US Army Corps
of Engineers
Savannah District

Fort Stewart
Georgia

Solicitation Number
DACA21-02-B-0010
Troop and Family Care Medical Clinic
FY-02, Line Item 53947
Volume II of III
Technical Provisions – Divisions 3 through 12
June 2002

THIS SOLICITATION IS UNRESTRICTED PURSUANT TO THE "BUSINESS OPPORTUNITY DEVELOPMENT REFORM ACT OF 1988" (PUBLIC LAW 100-656)

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CONCRETE REINFORCEMENT

09/97

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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 318M	(1995) Building Code Requirements for Structural Concrete and Commentary (Metric)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

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 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 C 1116	(1995) Fiber-Reinforced Concrete and Shotcrete

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; G|AE

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-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 OMITTED

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 OMITTED

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.

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 precast concrete blocks. Precast concrete blocks shall be not less than 100 by 100 mm when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete. 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.

2.7 SYNTHETIC FIBER REINFORCEMENT

Synthetic fiber shall be polypropylene with a denier less than 100 and a nominal fiber length of 50 mm.

PART 3 EXECUTION

3.1 REINFORCEMENT

Reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318M . 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 318M 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 318M . 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 318M and shall be made only as required or indicated. Splicing shall be by lapping. 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 150 mm.

3.2 WELDED-WIRE FABRIC PLACEMENT

Welded-wire fabric shall be placed in slabs as indicated. Lap splices shall be made in such a way that the overlapped area equals the distance between the outermost crosswires plus 50 mm. 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 1.2 m. Fabric shall be positioned by the use of supports.

3.3 OMITTED

3.4 SYNTHETIC FIBER REINFORCED CONCRETE

Fiber reinforcement shall be added to the concrete mix in accordance with zthe applicable sections of ASTM C 1116 and the recommendations of the manufacturer.

-- End of Section --

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DIVISION 03 - CONCRETE

SECTION 03300

CAST-IN-PLACE STRUCTURAL CONCRETE

09/95

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SECTION 03300

CAST-IN-PLACE STRUCTURAL CONCRETE
09/95

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.

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 214.3R	(1988) Simplified Version of the Recommended Practice for Evaluation of Strength Test Results of Concrete
ACI 305R	(1991) 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	(1998) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(19999a) Concrete Aggregates
ASTM C 39	(1996) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 42	(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	(1999) Ready-Mixed Concrete
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 143	(1998) Slump of Hydraulic Cement Concrete
ASTM C 150	(1998a) 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	(1998) 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	(1998) Air-Entraining Admixtures for Concrete

ASTM C 309	(1998a) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494	(1999) Chemical Admixtures for Concrete
ASTM C 578	(1995) Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 618	(1999) 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 989	(1999) Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
ASTM C 1017	(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	(1995) Fiber-Reinforced Concrete and Shotcrete
ASTM C 1240	(1999) 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	(1995) Water Vapor Transmission of Materials
ASTM E 1155M	(1996) Determing Floor Flatness and Levelness Using the F-Number System (Metric)

CORPS OF ENGINEERS (COE)

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 OMITTED

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

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.

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

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 Floors by the F-Number System

The flatness and levelness of floors shall be carefully controlled and the tolerances shall be measured by the F-Number system of Paragraph 4.5.6 and 4.5.6.1 of ACI 117/117R. The Contractor shall furnish an approved floor profilograph or other equipment capable of measuring the floor flatness (FF) number and the floor levelness (FL) number in accordance with ASTM E 1155M . The Contractor shall perform the tolerance measurements within 72 hours after floor slab construction while being observed by the Contracting Officer. The tolerances of surfaces beyond the limits of ASTM E 1155M (the areas within 600 mm of embedments and construction joints) shall be acceptable to the Contracting Officer. Tolerances of the following areas shall meet the requirements for the listed surfaces as specified in paragraphs 4.5.6 and 4.5.6.1 of ACI 117/117R.

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
20 MPa at 28 days	Unless noted otherwise on the drawings

a. Evaluation of Concrete Compressive Strength. Compressive strength specimens (152 by 305 mm cylinders) shall be fabricated by the a testing lab and laboratory cured in accordance with ASTM C 31/C 31Mand tested in accordance with ASTM C 39. 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 3.5 MPa. 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 3.5 MPa 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. 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.

1.8.3 Air Entrainment

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 19 mm or smaller it shall be between 4.5 and 7.5 percent. 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.

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.

	Slump	
Structural Element	Minimum	Maximum
All structural concrete unless otherwise noted on drawings	75 mm	125 mm

When use of a plasticizing admixture conforming to ASTM C 1017 or when a Type F or G high range water reducing admixture conforming to ASTM C 494 is permitted to increase the slump of concrete, concrete shall have a slump of 50 to 100 mm before the admixture is added and a maximum slump of 200 mm at the point of delivery after the admixture is added.

1.8.5 Concrete Temperature

The temperature of the concrete as delivered shall not exceed 32 degrees C. When the ambient temperature during placing is 5 degrees C 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 12 and 25 degrees C.

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.

1.9 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. 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 subparagraph 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 withASTM C 192/C 192M. They shall be tested at 7 and 28 days in accordance with ASTM C 39. 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 Omitted

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 7 MPa 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 MPa

f'cr = f'c + 2.33S - 3.45 where units are in MPa

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 20 MPa,

f'cr = f'c + 6.9 MPa

b. If the specified compressive strength f'c is 20 to 35 MPa,

f'cr = f'c + 8.3 MPa

c. If the specified compressive strength f'c is over 35 MPa,

f'cr = f'c + 9.7 MPa

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, portland blast-furnace slag cement, or portland cement in combination with pozzolan or ground granulated blast furnace slag or silica fume 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 with a maximum 15 percent amount of tricalcium aluminate, or Type II. White portland cement shall meet the above requirements except that it may be Type I, Type II.

2.1.2 Omitted

2.1.3 Omitted

2.1.4 Pozzolan (Fly Ash)

ASTM C 618, Class C and F with the optional requirements for multiple factor, drying shrinkage, and uniformity from Table 2A of ASTM C 618. If pozzolan is used, it shall never be less than 15 percent nor more than 35 percent by weight of the total cementitious material.

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 shall be as noted on the drawings.

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, 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, 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, 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.

2.4 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, B, C, 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 0.6 mm sieve to particles passing the 2.36 mm 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 09510 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 0.15 mm (6 mils) or other equivalent material having a vapor permeance rating not exceeding 30 nanograms per Pascal per second per square meter (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 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 480 MPa graded per manufacturer, and specifically manufactured to an optimum gradation for use as concrete secondary reinforcement.

2.16 PERIMETER RIGID INSULATION

Polystyrene board shall be extruded and conform to ASTM C 578, type IV. Minimum R-value shall be 0.88 (metric) and R-50 (english); with a minimum thickness of 25 mm.

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. 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 02315EXCAVATION, 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 Omitted

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 300 mm. 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 300 mm. Lapped joints shall be sealed and edges patched with pressure-sensitive adhesive or tape not less than 50 mm 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 50 mm 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 300 mm 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, 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 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. 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 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 Omitted

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. A truck mixer may be used either for complete mixing transit-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. Water may be added at the placing site; 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. Water must also be injected prior to starting of placement of affected batch.

3.3 OMITTED

3.4 OMITTED

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 0.9 kg of fibers per cubic m of concrete shall be used. Fibers shall be added at the batch plant. 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 by approved pumping equipment.

