 221 for extrusions and ASTM B 26/B 26M or ASTM B 108 for castings. Aluminum extrusions shall be provided at least 1/8 inch thick and aluminum plate or sheet at least 16 gauge thick. Welding for aluminum products shall conform to AWS C1.1M/C1.1.

2.7 OMITTED

2.8 ORGANIC COATING

Surfaces shall be cleaned, primed, and given a semi-gloss baked enamel finish in accordance with NAAMM AMP 505 with total dry film thickness not less than 1.2 mils.

2.9 STEEL PRODUCTS

Structural steel products shall conform to ASTM A 36/A 36M. Sheet and strip steel products shall conform to ASTM A 570/A 570M. Welding for steel products shall conform to AWS D1.2.

2.10 OMITTED

2.11 VINYL SHEETING FOR GRAPHICS

Vinyl sheeting shall be 5 to 7 year premium type and shall be in accordance with the flammability requirements of ASTM E 84 and shall be a minimum 0.003 inch film thickness. Film shall include a precoated pressure sensitive adhesive backing, Class 1, or positionable pressure sensitive adhesive backing, Class 3.

2.12 OMITTED
2.13 OMITTED
2.14 OMITTED
2.15 OMITTED

2.16 ANCHORS AND FASTENERS

Exposed anchor and fastener materials shall be compatible with metal to which applied and shall match in color and finish and shall be non-rusting, non-corroding, and non-staining. Exposed fasteners shall be tamper-proof.

2.17 SHOP FABRICATION AND MANUFACTURE

2.17.1 Factory Workmanship

Work shall be assembled in the shop, as far as practical, ready for installation at the site. Work that cannot be shop assembled shall be given a trial fit in the shop to ensure proper field assembly. Holes for bolts and screws shall be drilled or punched. Drilling and punching shall produce clean, true lines and surfaces. Welding to or on structural steel shall be in accordance with AWS D1.1. Welding shall be continuous along the entire area of contact. Exposed welds shall be ground smooth. Exposed surfaces of work shall have a smooth finish and exposed riveting shall be flush. Fastenings shall be concealed where practical. Items specified to be galvanized shall be by hot-dip process after fabrication if practical. Galvanization shall be in accordance with ASTM A 123/A 123M and ASTM A 653/A 653M, as applicable. Other metallic coatings of steel sheet shall be in accordance with ASTM A 924/A 924M. Joints exposed to the weather shall be formed to exclude water. Drainage and weep holes shall be included as required to prevent condensation buildup.

2.17.2 Dissimilar Materials

Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of asphalt varnish or a coat of zinc-molybdate primer to prevent galvanic or corrosive action.

2.17.3 Shop Painting

Surfaces of miscellaneous metal work, except nonferrous metal, corrosion resisting steel, and zinc-coated work, shall be given one coat of zinc-molybdate primer or an approved rust-resisting treatment and metallic primer in accordance with manufacturer's standard practice. Surfaces of items to be embedded in concrete shall not be painted. Upon completion of work, damaged surfaces shall be recoated.

2.18 COLOR, FINISH, AND CONTRAST

Color of products shall be as indicated. For buildings required to be handicapped-accessible, the characters and background of signs shall be eggshell, matte, or other non-glare finish. Characters and symbols shall contrast with their background - either light characters on a dark background or dark characters on a light background.

PART 3 EXECUTION

3.1 INSTALLATION

Signs shall be installed in accordance with approved manufacturer's instructions at locations shown on the approved detail drawings. Signs shall be installed plumb and true at mounting heights indicated, and by method shown or specified. Signs mounted on other surfaces shall not be installed until finishes on such surfaces have been completed.

3.1.1 Anchorage

Anchorage and fastener materials shall be in accordance with approved manufacturer's instructions for the indicated substrate. Anchorage not otherwise specified or indicated shall include slotted inserts, expansion shields, and powder-driven fasteners when approved for concrete; toggle bolts and through bolts for masonry; machine carriage bolts for steel; lag bolts and screws for wood.

3.1.2 Protection and Cleaning

The work shall be protected against damage during construction. Hardware and electrical equipment shall be adjusted for proper operation. Glass, frames, and other sign surfaces shall be cleaned in accordance with manufacturer's instructions. After signs are completed and inspected, the Contractor shall cover all project identification, directional, and other signs which may mislead the public. Covering shall be maintained until instructed to be removed by the Contracting Officer or until the facility is to be opened for business. Signs shall be cleaned, as required, at time of cover removal.

3.2 FIELD PAINTED FINISH

Miscellaneous metals and frames shall be field painted in accordance with Section 09900 PAINTING, GENERAL. Anodized metals, masonry, and glass shall be protected from paint. Finish shall be free of scratches or other blemishes.

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SECTION 10440A

INTERIOR SIGNAGE

06/01

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UFGS-10440A (June 2001)

SECTION 10440A

INTERIOR SIGNAGE
06/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF-45	(1997) Designation System for Aluminum Finishes
AA PK-1	(1999) Registration Record of Aluminum Association Alloy Designations and Chemical Composition Limits for Aluminum Alloys in the Form of Castings and Ingot

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 605	(1998) Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z97.1	(1984; R 1994) Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 209	(1996) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(2000) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

AMERICAN WELDING SOCIETY (AWS)

AWS D1.2	(1997) Structural Welding Code - Aluminum

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office

that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings

Drawings showing elevations of each type of sign, dimensions, details and methods of mounting or anchoring, shape and thickness of materials, and details of construction. A schedule showing the location, each sign type, and message shall be included.

SD-03 Product Data

Installation

Manufacturer's descriptive data, catalogs cuts, installation and cleaning instructions.

SD-04 Samples

Interior Signage; G, ED

One sample of each of the following sign types showing typical quality and workmanship. The samples may be installed in the work, provided each sample is identified and location recorded.

a. Directional sign.

b. Door identification sign.

c. Building map.

Two samples of manufacturer's standard color chips for each material requiring color selection.

1.3 GENERAL

Interior signage shall be of the design, detail, sizes, types, and message content shown on the drawings, shall conform to the requirements specified, and shall be provided at the locations indicated. Signs shall be complete with lettering, framing as detailed, and related components for a complete installation. Recyclable materials shall conform to EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS.

1.3.1 Character Proportions and Heights

Letters and numbers on indicated signs in handicapped-accessible buildings, which do not designate permanent rooms or spaces, shall have a width-to-height ratio between 3:5 and 1:1 and a stroke-width-to-height ratio between 1:5 and 1:10. Characters and numbers on indicated signs shall be sized according to the viewing distance from which they are to be read. The minimum height is measured using an upper case letter "X". Lower case characters are permitted. Suspended or projected overhead signs shall have a minimum character height of 3 inches.

1.3.2 Raised and Brailled Characters and Pictorial Symbol Signs (Pictograms)

Letters and numbers on indicated signs which designate permanent rooms and

spaces in handicapped-accessible buildings shall be raised 1/32 inch upper case, sans serif or simple serif type and shall be accompanied with Grade 2 Braille. Raised characters shall be at least 5/8 inch in height, but no higher than 2 inches. Pictograms shall be accompanied by the equivalent verbal description placed directly below the pictogram. The border dimension of the pictogram shall be 6 inches minimum in height. Indicated accessible facilities shall use the international symbol of accessibility.

1.4 QUALIFICATIONS

Signs, plaques, and dimensional letters shall be the standard product of a manufacturer regularly engaged in the manufacture of such products and shall essentially duplicate signs that have been in satisfactory use at least 2 years prior to bid opening.

1.5 DELIVERY AND STORAGE

Materials shall be delivered to the jobsite in manufacturer's original packaging and stored in a clean, dry area in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 ROOM IDENTIFICATION/DIRECTIONAL SIGNAGE SYSTEM

Signs shall be fabricated of Type ES/MP laminated thermosetting plastic suitable for engraving or acrylic plastic conforming to ANSI Z97.1.

2.1.1 Standard Room Signs

Signs shall consist of matte finish acrylic plastic. Frames shall be molded acrylic. Corners of signs shall be squared.

2.1.2 Changeable Message Strip Signs

Changeable message strip signs shall consist of cast acrylic back laminated to matte finish, laminated thermosetting Type ES plastic face with message slots and associated end caps, as detailed, for insertion of changeable message strips. Size of signs shall be as shown on the drawings. Individual message strips to permit removal, change, and reinsertion shall be provided as detailed. Corners of signs shall be squared.

2.1.3 Type of Mounting For Signs

Extruded aluminum brackets, mounted as shown, shall be furnished for hanging, projecting, and double-sided signs. Mounting for framed, hanging, and projecting signs shall be by mechanical fasteners. Surface mounted signs shall be provided with 1/16 inch thick vinyl foam tape . Sign inserts shall be provided with 1/16 inch thick foam tape.

2.1.4 Graphics

Signage graphics for modular identification/directional signs shall conform to the following:

Pressure sensitive prespaced and prealigned precision computer cut vinyl letters on release paper shall be provided. Edges and corners of finished letter forms and graphics shall be true and clean. Vinyl sheeting for graphics shall be 5- to 7-year premium type and shall be a

minimum 0.003 inch film thickness. Film shall include a precoated pressure sensitive adhesive backing.

Message shall be applied to panel using the silkscreen process. Silkscreened images shall be executed with photo screens prepared from original art. Handcut screens will not be accepted. Original art shall be defined as artwork that is a first generation reproduction of the specified art. Edges and corners shall be clean.

Graphics shall be raised 1/32 inch with background engraved exposed laminate.

2.2 OMITTED
2.3 OMITTED
2.4 OMITTED

2.5 ALUMINUM ALLOY PRODUCTS

Aluminum extrusions shall be at least 1/8 inch thick, and aluminum plate or sheet shall be at least 0.0508 inch thick. Extrusions shall conform to ASTM B 221; plate and sheet shall conform to ASTM B 209. Where anodic coatings are specified, alloy shall conform to AA PK-1 alloy designation 514.0. Exposed anodized aluminum finishes shall be as shown. Welding for aluminum products shall conform to AWS D1.2.

2.6 ANODIC COATING

Anodized finish shall conform to AA DAF-45 as follows: Integral color anodized designation AA-M10-C22-A32, Architectural Class 0.4 to 0.7 mil.

2.7 ORGANIC COATING

Organic coating shall conform to AAMA 605, with total dry film thickness not less than 1.2 mils.

2.8 FABRICATION AND MANUFACTURE

2.8.1 Factory Workmanship

Holes for bolts and screws shall be drilled or punched. Drilling and punching shall produce clean, true lines and surfaces. Exposed surfaces of work shall have a smooth finish and exposed riveting shall be flush. Fastenings shall be concealed where practicable.

2.8.2 Dissimilar Materials

Where dissimilar metals are in contact, the surfaces will be protected to prevent galvanic or corrosive action.

2.9 COLOR, FINISH, AND CONTRAST

Color shall be in accordance with Section 09000 BUILDING COLOR AND FINISH SCHEDULE. In buildings required to be handicapped-accessible, the characters and background of signs shall be eggshell, matte, or other non-glare finish. Characters and symbols shall contrast with their background - either light characters on a dark background or dark characters on a light background.

PART 3 EXECUTION

3.1 INSTALLATION

Signs shall be installed in accordance with approved manufacturer's instructions at locations shown on the detail drawings. Signs shall be installed plumb and true at mounting heights indicated, and by method shown or specified. Required blocking shall be installed as detailed. Signs which designate permanent rooms and spaces in handicapped-accessible buildings shall be installed on the wall adjacent to the latch side of the door. Where there is no wall space to the latch side of the door, including at double leaf doors, signs shall be placed on the nearest adjacent wall. Mounting location for such signage shall be so that a person may approach within 3 inches of signage without encountering protruding objects or standing within the swing of a door. Signs on doors or other surfaces shall not be installed until finishes on such surfaces have been installed. Signs installed on glass surfaces shall be installed with matching blank back-up plates in accordance with manufacturer's instructions.

3.1.1 Anchorage

Anchorage shall be in accordance with approved manufacturer's instructions. Anchorage not otherwise specified or shown shall include slotted inserts, expansion shields, and powder-driven fasteners when approved for concrete; toggle bolts and through bolts for masonry; machine carriage bolts for steel; lag bolts and screws for wood. Exposed anchor and fastener materials shall be compatible with metal to which applied and shall have matching color and finish. Where recommended by signage manufacturer, foam tape pads may be used for anchorage. Foam tape pads shall be minimum 1/16 inch thick closed cell vinyl foam with adhesive backing. Adhesive shall be transparent, long aging, high tech formulation on two sides of the vinyl foam. Adhesive surfaces shall be protected with a 5 mil green flatstock treated with silicone. Foam pads shall be sized for the signage as per signage manufacturer's recommendations. Signs mounted to painted gypsum board surfaces shall be removable for painting maintenance. Signs mounted to lay-in ceiling grids shall be mounted with clip connections to ceiling tees.

3.1.2 Protection and Cleaning

The work shall be protected against damage during construction. Hardware and electrical equipment shall be adjusted for proper operation. Glass, frames, and other sign surfaces shall be cleaned in accordance with the manufacturer's approved instructions.

-- End of Section --

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SECTION 10550

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-- End of Section Table of Contents --

CEGS-10550 (12/97)

SECTION 10550

POSTAL UNITS

PART 1 GENERAL

1.1 OMITTED

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings

Shop drawings shall indicate material thickness, type, grade and class, rough opening dimensions, overall finish dimensions, compartment size, number of compartments and arrangement, construction details, door construction and hardware, locking, method of identification, anchorage and erection details.