3.7 CONVEYING CONCRETE ON SITE

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 0.2 square meters.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 1.5 cubic meters shall 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. 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 Omitted

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 100 mm. 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 30 degrees C, 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 1.5 meters 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 300 mm 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 100 mm 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 0.6 mm, 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 150 mm 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 100 mm 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 5 degrees C. The temperature of the concrete when placed shall be not less than 10 degrees C nor more than 25 degrees C. 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, 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 30 degrees C, 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 49 degrees C. 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	33 C
40-60	30 C
Less than 40	27 C

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 Omitted

3.8.8 Placing Flowable Concrete

If a plasticizing admixture conforming to ASTM C 1017 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 50 mm clear from each joint. Except where otherwise indicated, construction joints between interior slabs on grade and vertical surfaces shall consist of 1.5 kg per square meter 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, by sawing sawable inserts, or by sawing to widen the top portion of sawed joints. 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 5 meters. 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 25 mm square-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 25 mm 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 rigid inserts impressed in the concrete during placing operations 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 3 and 5 mm 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 07900 JOINT SEALING.

3.10 OMITTED

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 100 mm 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 1.18 mm 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 12 mm deep or, for Class A and B finishes, more than 12 mm in diameter and, for Class C and D finishes, more than 50 mm in diameter. Also included are any defects of any kind whose depth is over 100 mm 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 50 mm on all sides. All such defective areas greater than 7800 square mm shall be outlined by saw cuts at least 25 mm deep. Defective areas less than 7800 square mm shall be outlined by a 25 mm 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.

3.12 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 10 degrees C. 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 Omitted

3.12.3 Omitted

3.12.4 Troweled Finish

All areas 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 hair 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

The following mechanical rooms shall be treated with floor hardener. Floor hardener shall be applied after the concrete has been cured and then air dried for 14 days. Three coats shall be applied, each the day after the preceding coat was applied. For the first application, 0.5 kg of the silocofluoride shall be dissolved in 4 liters of water. For subsequent applications, the solution shall be 1.0 kg of silicofluoride to each 4 liters 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 3.75 m 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 1 m longer than one-half the width of the pavement. The surface shall then be tested for trueness with a 3.75 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 belting with approved "belt" and procedures use of a burlap drag. A strip of clean, wet burlap from 1.0 to 1.5 m wide and 0.7 m 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 3 mm. Curing shall be as specified.

3.14.2 Sidewalks

Concrete shall be 100 mm minimum thickness. Contraction joints shall be provided at 1.75 m spaces unless otherwise indicated. Contraction joints shall be cut 25 mm deep with a jointing tool after the surface has been finished. Transverse expansion joints 12 mm 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 mm per 50 mm shall be provided, unless otherwise indicated. Variations in cross section shall be limited to 1 mm per 250 mm.

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 75 mm deep with a jointing tool after the surface has been finished. Expansion joints (12 mm wide) shall be provided at 35 m maximum 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:

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 10 degrees C for the first 3 days and at a temperature above 0 degrees C 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 Membrane Forming Curing Compounds

Membrane forming curing compounds shall be used only on surfaces in the following areas, all. Membrane curing shall not be used on surfaces that are to receive any subsequent treatment depending on adhesion or bonding to the concrete, including surfaces to which a smooth finish is to be applied or other concrete to be bonded. However, a styrene acrylate or chlorinated rubber compound meeting ASTM C 309, Class B requirements, may be used for surfaces which 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. Membrane curing compound shall not be used on surfaces that are maintained at curing temperatures with free steam. Curing compound shall be applied to formed surfaces immediately after the forms are removed and prior to any patching or other surface treatment except the cleaning of loose sand, mortar, and debris from the surface. All surfaces shall be thoroughly moistened with water. Curing compound shall be applied to slab surfaces as soon as the bleeding water has disappeared, with the tops of joints being temporarily sealed to prevent entry of the compound and to prevent moisture loss during the curing period. The curing compound shall be applied in a two-coat continuous operation by approved motorized power-spraying equipment operating at a minimum pressure of 500 kPa, at a uniform coverage of not more than 10 cubic meters per L for each coat, and the second coat shall be applied perpendicular to the first coat. Concrete surfaces which have been subjected to rainfall within 3 hours after curing compound has been applied shall be resprayed by the method and at the coverage specified. Surfaces on which clear compound is used shall be shaded from direct rays of the sun for the first 3 days. Surfaces coated with curing compound shall be kept free of foot and vehicular traffic, and from other sources of abrasion and contamination during the curing period.

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 0 degrees C the temperature of the concrete shall be maintained above 5 degrees C for the first seven 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 13 degrees C as determined by suitable temperature measuring devices furnished by the Contractor, as required, and installed adjacent to the concrete surface and 50 mm 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 nonshrink grout. The thickness of the mortar or grout shall be approximately 1/24 the width of the plate, but not less than 20 mm. 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 Omitted

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 18 to 30 degrees C until after setting.

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 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 meter, amount of water as free moisture in each size of aggregate, and the batch aggregate and water weights per cubic meter 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 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 12.5 mm 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 50 mm. 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 380 cubic meters 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. A set of test specimens for concrete with a 90-day strength per the same paragraph shall consist of six specimens, two tested at 7 days, two at 28 days, and two at 90 days. Test specimens shall be molded and cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39 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 meters per Liter, 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 60,000 cubic meters of concrete placed, whichever results in the shortest time interval, uniformity of concrete mixing shall be determined in accordance with ASTM C 94.

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. 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.

-- End of Section --

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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	(1998) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 615/A 615M	(1996ael) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 90	(1999a) Loadbearing Concrete Masonry Units
ASTM C 91	(1999) Masonry Cement
ASTM C 140	(1999b) Sampling and Testing Concrete Masonry Units
ASTM C 270	(1999b) Mortar for Unit Masonry
ASTM C 476	(1999) Grout for Masonry
ASTM C 494/C 494M	(1999a) Chemical Admixtures for Concrete
ASTM C 641	(1982; R 1998el) Staining Materials in Lightweight Concrete Aggregates
ASTM C 780	(1996el) Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
ASTM C 1019	(1989a; R 1999) Sampling and Testing Grout
ASTM C 1072	(1999) Measurement of Masonry Flexural Bond Strength
ASTM D 412	(1998a) Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D 1004	(1994a) Initial Tear Resistance of Plastic Film and Sheeting
ASTM D 2000	(1999) Rubber Products in Automotive Applications
ASTM D 2240	(1997el) Rubber Property - Durometer Hardness
ASTM D 2287	(1996a) Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
ASTM E 96	(1995) Water Vapor Transmission of Materials
ASTM E 154	(1988; R 1999) Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
ASTM G 21	(1996) 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:

Manufacturer's descriptive data.

SD-02 Shop Drawings

Masonry Work; G|RE.

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. If the Contractor opts to furnish inch-pound CMU products, drawings showing elevation of walls exposed to view and indicating the location of all cut CMU products shall be submitted for approval. 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 to 50. Reinforcement bending details shall conform to the requirements of ACI SP-66.

SD-04 Samples

Concrete Masonry Units (CMU); G|RE.

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; G|RE.

Two of each type used.

Expansion-Joint Material; G|RE.

One piece of each type used.

Joint Reinforcement; G|RE.

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

SD-07 Certificates

Concrete Masonry Units (CMU), Control Joint Keys, Anchors, Ties, and Bar Positioners, Expansion-Joint Material, Joint Reinforcement, Reinforcing Steel Bars and Rods, Masonry Cement, Mortar Coloring, Precast Concrete Items, Mortar Admixtures and Grout Admixtures

SD-08 Manufacturer's Instructions

Cold Weather Installation; G|RE.

Cold weather construction procedures.

SD-09 Manufacturer's Field Reports

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.

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 2.5 m by 1.2 m.