SD-03 Product Data

Manufacturer's Data

Manufacturer's descriptive data shall indicate type of mailboxes, collection units, materials, finishes, loading/unloading procedures, types of locks and installation instructions. Text explaining details of information to be submitted.

1.3 GENERAL REQUIREMENTS

Furnish and install rear loading horizontal type mailboxes, front access collection units, trim and accessories in the quantities and at the locations indicated on the drawings. Group A mailboxes and collection units shall be USPS approved construction and installation.

1.4 HANDLING AND DELIVERY

Postal units shall be adequately packaged and protected during shipment and shall be inspected for damage or stain upon delivery to the job site. They shall be carefully handled to avoid damage and shall be stored in a dry weathertight, ventilated area until installation.

PART 2 PRODUCTS

2.1 MAILBOX TYPE

Mailboxes shall be rear loading horizontal type. Individual compartment size shall be minimum 5 inches high by 6 inches wide by 15 inches deep.

2.1.1 Removal Rear Cover

Each mailbox module shall have a sheet aluminum removable rear cover strengthened with formed sheet aluminum stiffeners.

2.2 COMPARTMENT CONSTRUCTION

Mail compartments shall be manufacturer's standard compartment made of double-wall high strength sheet aluminum with stiffener frames.

2.3 COMPARTMENT DOORS

Compartment doors shall be manufacturer's standard doors fabricated of extruded aluminum not less than 0.125 inch thick with integral reinforcing ribs. Doors shall swing on concealed hinges.

2.4 COMPARTMENT DOOR LOCKS

Each mail compartment door shall be provided a lock, keyed different from all other locks supplied for the project. The lock shall be a five pin tumbler cam type with two change keys per lock and a minimum of 1,000 available key changes.

2.5 COMPARTMENT DOOR IDENTIFICATION

Each compartment door shall have 1/2 inch high three digit numbers permanently engraved in the face of the door. Numbering shall be in sequence vertically from left to right.

2.6 TRIM

Trim shall be manufacturer's standard aluminum trim to match mailboxes. Trim shall have mitered corners.

2.7 FINISH

Finish on mailbox fronts and associated trim shall be satin aluminum, medium bronze anodized.

2.8 COLLECTION UNITS

Unit shall have hopper door with inside deflector, engraved letters, and schedule card insert. Size shall be approximately 18 inches wide, 36 inches high, 12 inches deep. Removal of mail from unit shall be from inside of mailroom.

2.8.1 Finish

Collection unit finish, trim and construction shall be the same as that specified for the mail compartments and shall be USPS approved.

2.9 PARCEL LOCKERS

Parcel lockers shall be front loading. The configuration of compartments and compartment sizes shall be as indicated on the drawings.

2.9.1 Finish

Parcel lockers' finish, trim and construction shall be the same as that

specified for the mail compartments.

2.9.2 Locking System

Parcel lockers shall have a two-key locking system. One key will open the locker but will then be automatically retained in its lock until removed by the control key.

PART 3 EXECUTION

3.1 INSTALLATION

Postal units and accessories shall be installed in accurately framed openings with units plumb and adequately secured in position. Installation shall comply with current U.S. Postal Service regulations except high and low height requirements at Group B mailboxes only.

-- End of Section --

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DIVISION 10 - SPECIALTIES

SECTION 10800A

TOILET ACCESSORIES

04/01

PART 1 GENERAL

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2.2.17 Soap and Grab Bar Combination, Recessed (SGR)
2.2.18 Towel Bar (TB)
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2.2.20 Toilet Tissue Dispenser (TTD)
2.2.21 Omitted
2.2.22 Toothbrush and Tumbler Holder (TTH)
2.2.23 Waste Receptacle (WR)
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2.2.25 Mop and Broom Rack (MBR)
2.2.26 Multipurpose Unit (MPU)
2.2.27 Robe Hook (RH)

PART 3 EXECUTION

3.1 INSTALLATION
3.2 CLEANING

-- End of Section Table of Contents --

UFGS-10800A (April 2001)

SECTION 10800A

TOILET ACCESSORIES
04/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 1036 (1991; R 1997) Flat Glass

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Finishes
Accessory Items

Manufacturer's descriptive data and catalog cuts indicating materials of construction, fasteners proposed for use for each type of wall construction, mounting instructions, operation instructions, and cleaning instructions.

SD-04 Samples

Finishes
Accessory Items

One sample of each accessory proposed for use. Approved samples may be incorporated into the finished work, provided they are identified and their locations noted.

1.3 DELIVERY, STORAGE, AND HANDLING

Toilet accessories shall be wrapped for shipment and storage, delivered to the jobsite in manufacturer's original packaging, and stored in a clean, dry area protected from construction damage and vandalism.

1.4 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

Toilet accessories shall be provided where indicated in accordance with paragraph SCHEDULE. Porcelain type, tile-wall accessories are specified in Section 09310A CERAMIC TILE. Each accessory item shall be complete with the necessary mounting plates and shall be of sturdy construction with corrosion resistant surface.

2.1.1 Anchors and Fasteners

Anchors and fasteners shall be capable of developing a restraining force commensurate with the strength of the accessory to be mounted and shall be suited for use with the supporting construction. Exposed fasteners shall have oval heads and shall be finished to match the accessory.

2.1.2 Finishes

Except where noted otherwise, finishes on metal shall be provided as follows:

Metal	Finish
Stainless steel	No. 4 satin finish
Carbon steel, copper alloy, and brass	Chromium plated, bright

2.2 ACCESSORY ITEMS

Accessory items shall conform to the requirements specified below.

2.2.1 Omitted

2.2.2 Grab Bar (GB)

Grab bar shall be 18 gauge, 1-1/4 inches OD Type 304 stainless steel. Grab bar shall be form and length as indicated. Concealed mounting flange shall have mounting holes concealed. Grab bar shall have satin finish. Installed bars shall be capable of withstanding a 500-pound vertical load without coming loose from the fastenings and without obvious permanent deformation. Space between wall and grab bar shall be 1-1/2 inch.

2.2.3 Medicine Cabinet (MC)

Medicine cabinet shall be constructed with cold-rolled carbon steel sheet of not less than .03 inch thick, formed from a single sheet of steel or shall have mechanically formed spot welded or any other suitable joints. Width, height and depth of cabinet shall be as indicated on the drawings.

2.2.3.1 Omitted

2.2.3.2 Swinging Door Cabinet

Swinging door cabinet assembly shall be as indicated. Assembly shall be recess mounted. Cabinet shall be located centrally behind the door and

shall contain a minimum of two shelves. Door hinges shall be stainless steel or carbon steel. Magnets used in door catches shall be permanent type. Doors shall be with a mirror.