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, glass block units and accessories 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 that represent reinforced masonry shall contain a 600 mm by 600 mm opening placed at least 600 mm above the panel base and 600 mm 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 and shall conform to the moisture content as specified in ASTM C 90when delivered to the jobsite. In addition, glass block units and prefaced concrete units shall be stored with their finish surfaces covered. 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. The Contractor has the option to use either hard metric or substitute inch-pound (soft-metric) CMU products. If the Contractor decides to substitute inch-pound CMU products, the following additional requirements shall be met:

a. The metric dimensions indicated on the drawings shall not be altered to accommodate inch-pound CMU products either horizontally or vertically. The 100 mm building module shall be maintained, except for the CMU products themselves.

b. Mortar joint widths shall be maintained as specified.

c. Rebars shall not be cut, bent or eliminated to fit into the inch-pound CMU products module.

d. Inch-pound CMU products shall not be reduced in size by more than one-third (1/3) in height and one-half (1/2) in length. Cut CMU products shall not be located at ends of walls, corners, and other openings.

e. Cut, exposed brick and CMU products shall be held to a minimum and located where they would have the least impact on the architectural aesthetic goals of the facility.

f. Other building components, built into the CMU products, such as window frames, door frames, louvers, grilles, fire dampers, etc., that are required to be metric, shall remain metric.

g. Additional metric guidance shall conform to Section 01415 METRIC MEASUREMENTS.

2.2 BRICK VENEER

Brick veneer masonry is specified in Section 04220, NONBEARING MASONRY VENEER/STEEL STUD WALLS.

2.3 OMITTED

2.4 CONCRETE MASONRY UNITS (CMU)

Hollow and solid concrete masonry units shall conform to ASTM C 90, Type I. 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 25 mm (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

Minimum equivalent thickness in

TABLE I

FIRE-RATED CONCRETE MASONRY UNITS

Aggregate Type	See note (a) below mm (inches) for fire rating of: 4 hours	3 hours	2 hours
Pumice	120 (4.7)	100 (4.0)	75 (3.0)
Expanded slag	130 (5.0)	110 (4.2)	85 (3.3)
Expanded clay, shale, or slate	145 (5.7)	120 (4.8)	95 (3.7)
Limestone, scoria, cinders or unexpanded slag	150 (5.9)	130 (5.0)	100 (4.0)
Calcareous gravel	160 (6.2)	135 (5.3)	105 (4.2)
Siliceous gravel	170 (6.7)	145 (5.7)	115 (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 millimeters . 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

Trim, lintels, copings, splashblocks and door sills shall be factory-made units from a plant regularly engaged in producing precast concrete units. Unless otherwise indicated, concrete shall be 28 MPa (4000 psi) minimum conforming to Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE using 13 mm (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 20 mm 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 827 kPa (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 35 kg 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 Lintels

Precast lintels, unless otherwise shown, shall be of a thickness equal to the wall and reinforced with two No. 4 bars for the full length. Top of lintels shall be labeled "TOP" or otherwise identified and each lintel shall be clearly marked to show location in the structure.

2.8.2 Sills and Copings

Sills and copings shall be cast with washes. Sills for windows having mullions shall be cast in sections with head joints at mullions and a 6 mm (1/4 inch) allowance for mortar joints. The ends of sills, except a 20 mm (3/4 inch) wide margin at exposed surfaces, shall be roughened for bond. Treads of door sills shall have rounded nosings.

2.8.3 Splash Blocks

Splash blocks shall be located as indicated on drawings. Size and 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; Type N cement-lime mortar proportions shall be 1 part cement, 1 part lime and 6 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. Mortar for prefaced concrete masonry unit wainscots shall contain aggregates with 100 percent passing the 2.36 mm sieve and 95 percent passing the 1.18 mm sieve. Pointing mortar in showers and kitchens shall contain ammonium stearate, or aluminum tri-stearate, or calcium stearate in an amount equal to 3 percent by weight of cement used. Cement shall have a low alkali content and be of one brand. Aggregates shall be from one source.

2.10.1 Mortar 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 matching the CMU. 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 200 and 250 mm. 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 Grout 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 16 mm mortar cover from either face.

2.12.1 Wire Mesh Ties

Wire mesh for tying 100 mm (4 inch) thick concrete masonry unit partitions to other intersecting masonry partitions shall be 13 mm (1/2 inch) mesh of minimum 16 gauge steel wire. Minimum lengths shall be not less than 300 mm.

2.12.2 Wall Ties

Wall ties shall be rectangular-shaped or Z-shaped fabricated of 5 mm (3/16 inch) diameter zinc-coated steel wire. Rectangular wall ties shall be no less than 100 mm (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 5 mm (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 13 mm (1/2 inch) eccentricity between each element of the tie. Play between pintle and eye opening shall be

not more than 2 mm (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, 5 mm (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 5 mm (3/16 inch) diameter steel wire, triangular-shaped. Anchors attached to steel shall be 8 mm (5/16 inch) diameter steel bars placed to provide 2 mm (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 16 mm cover from either face. The distance between crosswires shall not exceed 400 mm (16 inches). Joint reinforcement for straight runs shall be furnished in flat sections not less than 3 m (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 16 mm (5/8 inch) thick and 10 mm (3/8 inch) thick flanges, with a tolerance of plus or minus 2 mm (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 34 degrees C (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 MATERIAL

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 07900JOINT SEALING.

2.17 WATERPROOFING

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.

2.17.1 Performance Requirements

All membranes shall meet the following requirements when tested by the referenced ASTM standards:

ASTM E 154 Puncture Resistance	178 N (40 pounds), (min.)
ASTM E 96, Procedure B Water Vapor Transmission at 27 degrees C Permeance	14.4 ng per Pa per sec per sq. meter (0.25 perms), (max.)
ASTM G 21 or ASTM E 154 Resistance to Soil Bacteria or Fungi	No sustained growth or discoloration after 21 days

2.17.1.1 Plastic Elastomeric Sheeting

Membrane shall be a minimum of 1.42 mm thick and shall meet the following requirements:

ASTM D 412, Die C Textile Strength	1520 kPa (220 psi) (min.)
ASTM D 412, Die C Elongation	250 percent (min.)
ASTM D 1004 Tear Resistance	61 300 Newtons per m (350 lb./inch) (min.)

2.17.2 Protection Board

Protection board for waterproofing membrane shall be 13 mm fiberboard.

2.17.3 Accessories

Flashing, counterflashing, expansion joint covers and corner fillets shall be as recommended by the membrane manufacturer.

2.18 FLASHING

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

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 37 degrees C 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 1.2 m 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 4 degrees C, 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 4 to 0 degrees C. Sand or mixing water shall be heated to produce mortar temperatures between 4 degrees C and 49 degrees C.

b. Air Temperature 0 to minus 4 degrees C. Sand and mixing water shall be heated to

produce mortar temperatures between 4 degrees C and 49 degrees C. Temperature of mortar on boards shall be maintained above freezing.

c. Air Temperature minus 4 to minus 7 degrees C. Sand and mixing water shall be heated to provide mortar temperatures between 4 degrees C and 49 degrees C. 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 24 km/hour.

d. Air Temperature minus 7 degrees C and below. Sand and mixing water shall be heated to provide mortar temperatures between 4 degrees C and 49 degrees C. Enclosure and auxiliary heat shall be provided to maintain air temperature above 0 degrees C. Temperature of units when laid shall not be less than minus 7 degrees C.

3.1.2.2 Completed Masonry and Masonry Not Being Worked On

a. Mean daily air temperature 4 degrees C to 0 degrees C. Masonry shall be protected from rain or snow for 24 hours by covering with weather-resistive membrane.

b. Mean daily air temperature 0 degrees C to minus 4 degrees C. Masonry shall be completely covered with weather-resistant membrane for 24 hours.

c. Mean Daily Air Temperature minus 4 degrees C to minus 7 degrees C. Masonry shall be completely covered with insulating blankets or equally protected for 24 hours.

d. Mean Daily Temperature minus 7 degrees C and Below. Masonry temperature shall be maintained above 0 degrees C 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 13 mm. 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 13 mm 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 400 mm 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 200 mm.

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 3 mm. 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 Omitted

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	3 mm
In 3 m	6 mm
In 6 m	10 mm
In 12 m or more	13 mm
Variations from the plumb for external corners, expansion joints, and other conspicuous lines	
In 6 m	6 mm
In 12 m or more	13 mm
Variations from the level for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines	
In 6 m	6 mm
In 12 m or more	13 mm
Variation from level for bed joints and top surfaces of bearing walls	
In 3 m	6 mm
In 12 m or more	13 mm
Variations from horizontal lines	
In 3 m	6 mm
In 6 m	10 mm
In 12 m or more	13 mm
Variations in cross sectional dimensions of columns and in thickness of walls	
Minus	6 mm
Plus	13 mm

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 300 mm 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 10 mm. On the exterior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 10 mm.

3.2.8 Joint Widths

Joint widths shall be as follows:

3.2.8.1 Concrete Masonry Units

Concrete masonry units shall have 10 mm (3/8 inch) joints, except for prefaced concrete masonry units.

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 100 mm (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 100 mm (4 inch) nominal thick units shall be tied to intersecting partitions of 100 mm (4 inch) units, 125 mm into partitions of 150 mm (6 inch) units, and 175 into partitions of 200 mm (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 100 mm (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. 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.

3.4 WATERPROOFING

Waterproofing shall not be applied to wet surfaces. The ambient and surface temperatures shall be above 4.5 degrees C during application. Membrane under slabs shall be carried up abutting vertical surfaces to the level of finish of floor or to within 13 mm 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.

3.4.1 Plastic Elastomeric Sheeting Installation

Sheeting shall be applied in sections no longer than 5400 mm. Each sheeting shall be lapped at sides and ends a minimum of 150 mm over the preceding sheet. Lap splices shall be reinforced with 300 mm 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 150 mm rubber hand roller on vertical surfaces.

3.4.2 Projections

Projections passing through membrane shall be flashed as recommended by the manufacturer of the waterproofing membrane.

3.4.3 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.

3.4.4 Vertical Membrane Waterproofing

Waterproofing shall be protected with a 13 mm minimum fiberboard. Edges of protection shall be butted, and exposed surfaces shall be covered by a coating of bitumen.

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 50 mm of tops of walls.

3.10.1 Omitted

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 400 mm (16 inches) on center or as indicated. Reinforcement shall be lapped not less than 150 mm. Prefabricated sections shall be installed at corners and wall intersections. The longitudinal wires of joint reinforcement shall be placed to provide not less than 16 mm 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 10 m 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 400 mm (16 inches) on centers shall be provided where grouting of all hollow unit masonry is indicated. Openings shall not be less than 100 mm in diameter or 75 by 100 mm 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 1.5 m. 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 800 mm (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 75 by 100 mm 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 1.5 m in height. High-lift grout methods shall be used on pours exceeding 1.5 m 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 13 mm into the grout space shall be removed before beginning the grouting operation. Grout pours 300 mm or less in height shall be consolidated by mechanical vibration or by puddling. Grout pours over 300 mm 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 6 mm 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 1.2 m 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 300 to 450 mm 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 (m) (4)	Grout Type	Grouting Procedure	Minimum Dimensions of the Total Clear Areas Within Grout Spaces and Cells (mm) (1,2) Multiwythe Masonry (3)	Hollow-unit Masonry
0.3	Fine	Low Lift	20	40 x 50
1.5	Fine	Low Lift	50	50 x 75
2.4	Fine	High Lift	50	50 x 75
3.6	Fine	High Lift	65	65 x 75
7.3	Fine	High Lift	75	75 x 75
0.3	Coarse	Low Lift	40	40 x 75
1.5	Coarse	Low Lift	50	65 x 75
2.4	Coarse	High Lift	50	75 x 75
3.6	Coarse	High Lift	65	75 x 75
7.3	Coarse	High Lift	75	75 x 100

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 20 mm 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 13 mm 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 special control-joint units in accordance with the details shown on the drawings. 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 20 mm; backer rod and sealant shall be installed in accordance with Section 07900 JOINT SEALING. Exposed interior control joints shall be raked to a depth of6 mm. Concealed control joints shall be flush cut.

3.15 OMITTED

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 3 m and installed with a 6 mmgap between sections. Shelf angles shall be mitered and welded at building corners with each angle not shorter than 1.2 m, 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 600 mm, whichever is greater. Reinforcing bars shall be supported in place prior to grouting and shall be located 15 mm above the bottom inside surface of the lintel unit.

3.17.2 Precast Concrete and Steel Lintels

Precast concrete and 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 200 mm (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 400 mm (16 inches) on centers vertically and 600 mm (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 400 mm (16 inches) on centers vertically, and if applicable, not over 600 mm (24 inches) on centers horizontally.

3.20 PARGING

The outside face of below-grade exterior concrete-masonry unit walls enclosing usable rooms and spaces, except crawl spaces, shall be parged with type S mortar. Parging shall not be less than 13 mm thick troweled to a smooth dense surface so as to provide a continuous unbroken shield from top of footings to a line 150 mm below adjacent finish grade, unless otherwise indicated. Parging shall be coved at junction of wall and footing. Parging shall be damp-cured for 48 hours or more before backfilling. Parging shall be protected from freezing temperatures until hardened.

3.21 OMITTED

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 and Concrete Brick Surfaces

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

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 600 mm 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 13 to 16 mm 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 13.8 MPa at 28 days.

-- End of Section --

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DIVISION 04 - MASONRY

SECTION 04220

NONBEARING MASONRY VENEER/STEEL STUD WALLS

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SECTION 04220

NONBEARING MASONRY VENEER/STEEL STUD WALLS
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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 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 36/A 36M	(1997a) Carbon Structural Steel
ASTM A 82	(1997a) Steel Wire, Plain, for Concrete Reinforcement
ASTM A 123/A 123M	(1997a) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(1998) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 653/A 653M	(1998) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C 67	(1998a) Sampling and Testing Brick and Structural Clay Tile
ASTM C 79/C 79M	(1997) Treated Core and Nontreated Core Gypsum Sheathing Board
ASTM C 91	(1998) Masonry Cement
ASTM C 216	(1998) Facing Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C 270	(1997ael) Mortar for Unit Masonry
ASTM C 494	(1998) Chemical Admixtures for Concrete
ASTM C 665	(1998) Mineral-Fiber Blanket Thermal

	Insulation for Light Frame Construction and Manufactured Housing
ASTM C 780	(1996) Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
ASTM C 955	(1998) 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	(1998) Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases
ASTM C 1072	(1998) Measurement of Masonry Flexural Bond Strength
ASTM D 412	(1992) Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D 570	(1995) Water Absorption of Plastics
ASTM D 1004	(1994) Initial Tear Resistance of Plastic Film and Sheeting
ASTM D 1056	(1998) Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 1330	(1985; R 1995) Rubber Sheet Gaskets
ASTM D 1876	(1995) Peel Resistance of Adhesives (T-Peel Test)
ASTM D 1970	(1995) Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
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

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING (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|AE

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. If the Contractor opts to furnish inch-pound (IP) CMU products, drawings showing elevation of walls exposed to view and indicating the location of all cut CMU products shall be submitted for approval.

SD-04 Samples

Expansion Joint Materials

Brick

Sample Panel G|RE

A portable panel, approximately 600 by 600 mm , 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|RE

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

Brick

Joint Reinforcement

Expansion Joint Materials

Insulation

Exterior Sheathing

Vapor Barrier

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 1.8 m long by 1.2 m 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 system 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, weather-tight 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. The Contractor has the option to use either hard metric or substitute inch-pound (soft-metric) masonry products. If the Contractor decides to substitute inch-pound masonry products, the following additional requirements shall be met:

a. The dimensions indicated on the drawings shall not be altered to accommodate inch-pound masonry products either horizontally or vertically. The 100 mm building module shall be maintained, except for the actual physical size of the masonry products themselves.

b. Mortar joint widths shall be maintained as specified.

c. Indicated reinforcing bar spacing shall not be exceeded. Inch-pound masonry products shall accommodate reinforcing bar placement. Reinforcing bars shall not be cut, bent or eliminated to fit into the inch-pound masonry product modules.

d. Masonry inch-pound products shall not be reduced in size by more than one-third (1/3) in height and one-half (1/2) in length. Masonry products shall not be cut at ends of walls, corners, and other openings.

e. Cut, exposed masonry products shall be held to a minimum and shall be located where they will have the least impact on the aesthetics of the facility.

f. Other building components built into the masonry products, such as window frames, door frames, louvers, fire dampers, etc., that are required to be metric, shall remain metric.

g. Additional metric guidance shall conform to Section 01415 METRIC MEASUREMENTS.