2.2.4 Mirrors, Glass (MG)

Glass for mirrors shall be Type I transparent flat type, Class 1-clear. Glazing Quality q1 1/4 inch thick conforming to ASTM C 1036. Glass shall be coated on one surface with silver coating, copper protective coating, and mirror backing paint. Silver coating shall be highly adhesive pure silver coating of a thickness which shall provide reflectivity of 83 percent or more of incident light when viewed through 1/4 inch thick glass, and shall be free of pinholes or other defects. Copper protective coating shall be pure bright reflective copper, homogeneous without sludge, pinholes or other defects, and shall be of proper thickness to prevent "adhesion pull" by mirror backing paint. Mirror backing paint shall consist of two coats of special scratch and abrasion-resistant paint and shall be baked in uniform thickness to provide a protection for silver and copper coatings which will permit normal cutting and edge fabrication.

2.2.5 Omitted

2.2.6 Mirror, Tilt (MT)

Tilt mirror shall be surface mounted and shall provide full visibility for persons in a wheelchair. Mirror shall have adjustable tilt, extending at least 4 inches from the wall at the top and tapering to 1 inch at the bottom. Size shall be in accordance with the drawings. Glass for mirrors shall conform to ASTM C 1036 and paragraph Glass Mirrors.

2.2.7 Paper Towel Dispenser (PTD)

Paper towel dispenser shall dispense C-fold towels and shall be constructed of not less than 0.269 inch Type 304 stainless steel, and shall be surface or recessed mounted as indicated. Dispenser shall have a towel compartment. Locking mechanism shall be tumbler key lock.

2.2.8 Combination Paper Towel Dispenser/Waste Receptacle Units (PTDWR)

Dispenser/receptacle shall be recessed and shall have a capacity of 600 sheets of C-fold, single-fold, or quarter-fold towel. Waste receptacle shall be designed to be locked in unit and removable for service. Locking mechanism shall be tumbler key lock. Waste receptacle shall have a capacity of 12 gallons. Unit shall be fabricated of not less than 0.30 inch stainless steel welded construction with all exposed surfaces having a satin finish. Waste receptacle that accepts reusable liner standard for unit manufacturer shall be provided.

2.2.9 Sanitary Napkin Disposer (SND)

Sanitary napkin disposal shall be constructed of Type 304 stainless steel with removable leak-proof receptacle for disposable liners. Fifty disposable liners of the type standard with the manufacturer shall be provided. Receptacle shall be retained in cabinet by tumbler lock. Disposer shall be provided with a door for inserting disposed napkins, and shall be recessed, partition mounted, double access or surface mounted as indicated.

2.2.10 Sanitary Napkin and Tampon Dispenser (SNTD)

Sanitary napkin and tampon dispenser shall be surface mounted or recessed as indicated. Dispenser, including door shall be Type 304 stainless steel and shall dispense both napkins and tampons with a minimum capacity of 20 each. Dispensing mechanism shall be for coin operation. Coin mechanisms shall have minimum denominations of 10 cents, 25 cents, 50 cents. Doors shall be hung with a full-length corrosion-resistant steel piano hinge and secured with a tumbler lock. Keys for coin box shall be different from the door keys.

2.2.11 Shower Curtain (SC)

Shower curtain shall be size to suit conditions. Curtain shall be anti-bacterial nylon/vinyl fabric. Color shall be white. Shower curtain shall be provided with Type 304 stainless steel shower curtain hooks, hook snap type, one for each hole in curtain.

2.2.12 Shower Curtain Rods (SCR)

Shower curtain rods shall be Type 304 stainless steel 1-1/4 inch OD by 0.049 inch minimum straight to meet installation conditions.

2.2.13 Soap Dispenser (SD)

Soap dispenser shall be surface mounted, liquid type consisting of a vertical Type 304 stainless steel tank with holding capacity of 40 fluid ounces with a corrosion-resistant all-purpose valve that dispenses liquid soaps, lotions, detergents and antiseptic soaps.

2.2.14 Soap Holder (SH)

Soap holder shall be recessed Type 304 stainless steel. Separate supports shall be stainless steel.

2.2.15 Shelf, Metal, Heavy Duty (SMHD)

Heavy duty metal shelf shall be minimum of 18 gauge stainless steel with hemmed edges. Shelves over 30 inches shall be provided with intermediate supports. Supports shall be minimum of 16 gauge, shall be welded to the shelf, and shall be spaced no more than 30 inches apart.

2.2.16 Shelf, Metal, Light Duty (SMLD)

Light duty metal shelf shall be supported between brackets or on brackets. Brackets shall prevent lateral movement of the shelf. Shelf shall be 18 inches or 24 inches long. Shelf and brackets shall be stainless steel.

2.2.17 Soap and Grab Bar Combination, Recessed (SGR)

Soap and grab bar combination shall be recessed type and shall be Type 304 stainless steel, satin finish.

2.2.18 Towel Bar (TB)

Towel bar shall be stainless steel with a minimum thickness of .015 inch. Bar shall be minimum 3/4 inch diameter. Finish shall be satin.

2.2.19 Towel Pin (TP)

Towel pin shall have concealed wall fastenings, and a pin integral with or permanently fastened to wall flange. Maximum projection shall be 4 inches. Design shall be consistent with design of other accessory items. Finish shall be satin.

2.2.20 Toilet Tissue Dispenser (TTD)

Toilet tissue holder shall be surface mounted with one or two rolls of standard tissue as indicated mounted horizontally.

2.2.21 Omitted

2.2.22 Toothbrush and Tumbler Holder (TTH)

Toothbrush and tumbler holder shall be stainless steel, surface mounted. Holder shall hold a minimum of four toothbrushes in a vertical position. Size of hole for securing tumbler shall be 2-1/4 plus or minus 1/8 inch in diameter.

2.2.23 Waste Receptacle (WR)

Waste receptacle shall be Type 304 stainless steel, designed for recessed or surface mounting as indicated. Reuseable liner, of the type standard with the receptacle manufacturer, shall be provided. Capacity shall be not less than 1.5 cubic feet. Receptacles with push doors and doors for access to the waste compartment shall have continuous hinges. Locking mechanism shall be tumbler key lock.

2.2.24 Omitted

2.2.25 Mop and Broom Rack (MBR)

Mop and broom holder shall be surface mounted to stainless steel mounting base with three spring-loaded, rubber cam holders to accommodated handles from 7/8 inch to 1-1/4 inch diameter. Holder shall be 24 inches wide.

2.2.26 Multipurpose Unit (MPU)

Paper towel dispenser shall dispense C-fold towels and shall be constructed to not less than 0.269 inch type 304 stainless steel and shall be recessed mounted. Dispenser shall have a towel compartment and a mirror door and liquid soap dispenser. Locking mechanism shall be tumbler key lock.

2.2.27 Robe Hook (RH)

Robe hook shall be type 304 stainless steel and shall have concealed wall fastenings and a pin integral with or permanently fastened to wall flange. Maximum projection shall be 2 inches. Design shall be consistent with design of other accessory items.

PART 3 EXECUTION

3.1 INSTALLATION

Toilet accessories shall be securely fastened to the supporting construction in accordance with the manufacturer's approved instructions. Accessories shall be protected from damage from the time of installation until acceptance.

3.2 CLEANING

Material shall be cleaned in accordance with manufacturer's recommendations. Alkaline or abrasive agents shall not be used. Precautions shall be taken to avoid scratching or marring of surfaces.

-- End of Section --

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DIVISION 10 - SPECIALTIES

SECTION 10900

LOCKERS

12/97

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SAVH-10900 (12/97)

SECTION 10900

LOCKERS
12/97

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings

Lockers showing anchorage. Fastenings and methods of installation as specified.

SD-03 Product Data

Manufacturer's Literature

Locker manufacturer's literature and data.

SD-04 Samples

Lockers

Six-inch square metal panel of lockers, showing color.

1.2 QUALITY ASSURANCE

Lockers shall be products of manufacturers regularly engaged in manufacturing lockers of type specified and as detailed on drawings.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Sheet Steel

2.1.1.1 Cold Rolles

Cold rolled, stretcher leveled for doors and door frames.

2.1.1.2 Mild Annealed

Mild annealed, cold rolled for other parts.

2.1.2 Rubber or Vinyl Base

FS SS-W-40, Type I (rubber), or Type II (vinyl), Class 1 or 2, Style B, 1/8 inch thick.

2.2 FABRICATION

2.2.1 General

Lockers shall be Type I (single-tier) or Type II (double-tier) as indicated on drawings. Size lockers as detailed, with sloping tops. Furnish lockers as individual units or in batteries of two, with a common dividing panel and common sloping top. No bolts shall be exposed on front of lockers. Fabricate double-tier lockers as a single unit.

2.2.2 Interior Equipment

Lockers shall have one double prong ceiling hook and three single prong wall hooks. Hooks to be steel, ball tip, cadmium plated, attached with two bolts per hook.

2.2.3 Numbering

Number lockers consecutively. Number plates shall be polished aluminum with black numerals not less than 3/8 inch high, attached near top center of door with pop rivets.

2.2.4 Sheet Steel

Sheet steel 0.0478 gauge. Height of slope shall be approximately one-third the depth of the locker. Provide filler plates and closures as specified. Fasten sloping tops with oval-head sheet metal screws inserted from interior. Exposed ends of sloping tops shall have flush closures fastened as recommended by manufacturer.

2.2.5 Base

Where indicated on drawings over concrete base, provide ceramic tile base.

2.2.6 Spacers

Where lockers are fastened to walls, provide spacers, permanently mounted on lockers at each fastener. Thickness of spacers as required to fill space between back of locker and wall face. Spacer shall be designed so wall face or back of locker is not deformed when fastener is tightened.

2.2.7 Locking Device

Doors shall be latch clips engaging the door frame at two points. Locking device to be positive, automatic type, whereby locker door may be locked when open, then closed without unlocking. One rubber silencer shall be provided at each latch hook and shall be firmly secured in the frame.

2.2.8 Handles

All parts shall be chrome-plated, die cast zinc alloy. No moving parts are to operate on the outside surface of the locker. Padlock attachment to be integral part of lift which shall be attached directly to locking bar. Handle to provide built-in padlock strike.

2.2.9 Ventilation

Door shall be louvered at top and bottom with groups of four louvers minimum.

2.2.10 Anchoring and Filler Panels

Lockers shall be of the built-in type and anchored to base and wall as indicated or recommended by manufacturer. Adjustable corner filler/closure panels and flat top corner filler panels shall be provided where required.

2.2.11 Locker Sizes

Lockers shall be sized as shown on the drawings.

2.3 FASTENERS

2.3.1 Securing Lockers

For securing lockers to adjoining construction; toggle or expansion bolts, 1/4 inch in diameter, or other appropriate size and type of fastenings as required for each specific type installation.

2.3.2 Fastenings

Where type, size, or spacing of fastenings is not shown or specified, submit shop drawings for approval showing proposed fastenings and method of installation.

2.4 CLOSURES

Closures for openings larger than 1/4 inch wide between lockers and adjacent walls; either 0.0478 gauge flat steel closure strips, scribed to required contours, or 0.0359 gauge machined formed fillers with returns.

2.5 FINISH

2.5.1 Locker Finish

Finish lockers with baked-on enamel. Color of finish shall be as shown in Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

2.5.2 Closure Finish

Finish closure strips and filler plates same color as lockers.

2.6 LOCKER BENCHES

Locker benches shall be constructed of hardwood with rounded edges on all sides and shall be finished with two coats of satin-gloss sealer. Pedestals shall be round enameled steel with base and top flanges. Pedestals shall be secured to bench at top and anchored to floor at bottom with suitable fasteners and shall be spaced as per manufacturer's recommendations. Pedestal color shall match locker color.

PART 3 EXECUTION

3.1 ANCHORAGE TO WALLS

Except as otherwise shown, anchor each locker through back near top and

bottom with wood screws in wood members.

3.2 INSTALLATION

3.2.1 Closures

Secure closures with sheet metal screws to tubular or channel members of units, or with bolts where exposed on inside.

-- End of Section --

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SECTION 10902

TA-50 STORAGE LOCKERS

10/97

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SAVH-10901 (10/97)

SECTION 10902

TA-50 STORAGE LOCKERS
10/97

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123	(1989a) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 525	(1990) Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Storage Lockers

Detail drawings indicating locker layout, materials, member size, thickness, gauge, hardware, fasteners and construction details. Drawings shall include catalog cuts, erection details, manufacturer's descriptive data and installation instruction.

1.3 GENERAL DESCRIPTION

TA-50 storage lockers shall be single lockers as indicated on the drawings meeting the following minimum specifications. Lockers shall be sized as shown on the drawings. The Contractor shall verify all measurements and shall take all field measurements necessary before fabrication. Items specified to be galvanized, when practicable and not indicated otherwise, shall be hot-dip galvanized after fabrication. Galvanizing shall be in accordance with ASTM A 123, ASTM 446, or ASTM A 525, as applicable. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Poor matching of holes for fasteners shall be cause for rejection. Thickness of metal and details of assembly and supports shall provide strength and stiffness.

1.4 WORKMANSHIP

Drilling and punching shall produce clean true lines and surfaces. Exposed surfaces of work in place shall have a smooth finish. Corner joints shall

be well formed, and in true alignment. Work shall be accurately set to established lines and elevations and securely fastened in place. Installation shall be in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

1.5 ANCHORAGE

Anchorage shall be provided for fastening lockers securely in place. Anchorage to concrete shall be as recommended by the locker manufacturer.

PART 2 PRODUCTS

2.1 LOCKERS

Lockers shall be heavy duty, all welded ventilated type. Locker units shall be welded at all seams and joints with all exposed welds sanded smooth. There shall be no bolts, rivets or screws used in the construction of the main locker unit.

2.1.1 Tops, Bottoms, Shelves, and Filler Panels

All tops, bottoms, shelves, and filler front and top panels shall be constructed of .059 inch minimum thick cold rolled sheet steel.