2.1.1 Clay or Shale Brick

*1

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, and the nominal size of brick shall be 57 mm thick, 90 mm wide, and 190 mm long. Minimum compressive strength of the brick shall be 207 MPa.

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, 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 11 square mm (0.017 square inches).

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 G 60. 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 09250 GYPSUM WALLBOARD.

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 230 MPa. Material thickness 1.44 mm thick (minimum), and shall have a minimum yield strength of 345 MPa.

2.5 INSULATION

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 - unfaced. The thermal resistance of insulation shall be not less than r-value of 3.35 (metric) and R-19 metric. A minimum thickness of 150 mm shall be provided.

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 09250 GYPSUM

WALLBOARD.

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 15 mm and shall be 1.2 m wide. Gypsum sheathing shall conform to ASTM C 79/C 79M. Gypsum sheathing shall have a water-resistant silicone-treated gypsum core with a water-repellent paper both sides and long edges firmly bonded to the core.

2.8 MOISTURE PROTECTION

2.8.1 Vapor Barrier

The vapor retarder shall be .9 mm of self-adhesive rubberized asphalt integrally bonded to .1 mm of cross-laminated, high-density polyethylene film to provide a min .1 mm thick membrane. Membrane shall be inter-leaved with disposable silicone-coated release paper until installed. It must conform with the following:

a. Water Vapor Transmission: ASTM E 96, Method B - 2.9 ng/m2sPa (0.05 perms) maximum.

b. Water Absorption: ASTM D 570 - Max. 0.1% by weight.

c. Puncture Resistance: ASTM E 154 - 178 N.

d. Tear Resistance:

1. Initiation - ASTM D 1004 - min. 58 N M.D.

2. Propagation - ASTM D 1938 - min. 40 N M.D.

e. Lap Adhesion at -4 degrees C: ASTM D 1876 - 880 N/m of width.

f. Low Temperature Flexibility - ASTM D 1970 - Unaffected to -43 degrees C.

g. Tensile Strength: ASTM D 412, Die C Modified - Min. 2.7 MPa.

h. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D 412 - Die C - Min. 200%.

2.8.2 Staples

Staples for attaching the vapor 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.

2.8.3 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 32 mm 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 5 mm 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 900 newtons. The load-displacement capacity of each veneer anchor, both in direct pull-out for tension and compression, shall be not less than 350 kilo newtons per meter (2000 pounds per inch) (or a deflection of 2.85 mm per kilo newton (0.05 inches 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 1.6 mm.

2.9.1 General

Provide 2-piece assemblies allowing vertical or horizontal differential movement between wall and wall framing parallel to plane of wall but resisting tension and compression forces perpendicular to it, for attachment over sheathing to metal studs, and with the following structural performance characteristics:

a. Structural Performance Characteristics: Capable of withstanding a 900 newton load in either tension or compression without deforming over, or developing play in excess of 1.3 mm.

b. Plate and Strap Lengths: 225 mm and 140 mm.

2.9.2 Anchor Section

Gasketed sheet-metal plate with screw holes top and bottom; top and bottom ends bent to form pronged legs to bridge insulation or sheathing and abut studs; and raised, rib-stiffened strap stamped into center to provide a slot between strap and plate for connection of wire tie; of overall size indicated below:

a. Plate and Strap Size: 32 mm wide for plate by 150 mm long, 16 mm wide by 150 mm long for strap; slot clearance formed between face of plate and back of strap at maximum rib projection: 0.8 mm plus diameter of wire tie.

b. Neoprene Gaskets: Screw-attached, masonry-veneer anchor manufacturer's standard closed-cell neoprene gaskets manufactured to fit behind anchor plate and to prevent moisture from penetrating through screw holes to steel studs behind sheathing.

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, submitted by the Contractor.

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. The length of screws shall be such that the screws penetrate the holding member by not less than 16 mm.

2.10.4 Gypsum Sheathing Screws

Screws for attachment of gypsum sheathing to cold-formed steel framing shall conform to ASTM C 1002, Type S, bugle head, self tapping, rust resistant, fine thread for heavy steel gauge.

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 and Section 07900, JOINT SEALING. Premolded type shall be closed-cell cellular rubber conforming to ASTM D 1056.

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.

2.16 CAVITY MESH

Cavity mesh shall be high-density polyethylene or nylon strand, 50 mm thickness. Provide a dovetail shape pattern that will break up mortar droppings so moisture has open flow paths to flashing and weep holes. Provide from weep hole height to a minimum height of 400 mm .

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. 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 400 mm on center. 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

At building corners, shelf angle segments shall be mitered and securely attached together by welding with legs no less than 1.2 m where possible. Shelf angle segments shall not be connected together but instead shall be installed with 6 mm 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. All angles shall be supported with structural steel.

3.4 INSULATION

The actual installed thickness of insulation shall provide a minimum thermal R as indicated for the completed exterior wall construction. 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. 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 09250 GYPSUM WALLBOARD.

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 10 mm from the ends and edges of sheathing panels and shall be spaced not more than 200 mm 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 Omitted

3.7.2 Vapor Barrier

A vapor retarder shall be installed on the outer face of the exterior sheathing. The vapor barrier shall be installed in accordance with the manufacturer's recommendations to form a complete barrier to vapor infiltration. The joints shall be lapped and sealed as per manufacturer's requirements.

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 16 mm 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 0.2 square meters of wall and shall be attached to steel studs and other supports with a maximum spacing of 600 mm on center. For pintle-eye anchors the vertical distance between the pintle section horizontal wires and the eye section horizontal wires shall not exceed 13 mm. Dovetail slots shall be installed as specified in the Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

Due to the varying cavity sizes, as indicated on the drawings, the Contractor shall coordinate the tie lengths with the various cavity sizes.

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 150 mm 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 150 mm 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 minimum air width of 50 mm will be provided between the vapor barrier and the masonry veneer. Masonry veneer shall not be installed until the exterior sheathing, vapor 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 vapor barrier and flashing during construction of the masonry veneer. Any portion of the vapor 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 unless otherwise indicated. 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 5 mm 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. All mortar joints on the cavity side shall be back beveled to minimize mortar falling into the cavity. 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 50 degrees C when laid. Masonry erected when the ambient air temperature is more than 37 degrees C 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 4 degrees C when laid. When the ambient air temperature is 0 degrees C or less, masonry veneer under construction shall be protected and maintained at a temperature greater than 0 degrees C 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	3 mm
In 3 m	6 mm
In 6 m	10 mm
In 12 m or more	13 mm

Variation From Level Or Grades

In 3 m	3 mm
In 6 m	6 mm
In 12 m or more	13 mm

Variation From Linear Building Lines

In 6 m	13 mm
In 12 m or more	19 mm

Variation From Cross Sectional Dimensions Of Walls

Plus	13 mm
Minus	6 mm

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 6 mm nor more than 13 mm 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 Joint Reinforcement

Unless otherwise shown, joint reinforcement shall be spaced at 400 mm on center vertically. Joint reinforcement shall not be placed in the same masonry course as veneer anchors unless the anchors are designed to accommodate the wire. Joint reinforcement shall be placed so that longitudinal wires are centered in the veneer wythe for solid units. Longitudinal wires shall be fully embedded in mortar for their entire length. Splices in joint reinforcement shall be lapped a minimum of 150 mm. Joint reinforcement must be discontinuous at all veneer joints. The minimum cover for joint reinforcement is 16 mm.

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. In addition, joints will be a maximum of 600 mm from any building corner, and at least every 7400 mm (24 feet) on center.