2.1.2 Sides, Intermediate Partitions and Backs

All sides, intermediate partitions and backs shall be constructed of .089 inch minimum thick flattened expanded metal welded to angle iron frames with all exposed edges bond sheared. Perforated metal with a minimum free area of 50 percent may be substituted for expanded metal.

2.1.3 Frames

Frames shall be constructed of 1 inch by 1 inch by 1/8 inch minimum angle iron steel continuously welded.

2.1.4 Doors

Double doors shall be framed with 1 inch by 1 inch by 1/8 inch minimum angle iron steel and infilled with .089 inch minimum thick flattened expanded metal. A .089 inch minimum thick steel panel with a .059 inch minimum thick cold rolled steel back panel shall be welded to the center span of the door. Doors shall have a three-point three-sided cremone latch and shall be padlockable. Perforated metal with a minimum free area of 50 percent may be substituted for expanded metal.

2.1.5 Hinges

Door shall be hinged with minimum five-knuckle heavy duty steel pin butt hinges welded to both door and locker frame. Provide three hinges for single tier doors.

2.1.6 Number Plate

Provide one aluminum number plate on each locker door with number etched on face of plate. Lockers grouped in each individual room or space shall be numbered in sequential order.

2.1.7 Hooks

Two single wall hooks shall be provided in each locker less than 24 inches wide and three hooks shall be provided in spaces over 24 inches wide. One double ceiling hook shall be provided in double tier lockers. Hooks shall be forged steel with ball ends and be zinc plated.

2.1.8 Clothes Rod

Provide a galvanized or stainless steel clothes rod in place of ceiling hook in single tier lockers. Rod shall be mounted from side to side of locker space and be attached to side panels.

2.1.9 Base

Closed welded steel base minimum .075 inch thick shall be welded to locker bottom and be enclosed on all four sides. Base shall be approximately 4 inches high.

2.1.10 Finish

Exposed steel parts shall be given a coat of rust inhibitive phosphate treatment and then finished with a heavy coat of high quality baked enamel. Unless otherwise indicated in Section 09000 BUILDING COLOR AND FINISH SCHEDULE, color shall be manufacturer's standard tan or gray.

PART 3 EXECUTION

3.1 INSTALLATION

TA-50 storage lockers shall be installed in place in accordance with the approved manufacturer's installation instructions. Anchorage to concrete base shall be according to the manufacturer's recommendations.

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SECTION 10999

FIRE EXTINGUISHER CABINETS

10/97

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SAVH-10999 (10/97)

SECTION 10999

FIRE EXTINGUISHER CABINETS
10/97

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings

Shop drawings shall indicate thickness of materials, depth of cabinet and installation procedures.

1.2 GENERAL REQUIREMENTS

The contract drawings indicate the locations and details for the various sized extinguishers.

PART 2 PRODUCTS

2.1 FIRE EXTINGUISHER CABINETS

Provide flat trim fully recessed; 2-1/2 inch rolled edge semirecessed, fully recessed, or surface-mounted cabinets as indicated at locations shown on drawings. Cabinet shall have minimum interior box dimensions of 30 inches high, 12 inches wide and 8 inches deep. The fire extinguishers shall be furnished by the Government.

2.1.1 Materials

The cabinets at the barracks shall be constructed of 20 gauge mill finish aluminum. All other cabinets shall be constructed of minimum 18-gauge steel with a white baked enamel surface. Trim and doors at the barracks are to be constructed of extruded aluminum with satin anodized finish. Trim and doors at all other locations shall be steel prefinished with manufacturer's standard epoxy or polyester paint finish. Colors shall be as indicated in Section 09000 BUILDING COLOR AND FINISH SCHEDULE. All corners at trim and doors shall be mitered. Doors are to be full glass and are to be glazed with tempered glass. Doors shall be fully hinged with piano type hinge and furnished with handle and latch unless noted otherwise on drawings.

2.1.2 Fire Rated Cabinets

At all locations where recessed or semi-recessed cabinets are shown in fire-rated wall construction, cabinet shall be fire rated to maintain wall rating. Fire rated cabinets shall be fabricated in accordance with ASTM E

814 and shall be labeled for the required fire rating with a label from a nationally recognized testing laboratory such as UL or Warnock-Hersey.

2.1.3 ADA Compliant Cabinets

Cabinets located in corridors or passageways in the Battalion Headquarters building shall have hardware and configuration such that no portion of the unit projects more than 4 inches from the wall face.

PART 3 EXECUTION

3.1 INSTALLATION

Cabinets shall be installed in accordance with approved instructions. Extinguisher cabinets shall be installed so that top is no more than 5 feet above the floor.

3.2 CLEANING

Windows of doors shall be cleaned on both exterior and interior.

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SECTION 11020

SECURITY VAULT DOOR

12/97

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3.1 INSTALLATION

-- End of Section Table of Contents --

CEGS-11020 (December 1997)

SECTION 11020

SECURITY VAULT DOOR
12/97

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

FEDERAL SPECIFICATIONS (FS)

FS AA-D-00600 (Rev B) Door, Vault, Security

1.2 GENERAL REQUIREMENTS

The vault door unit shall be a steel security-vault type door with frame, day gate, and ramp type threshold, and shall be a standard product of a manufacturer specializing in this type of fabrication.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Vault Door and Frame

Manufacturer's catalog data including catalog cuts and brochures. The data shall show that the proposed vault door unit conforms with the requirements in FS AA-D-00600, and has been tested and approved by the General Services Administration (GSA).

SD-07 Certificates

Vault Door and Frame

Certification shall state that vault-door units that do not bear the GSA label are constructed to Class 5 standards.

1.4 DELIVERY AND STORAGE

Door and frame assemblies shall be delivered to the jobsite in a protective covering with the brand and name clearly marked thereon. Materials delivered to the jobsite shall be inspected for damage, and unloaded with a minimum of handling. Storage shall be in a dry location with adequate ventilation, free from dust, water, and other contaminants, and which

permits easy access for inspection and handling. Door assemblies shall be stored off the floor on nonabsorptive strips or wood platforms. Damage to doors and frames shall be prevented during handling. Damaged items that cannot be restored to like-new condition shall be replaced.

PART 2 PRODUCTS

2.1 VAULT DOOR AND FRAME

Design and construction of the door and frame assembly shall conform to FS AA-D-00600. The door shall be Class 5, Type IIR - right opening swing without optical device or IIL - left opening swing without optical device as indicated, K - key change combination lock.

2.2 DAY GATE

The day gate shall be the manufacturer's standard product designed for use with the vault door furnished, and shall provide access control and visual security. The gate shall be hinged on the same side as the vault door, shall swing into the vault, and shall have a locking device operable from outside by key and from inside by knob or handle.

2.3 DUTCH DAY GATE

The day gate shall be a dutch type wire mesh partition door with a 3 mm thick minimum metal shelf full width of door by 12 inches deep on the lower leaf. The gate shall be hinged on the same side as the vault door and swing into the vault. The lower leaf shall have a locking device operable from outside by key and from inside by knob or handle. The upper leaf shall have a barrel bolt locking device for locking into the lower leaf. Wire mesh fabric and framing shall be as specified in Section 05500A MISCELLANEOUS METAL.

PART 3 EXECUTION

3.1 INSTALLATION

The vault door assembly shall be installed in strict compliance with the printed instructions and drawings provided by the manufacturer. The day gate shall be installed in a manner that will not interfere with operation of the release handle on the inside of the vault door. After installation, the door, the locking mechanism, and the inner escape device shall be adjusted for proper operation.

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DIVISION 11 - EQUIPMENT

SECTION 11133

KITCHEN EQUIPMENT (Range Hoods for Barracks Building)

6/01

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3.1 MAINTAINABILITY

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SAVH-11133 (June 2001)

SECTION 11133

KITCHEN EQUIPMENT
(Range Hoods for Barracks Building)
6/01

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Provide manufacturer's product data sheets and catalog cuts on the range/oven, range hood and dishwasher.

PART 2 PRODUCTS

2.1 OMITTED

2.2 RANGE HOODS (BARRACKS BUILDINGS)

Provide metal range hoods, the same length and finish as the range, with separately switched light and exhaust fan. The hood shall have a washable filter. The fan shall have a capacity of not less than 50 cubic feet per minute per linear foot of range hood. The sound level of the fan shall not exceed 6 sones. Duct the fan to the exterior, with a weatherproof cap. The range hood fan and light will be on a separate circuit from the fire alarms system so that the alarm circuit will not trip off in case of range fire.

2.3 OMITTED
2.4 OMITTED

2.5 COLOR AND MANUFACTURE

Appliances, except disposals, shall be of the same manufacture, and have matching finish, white or off-white in color.

PART 3 EXECUTION

3.1 MAINTAINABILITY

The design, including the selection and specifying of exterior and interior finishes, equipment, appliances, and systems, shall include consideration of maintenance ease and cost. Avoid products that require continuing maintenance at high cost.

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SECTION 12320

CABINETS AND COUNTERTOPS

05/98

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CEGS-12320 (May 1998)

Includes changes through Notice 2 (April 1999)

SECTION 12320

CABINETS AND COUNTERTOPS
05/98

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA A156.9	(1994) Cabinet Hardware

KITCHEN CABINET MANUFACTURERS ASSOCIATION (KCMA)

KCMA ANSI/KCMA A161.1	(1995) Performance & Construction Standards for Kitchen and Vanity Cabinets

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA LD 3	(1995) High-Pressure Decorative Laminates

1.2 DESIGN

Cabinets shall be wood, factory-fabricated and finished in the manufacturer's standard sizes and finishes of the type, design, and configuration indicated. Cabinets shall be constructed as specified and shall meet the requirements of KCMA ANSI/KCMA A161.1. Wall and base cabinet assemblies shall consist of individual units joined into continuous sections. Fastenings shall be accomplished to permit removal and replacement of individual units without affecting the remainder of the installation. Counters shall be provided with watertight sink rim when indicated. Drawers shall be removable and shall be equipped with position stops to avoid accidental complete withdrawals. Shelves shall be fixed or adjustable as indicated.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation

Drawings showing each type of cabinet and related item, and clearly indicating the complete plan, location, and elevations of the cabinets and accessories and pertinent details of construction, fabrication, and attachments.

SD-03 Product Data

Cabinets
Countertops and Backsplash

Manufacturer's printed data, catalog cuts, installation and cleaning instructions.

SD-04 Samples

Cabinets
Countertops and Backsplash

In lieu of individual samples, complete minimum size cabinets may be furnished as samples. Mock-up units are not acceptable. Samples shall be of sufficient size to show color, pattern, and method of assembly.

a. Countertop and backsplash - One section, containing both.

b. Door and drawer front - One of each, with hardware mounted.

c. Countertop color samples approximately 2 x 3 inches size.

d. Stain/color samples approximately 2 x 3 inches size.

SD-06 Test Reports

Cabinets and Countertops

Test reports certifying that all cabinets comply with the requirements of KCMA ANSI/KCMA A161.1. Tests shall be conducted by independent laboratories approved by KCMA. KCMA certification seals affixed to the cabinets will be accepted in lieu of certified test reports.

1.4 DELIVERY AND STORAGE

Cabinets shall be delivered to the jobsite wrapped in a protective covering. Cabinets shall be stored in accordance with manufacturer's recommendations in an adequately ventilated, dry location that is free of dust, water, or other contaminants and in a manner to permit access for inspection and handling. Cabinets shall be handled carefully to prevent damage to the surfaces. Damaged items that cannot be restored to like-new condition shall be replaced.

PART 2 PRODUCTS

2.1 CABINETS

Wall and base cabinets shall be of the same construction and same outside appearance. Door design shall be solid flush face as indicated. Shelves

shall be fixed or fully adjustable as indicated. Adjustable shelves shall be capable of adjusting on approximately 1 inch increments. Shelves shall be supported by self-locking clips on recessed metal standards. Shelves shall be minimum 3/4 inch thick plywood. Drawer fronts shall be as indicated. Particle board core plywood shall not be permitted.

2.1.1 Frame Type Cabinets

The cabinets shall be constructed with frame fronts and solid ends, or frame construction throughout. Frame members shall be 3/4 inch thick by 1-1/2 inch wide; kiln-dried hardwood, glued together, and shall be either mortised and tenoned, dovetailed or doweled, nailed, stapled or screwed. Top and bottom corners shall be braced with either hardwood blocks that are glued together with water resistant glue and nailed in place, or metal or plastic corner braces. Backs of wall cabinets shall be 1/4 inch thick plywood or tempered hardboard. Backs of base and tall cabinets shall be 3/8 inch thick hardwood. Bottoms of cabinets shall be minimum 3/4 inch thick plywood sound grade plywood and shall be braced with wood members glued in place. Cabinet ends shall be 5/8 inch thick hardwood plywood.

2.2 COUNTERTOPS AND BACKSPLASH

2.2.1 High-Pressure Laminated Plastic Clad Countertops

Clad countertop and backsplash shall be constructed of 3/4 inch thick plywood and shall be post formed cove type or fully formed type. Cove type shall be a single unit with self-edging and plastic laminate coved at the juncture of the countertop and backsplash. Fully formed type or square edge shall be a unit with shaped edges using wood nose molding at counter edge and shall include a separate backsplash. Backsplash shall be not less than 3-1/2 inches high. Edging and trim shall consist of plastic laminate cut and fitted to all exposed edges or solid hardwood lumber trim as indicated. End splashes constructed of 3/4 inch plywood. Continuous sheets of longest lengths practicable shall be provided. Joints in surface sheeting shall be tight and flush and held to a practicable minimum. When the countertop and backsplash are two separate units, GP50 plastic laminate shall be used. When the countertop and backsplash are one unit, PF42 plastic laminate shall be used. Plastic laminate shall conform to the requirements of NEMA LD 3 and plastic laminate adhesive shall be contact type applied to both surfaces. For fully formed and cove type countertops, the post-forming plastic laminate shall not be bent to a radius smaller than the limit recommended by the plastic manufacturer.