3.10.11 Weep Holes

Weep holes shall be provided at all flashing locations at intervals of 600 mm. 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 600 mm 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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DIVISION 05 - METALS

SECTION 05120

STRUCTURAL STEEL

09/97

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SECTION 05120

STRUCTURAL STEEL
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 INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC FCD	(1995a) Quality Certification Program Description
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 LRFD Vol II	(1995) Manual of Steel Construction Load & Resistance Factor Design, Vol II: Structural Members, Specifications & Codes
AISC Pub No. S303	(1992) Code of Standard Practice for Steel Buildings and Bridges

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1997a) Carbon Structural Steel
ASTM A 53	(1999) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 307	(1997) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 325M	(1997) High-Strength Bolts for Structural Steel Joints (Metric)
ASTM A 490M	(1993) High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric)
ASTM A 500	(1999) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 529/A 529M	(1996) High-Strength Carbon-Manganese Steel of Structural Quality
ASTM A 563M	(1997) Carbon and Alloy Steel Nuts (Metric)
ASTM A 572/A 572M	(1999) High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 992/A 992M	(1998e1) Steel for Structural Shapes For Use in Building Framing
ASTM F 844	(1998) 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	(1998) Structural Welding Code - Steel

STEEL STRUCTURES PAINTING COUNCIL (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 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

Structural Connections; G|AE

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

Prior to erection, erection plan of the structural steel framing describing all necessary temporary supports, including the sequence of installation and removal.

Welding

WPS 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

Structural Steel

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.

Welding Inspector

Welding Inspector qualifications.

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 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 Omitted

2.1.4 Omitted

2.1.5 Omitted

2.1.6 Omitted

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 STEEL PIPE

Steel pipe shall conform to ASTM A 53, Type E, Type S, Grade B.

2.4 OMITTED

2.5 HIGH STRENGTH BOLTS AND NUTS

High strength bolts shall conform to ASTM A 325M , Type 1 with carbon steel nuts conforming to ASTM A 563M , 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 563M , Grade A.

2.7 NUTS DIMENSIONAL STYLE

Carbon steel nuts shall be Hex style when used with ASTM A 307 bolts or Heavy Hex style when used with ASTM A 325M or ASTM A 490M bolts.

2.8 WASHERS

Plain washers shall conform to ASTM F 844.

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. 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. For low-rise structural steel buildings (18 m tall or less and a maximum of 2 stories), the erection plan shall conform to AISC Pub No. 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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DIVISION 05 - METALS

SECTION 05210A

STEEL JOISTS

11/88

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SECTION 05210A

STEEL JOISTS
11/88

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|AE

Detail drawings shall include fabrication and erection details, specifications for shop painting, and identification markings of joists.

SD-07 Certificates

Steel Joists

Certificates stating that the steel joists 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 DESCRIPTION

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 OMITTED

2.3 OMITTED

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 and accessories shall be shop painted with a rust-inhibiting primer paint. For joists which will be finish painted under Section 09900 PAINTING, GENERAL, 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 shall be in accordance with the standard specification under which the member was produced. Joists shall be handled in a manner to avoid damage. Damaged joists 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 shall be accurately set, and end anchorage shall be in accordance with the standard specification under which the joists were produced. For spans over 12 m through 18 m one row of bridging nearest midspan shall be bolted diagonal bridging; for spans over 18 m 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.

-- End of Section --

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DIVISION 05 - METALS

SECTION 05300A

STEEL DECKING

10/89

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SECTION 05300A

STEEL DECKING
10/89

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 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	(1997) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 780	(1993a) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM A 792/A 792M	(1997) 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 Diaphram Mnl	(1987; Amended 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

STEEL STRUCTURES PAINTING COUNCIL (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|AE

Accessories; G|AE

Attachments; G|AE

Holes and Openings

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|AE

Design computations for the structural properties of the deck units or SDI certification that the units are designed in accordance with SDI specifications.

Attachments

Prior to welding operations, copies of qualified procedures and lists of names and identification symbols of qualified welders and welding operators.

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 touch-up 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 50 mm laps 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 zinc-coated in conformance with ASTM A 653/A 653M, G90 coating class.

2.1.2 Omitted

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 of the same type used for the shop painting, and touch-up paint for zinc-coated 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 touch-up 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 6 mm 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, 1.204 mm (0.0474 inch); welding washers, 1.519 mm (0.0598 inch); cant strip, 0.749 mm (0.0295 inch); other metal accessories, 0.909 mm (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 Diaphram 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. 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 OMITTED

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 16 mm diameter puddle welds to supports as indicated on the design drawings and in accordance with requirements of the drawings. 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. Holes and similar defects will not be acceptable. Deck ends shall be lapped 50 mm. All partial or segments of deck units shall be attached to

structural supports in accordance with Section 2.5 of SDI Diaphram Mnl. Powder-actuated fasteners shall be driven with a low-velocity piston tool by an operator authorized by the manufacturer of the piston tool. Pneumatically driven fasteners shall be driven with a low-velocity fastening tool and shall comply with the manufacturer's recommendations.

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 150 mm across require no reinforcement. Holes and openings 150 to 300 mm across shall be reinforced by 1.204 mm (0.0474 inch) thick steel sheet at least 300 mm wider and longer than the opening and be fastened to the steel deck at each corner of the sheet and at a maximum of 150 mm on center. Holes and openings larger than 300 mm 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.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05500

MISCELLANEOUS METAL

04/01

SECTION 05500

MISCELLANEOUS METAL
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.

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 53/A 53M	(1999b) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 123/A 123M	(2000) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 467/A 467M	(1998) Machine and Coil Chain
ASTM A 569	(1996) Specification for Steel, Carbon (0.15 maximum percent) Hot-Rolled Sheet and Strip Commercial 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 221M	(2000) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - 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

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: handrails, ladders, medical equipment supports, trellis and floor plate panels.

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.

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 ALUMINUM TRELLIS

2.1.1 Metals for Fabrication

a. Aluminum-alloy extrusions shall be 6063, temper T5, conforming to ASTM B 221M.

b. Aluminum-alloy castings: Sand castings, alloy and temper as required.

c. Shop Paint for Aluminum: Shop paint shall be an inhibitive epoxy polyamide primer.

2.1.2 Trelis Framing

Aluminum-alloy extrusions of the shapes and sizes indicated. Weld shop connections and field connections. Provide column supports with base plates and stainless steel anchor bolts.

2.1.3 Finish

Factory-finish, architectural Class I type, as described above. Color as indicated on drawings.

2.2 OMITTED

2.3 OMITTED

2.4 STEEL GATES

Fabricate metal gate assemblies with steel tube, EN10220, Grade A or B. Weld and grind smooth all joints and connections, miter corner joints and close ends of all tube sections. Shop coat paint. Equip gate with finish operating hardware as follows:

a. Steel hinges welded to each leaf. Size hinges as required for gate weight.

b. Steel cane bolt on each leaf.

c. Steel padlock hasp.

2.5 CORNER GUARDS AND SHIELDS

Corner guards and shields are specified in Section 10260, WALL AND CORNER PROTECTION.

2.6 OMITTED

2.7 PIPE GUARDS

Pipe guards shall be heavy duty steel pipe conforming to ASTM A 53/A 53M, Type E or S, weight STD, black finish.

2.8 DOWNSPOUT BOOTS

Downspout boots shall be cast iron with receiving bells sized to fit downspouts.

2.9 OMITTED

2.10 OMITTED

2.11 OMITTED

2.12 FLOOR PLATES

2.12.1 Floor Plate Panels

Shall be 35 mm deep (without covering) steel encased welded steel panels with lightweight cementitious material. The finish surface shall be protected with epoxy to accept the flexible terrazzo floor finish as specified in 09650. Panel sizes shall be 600 mm x 600 mm and shall be able to be field cut to sizes required. All materials shall be non-combustible with a Class A flame spread rating. Panels have an integral trim to receive the flexible terrazzo floor finish. The panel shall be able to withstand a minimum of 455 kg. (concentrated load) and 11.9 kPa (uniform load).

2.12.2 Floor Plate Panel Pedestal Assembly

Shall provide a minimum of 2720 kg axial load capacity. The assembly shall provide a 50 mm total height adjustment. The pedestal head projection shall be formed galvanized welded to a steel stud rod and have tapped holes for engagement of cornerlock fasteners and shall incorporate alignment guides and locating points to laterally contain and position the panel with or without fasteners. Cornerlock fasteners shall be self-capturing 6 mm 20 flat-head machine screws. Pedestal base plates shall be at least 100 mm x 100 mm square galvanized steel.

2.12.3 Panel Lifter

Provide one panel lifter, as provided by the manufacturer.

2.13 OMITTED

2.14 HANDRAILS

Handrails shall be designed to resist a concentrated load of 890 N (200 pounds) in any direction at any point of the top of the rail or 292 Newtons per meter (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. Steel railings shall be 40 mm nominal size. Railings shall be hot-dip galvanized and shop painted.

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 10 mm 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 150 mm 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 OMITTED

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, SECURITY MESH

Steel expanded galvanized metal panels, (used as penetration resistance behind gypsum board finishes.) Carbon steel: ASTM A 569. Size and gauge: ASM. 75-13F, 75 lbs. per 100 square feet.

2.21 ROLL-UP FLOOR MATS

Roll-up mats shall be specified in Section 12680, WALK OFF MAT.

2.22 ROOF SCUTTLES

Roof scuttles shall be of aluminum with 75 mm beaded flange welded and ground at corners. Scuttle shall be sized to provide minimum clear opening of 940 by 760 mm. Cover and curb shall be insulated with 25 mm thick rigid insulation covered and protected by aluminum sheet. The curb shall be equipped with an integral metal cap flashing of the same gauge and metal as the curb, full welded and ground at corners for weathertightness. Scuttle shall be completely assembled with heavy hinges, compression spring operators enclosed in telescopic tubes, positive snap latch with turn handles on inside and outside and neoprene draft seal. Fasteners shall be provided for padlocking on the inside. The cover shall be equipped with an automatic hold-open arm complete with handle to permit one hand release.

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, 5 mm diameter, minimum 39 links per meter (12 links per foot) and with bolt type snap hooks on each end. Eye bolts for attachment of chains shall be galvanized 10 mm bolt with 19 mm eye, anchored as indicated. Two chains shall be furnished for each guarded opening.

2.24 SAFETY NOSING

Safety nosings shall be of cast iron with cross-hatched, abrasive surface. Nosing shall be 75 mm wide and terminating at not more than 150 mm 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 19 mm long. Integrally cast mushroom anchors are not acceptable.

2.25 STORAGE RACK

Storage racks shall be M2025, rack, storage, cylinder. This rack shall be a modular cage

frame for holding various sizes of gas cylinders. Nylon or fabric securing straps shall be attached to the frame bar to stabilize gas cylinders. Unit size is 75 cm high x 65 cm wide x 35 cm deep.

2.26 OMITTED

2.27 OMITTED

2.28 OMITTED

2.29 OMITTED

2.30 OMITTED

2.31 OMITTED

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 FIRE EXTINGUISHER CABINETS

Cabinets are specified in Section 10999, FIRE EXTINGUISHER CABINETS.

2.35 EQUIPMENT AND SEISMIC SUPPORTS

Provide ceiling supports for x-ray equipment, surgical lighting, ceiling TV brackets mechanical, plumbing, fire protection, electrical, communication and all other equipment support required for seismic bracing as indicated.

2.35.1 Metal Framing Systems

Provide channel supports, sized to accommodate loading required for each item indicated. Channel supports shall span structural framing system; with clip angles and fasteners sized to accommodate specific equipment loadings. Metal framing system shall include galvanized channel framing, equipment mainframe, mainrails, subrails, and all anchorage to interface with structural framing. Equipment supports shall accommodate dead loads, live loads and seismic requirements.

2.35.1.1 X-Ray Equipment Supports

The support structure shall be capable of supporting a vertical point load of 408 kg applied anywhere within the limit of the structure, and a uniformly distributed load of 730 N/m .

a. X-ray equipment support system shall be "Universal Grid" type, with rails extending wall to wall, perpendicular to the path of travel of the equipment. Rail shall be on centers as required by the equipment manufacturer and allow continuous attachment along any point on the rail. System shall be true, plumb and level to the tolerances indicated, with no more than 1/720th of the span maximum deflection in either plane, when maximum loading conditions are applied due to equipment operation. Medical equipment supports shall be finished with baked acrylic finished channels, electro-galvanized parts and fasteners.

b. Acceptable product: Unistrut Corporation "Model P5501-K" in combination with "Telespar Vertical Support" meet this specification.

2.35.2 Surgical Lighting Supports

Shall include subrails with anchorage to structural supports sized to accommodate specific loading requirements. Provide adjustable telescopic tubular steel vertical drops in lengths required for mounting heights, with 1/4 inch steel mounting plates for equipment, sized and prepared as required by surgical lighting manufacturer's instructions, and all diagonal bracing with fasteners and anchorage to structural framing or ceiling subrail. Provide mainrails, ceiling angles secured flush to bottom of channels as required by support manufacturer's instructions and all connections, fittings, clamps, hangers and brackets with components and accessories for a complete assembly. Surgical lighting supports shall be finished with baked acrylic finished channels, electro-galvanized parts and fasteners.

a. Acceptable product: Unistrut Corporation "Model P1000" in combination with "Telespar Vertical Support" meet this specification.

2.35.3 Ceiling TV Supports

Shall include subrails with anchorage to structural supports sized to accommodate specific loading requirements. Provide adjustable telescopic tubular steel vertical drops in lengths required for mounting heights, with steel mounting plates for TV bracket, sized and prepared as required by TV bracket manufacturer's instructions, and all diagonal bracing with fasteners and anchorage to structural framing or ceiling subrail. Provide mainrails, ceiling angles secured flush to bottom of channels as required by support manufacturer's instructions and all connections, fittings, clamps, hangers and brackets with components and accessories for a complete assembly. Ceiling TV bracket supports shall be finished with baked acrylic finished channels, electro-galvanized parts and fasteners.

a. Acceptable product: Unistrut Corporation "Model P1000" meets this specification.

2.35.4 Seismic Equipment Supports

Shall include subrails with anchorage to structural supports sized to accommodate specific for mechanical, plumbing, fire protection, electrical, communications, and all other loading requirements. Provide adjustable telescopic tubular steel vertical drops in lengths required for mounting heights, and all diagonal bracing with fasteners and anchorage to structural framing or ceiling subrail. Provide mainrails, ceiling angles secured flush to bottom of channels as required by support manufacturer's instructions and all connections, fittings, clamps, hangers and brackets with components and accessories for a complete assembly. All components shall comply with FEMA 20 NEHRP Recommended Provisions for Seismic Regulations for New Buildings requirements.

a. Acceptable product: Unistrut Corporation "Model P5501" in combination with "Telespar Vertical Support" meet this specification.

2.35.5 Wall Mounted TV Supports

Provide structural support to accommodate weight of television equipment. Coordinate electrical requirements with Division 16 of this Project Manual.

2.36 TOILET PARTITION CEILING SUPPORTS

Coordinate weight requirements and template details with Section 10160 - "Toilet Partitions". Provide galvanized steel structural support to accommodate toilet partitions selected.

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 OMITTED

3.3 OMITTED

3.4 OMITTED

3.5 INSTALLATION OF PIPE GUARDS

Pipe guards shall be set vertically in concrete piers. Piers shall be constructed of, and the hollow cores of the pipe filled with, concrete having a compressive strength of 21 MPa.