2.3 Sink/Lavatory Rims

Sink/lavatory rims shall be of the corrosion resistant steel clamping type, sized to the sink, and a standard product of a manufacturer regularly producing this type of equipment.

2.4 FINISH

2.4.1 Cabinet Finish

Cabinets shall be provided with a factory-applied durable finish in accordance with KCMA ANSI/KCMA A161.1 requirements and of a type standard with the manufacturer. Natural finish wood doors, drawer fronts, cabinet fronts, and exposed cabinet sides shall be fabricated of wood which will be free of extreme color variations within each panel or between adjacent panels. Exposed exterior surfaces shall be hardwood or grade A-A hardwood

veneer with natural stain and sprayed on factory applied finish or plastic laminated finish as indicated.

2.4.2 Omitted

2.4.3 Backer Sheets

Backer Sheets of high pressure plastic laminate, shall conform to NEMA LD 3, Grade BK20 and shall be applied to the underside of all core material.

2.5 HARDWARE

Hardware shall conform to BHMA A156.9, shall be suitable for kitchen cabinet use, and shall include all miscellaneous hardware for a complete installation. Door hinges shall be self-closing type. Drawer runners shall have nylon rollers standard with the manufacturer.

2.6 COLOR, TEXTURE, AND PATTERN

Design, color, and finish shall be as specified in Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

PART 3 EXECUTION

3.1 INSTALLATION

Cabinets shall be installed level, plumb, and true to line, and shall be attached to the walls or floors with suitable devices to securely anchor each unit. Countertops, accessories, and hardware shall be installed as indicated on the drawings. Installation shall be in accordance with the manufacturer's approved printed instructions. The inner edge of sink cut-outs in laminated plastic tops shall be painted with a coat of semigloss enamel paint and sink flanges shall be set in a bed of sealant. Closer and filler strips and finish moldings shall be provided as required. Prior to final acceptance, doors shall be aligned, and hardware shall be adjusted.

3.2 CLEANING

Cabinet and countertop surfaces shall be cleaned in accordance with manufacturer's instructions.

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SECTION 12490

WINDOW TREATMENT

01/98

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2.1.1.2 Controls
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PART 3 EXECUTION

3.1 WINDOW TREATMENT PLACEMENT SCHEDULE
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-- End of Section Table of Contents --

CEGS-12490 (January 1998)

SECTION 12490

WINDOW TREATMENT
01/98

PART 1 WORK DESCRIPTION

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

FEDERAL SPECIFICATIONS (FS)

FS AA-V-00200 (Rev B) Venetian Blinds

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Approved Detail Drawings

Drawings showing fabrication and installation details. Drawings shall show layout and locations of track, direction of draw, mounting heights, and details.

SD-03 Product Data

Window Treatments
Hardware

Manufacturer's data composed of catalog cuts, brochures, product information, and maintenance instructions.

SD-04 Samples

Window Treatments

Three samples of each type and color of window treatment. Blind slats or louvers shall be 6 inches in length for each color. Track shall be 6 inches in length. Shade material shall be minimum 6 x 6 inches in size.

1.3 GENERAL

Window treatment shall be provided, complete with necessary brackets, fittings, and hardware. Each window treatment type shall be a complete

unit provided in accordance with paragraph WINDOW TREATMENT PLACEMENT SCHEDULE. Equipment shall be mounted and operated as indicated. Windows to receive a treatment shall be completely covered. The Contractor shall take measurements at the building and shall be responsible for the proper fitting and hanging of the equipment.

1.4 DELIVERY, STORAGE, AND HANDLING

Components shall be delivered to the jobsite in the manufacturer's original packaging with the brand or company name, item identification, and project reference clearly marked. Components shall be stored in a dry location that is adequately ventilated and free from dust, water, or other contaminants and shall have easy access for inspection and handling. Materials shall be stored flat in a clean dry area with temperature maintained above 50 degrees F.

1.5 FIELD MEASUREMENTS

The Contractor shall become familiar with details of the work, verify dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing the work.

1.6 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 WINDOW BLINDS

Each blind, including hardware, accessory items, mounting brackets and fastenings, shall be provided as a complete unit produced by one manufacturer. All parts shall be one color unless otherwise shown, and match the color of the blind slat. Steel features shall be treated for corrosion resistance.

2.1.1 Horizontal Blinds

Horizontal blinds shall conform to FS AA-V-00200, Type II (1 inch slats), except as modified below. Blind units shall be capable of nominally 180 degree partial tilting operation and full-height raising. Blinds shall be inside or outside mount as shown.

2.1.1.1 Head Channel and Slats

Head channel shall be steel or aluminum nominal 0.024 for Type II. Slats shall be aluminum, not less than 0.008 inch thick, and of sufficient strength to prevent sag or bow in the finished blind. A sufficient amount of slats shall be provided to assure proper control, uniform spacing, and adequate overlap.

2.1.1.2 Controls

The slats shall be tilted by a transparent tilting wand, hung vertically by its own weight, and shall swivel for easy operation. The tilter control shall be of enclosed construction. Moving parts and mechanical drive shall be made of compatible materials which do not require lubrication during normal expected life. The tilter shall tilt the slats to any desired angle

and hold them at that angle so that any vibration or movement of ladders and slats will not drive the tilter and change the angle of slats. A mechanism shall be included to prevent over tightening. The wand shall be of sufficient length to reach to within 5 feet of the floor.

2.1.1.3 Intermediate Brackets

Intermediate brackets shall be provided for installation of blinds over 48 inches wide and shall be installed as recommended by the manufacturer.

2.1.1.4 Hold-Down Brackets

Universal type hold-down brackets for sill or jamb mount shall be provided.

2.2 OMITTED

2.3 COLOR

Color shall be in accordance with Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

PART 3 EXECUTION

3.1 WINDOW TREATMENT PLACEMENT SCHEDULE

Window blinds shall be provided as indicated in Section 09000 BUILDING COLOR AND FINISH SCHEDULE.

3.2 INSTALLATION

Installation shall be in accordance with the approved detail drawings and manufacturer's installation instructions. Units shall be level, plumb, secure, and at proper height and location relative to window units. The Contractor shall furnish and install supplementary or miscellaneous items in total, including clips, brackets, or anchorages incidental to or necessary for a sound, secure, and complete installation. Installation shall not be initiated until completion of room painting and finishing operations. Upon completion of the installation, window treatments shall be adjusted for form and appearance, shall be in proper operating condition, and shall be free from damage or blemishes. Damaged units shall be repaired or replaced by the Contractor as directed by the Contracting Officer.

-- End of Section --