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. 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 OMITTED

3.12 MOUNTING OF SAFETY CHAINS

Safety chains shall be mounted 1070 mm and 610 mm 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 DOOR FRAMES

Door frames shall be secured to the floor slab by means of angle clips and expansion bolts. Continuous door stops shall be welded to the frame or tap screwed with countersunk screws at no more than 450 mm centers, assuring in either case full contact with the frame. Any necessary reinforcements shall be made and the frames shall be drilled and tapped as required for hardware.

3.15 INSTALLATION OF MEDICAL EQUIPMENT AND SEISMIC EQUIPMENT SUPPORTS

Support structure shall be as indicated on the drawings. Coordinate spacing with ceiling installation and ceiling fixtures.

It shall be possible to attach the X-Ray equipment at any point of the support system. Install ceiling anchorage as indicated in approved shop drawings. Vertical supports shall be as indicated; provide for both basic and micro vertical adjustments. X-Ray support system shall be adequately braced. Safety factor; designed with a minimum safety factor of 3 based upon ultimate strength under static loading conditions. Mainrail shall have ceiling angle secured flush to bottom of channel.

Coordinate mounting heights for all equipment with ceiling installation. Anchor to ceiling upper subrail or supporting structure with required metal framing system. Ceiling angles shall be secured flush with bottom of channels.

Coordinate electrical requirements with Division 16 sections of this Project Manual.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 06 - WOODS & PLASTICS

SECTION 06100

ROUGH CARPENTRY

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-- End of Section Table of Contents --

SECTION 06100

ROUGH 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 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 665	(1998) Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
ASTM D 2898	(1994; R 1999) Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C9	(1997) Plywood - Preservative Treatment by Pressure Processes
AWPA C20	(1999) Structural Lumber Fire-Retardant Pressure Treatment
AWPA C27	(1999) Plywood - Fire-Retardant Pressure Treatment
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

FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM LPD 1-49	(1995) Loss Prevention Data Sheet - Perimeter Flashing

NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION (NELMA)

NELMA Grading Rules	(1997) Standard Grading Rules for Northeastern Lumber

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

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

Sound Attenuation.

Data substantiating STC ratings for wall assembly.

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 cellulose, perlite, glass and mineral fiber,glass mat gypsum roof board, polyurethane, or polyisocyanurate 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 and wood structural panels, 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 455 mm of soil.

b. Wood members exposed to the weather including those used in roofing systems or as nailing strips or nailers over fiberboard or gypsum-board wall sheathing as a base for wood siding.

c. Wood members set into concrete regardless of location, including flush-with-deck wood nailers for roofs.

d. Wood members in contact with concrete that is in contact with soil or water or that is exposed to weather.

2.1.3.1 Omitted

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. 4 kg per cubic meter (0.25 pcf) intended for above ground 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: 100 mm or less, nominal thickness, 19 percent maximum. 125 mm or more, nominal thickness, 23 percent maximum in a 75 mm perimeter of the timber cross-section.

b. Materials Other Than Lumber: In accordance with standard under which product is produced.

2.1.5 Fire-Retardant Treatment

Fire-retardant treated wood shall be pressure treated in accordance with AWPA C20 for lumber and AWPA C27 for plywood. Material use shall be defined in AWPA C20 and AWPA C27 for Interior Type A and B and Exterior Type. Treatment and performance inspection shall be by an independent and qualified testing agency that establishes performance ratings. Each piece or bundle of treated material shall bear identification of the testing agency to indicate performance in accordance with such rating. Treated materials to be exposed to rain wetting shall be subjected to an accelerated weathering technique in accordance with ASTM D 2898 prior to being tested for compliance with AWPA C20 or AWPA C27. Items to be treated include: plywood backing for communications systems.

2.1.6 Omitted

2.1.7 Omitted

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 mm (inch)
Bridging	25 x 75 (1 X 3) or 25 x 100 (1 X 4) for use between members 50 x 300 (2 x 12) and smaller; 50 x 100 (2 x 4) for use between members larger than 50 x 300 (2 x 12)
Corner bracing	25 x 100 (1 x 4)
Furring	25 (1) x 50 (2) 75 (3)

Member	Size mm (inch)
Grounds	Plaster thickness by 38.
Nailing strips	25 x 75 (1 x 3) or 25 x 100 (1 x 4) when used as shingle base or interior finish, otherwise 50 mm (2 inch) stock.

2.1.12.2 Omitted

2.1.12.3 Omitted

2.1.12.4 Blcoking and Plates

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 Clip Angles

Steel, 5 mm (3/16 inch) thick, size best suited for intended use; or zinc-coated steel or iron commercial clips designed for connecting wood members.

2.2.4 Expansion Shields

Type and size best suited for intended use.

2.3 INSULATION

Insulation shall be the standard product of a manufacturer and factory marked or identified with manufacturer's name or trademark. 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 for Sound Attenuation

2.3.1.1 Omitted

2.3.1.2 Mineral Fiber Batt

Mineral fiber batt shall conform to ASTM C 665, Type I unfaced insulation, Class A, maximum flame spread of 15 and smoke development of 0.

PART 3 EXECUTION

3.1 OMITTED

3.2 OMITTED

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 siding, sheathing, subflooring, wallboard, and other materials or building items, and to provide firestopping. Blocking for firestopping shall ensure a maximum dimension of 2400 mm for any concealed space. Blocking shall be cut to fit between framing members and rigidly nailed thereto.

3.6.4 Nailers and Nailing Strips

Nailers and nailing strips shall be provided as necessary for the attachment of finish materials. Nailers used in conjunction with roof deck installation shall be installed flush with the roof deck system. Stacked nailers shall be assembled with spikes or nails spaced not more than 450 mm on center and staggered. Beginning and ending nails shall not be more than 150 mm for nailer end. Ends of stacked nailers shall be offset approximately 300 mm in long runs and alternated at corners. Anchors shall extend through the entire thickness of the nailer. Strips shall be run in lengths as long as practicable, butt jointed, cut into wood framing members when necessary, and rigidly secured in place. Nailers and nailer installation for Factory Mutual wind uplift rated roof systems specified in other Sections of these specifications shall conform to the recommendations contained in FM LPD 1-49.

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 thermal resistance 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

Blocking, Plates and Furring

Grading Rules	Species	Const Standard	No. 2 Comm	No. 2 Board Comm	No. 3 Comm
NELMA Grading Rules					
	Northern White Cedar				X
	Eastern White Pine	X			
	Northern Pine	X			
	Balsam Fir				X
	Eastern Hemlock-Tamarack				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			

-- End of Section --

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DIVISION 06 - WOODS & PLASTICS

SECTION 06200

FINISH CARPENTRY

04/01

-- End of Section Table of Contents --

SECTION 06200

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

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

Finish Carpentry

SD-04 Samples

Trim

Plastic Laminate

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 TRIM

a. Trim shall meet AWI Manual Section 300, Premium grade.

b. Trim members shall be natural birch, milled to profiles required by drawings.

c. Lumber shall be sound and dry, selected for compatibility of grain and color and containing no defects that cannot be concealed by finishing methods for stained transparent finish.

d. Scribing and joining shall accomplish hairline joints. Finish trim corners shall be mitered, trim other than natural finish may be butted.

2.1.1 Finish Carpentry

Drawings showing fabricated items and special mill and woodwork items. Drawings shall indicate materials and details of construction, methods of fastening, erection, and installation.

2.2 PLASTIC LAMINATE

a. Plastic laminate for countertops: high pressure (HPDL) laminate meeting NEMA requirements for abrasion, heat, stain and moisture resistance and dimensional stability.
GP-50: 1.3 mm thick for horizontal surfaces

GP-28: 0.7 mm thick for vertical surfaces

b. Backing sheet shall be 0.5 mm or thicker as supplied by the manufacturer.

c. Countertop shall have top and back splash of decorative plastic laminate all to be applied to the core in the shop, using commercial methods of application and pressing.

d. Exposed edges shall be laminate self-edged.

e. Colors: as indicated on drawing finish schedules.

2.3 PLYWOOD

Plywood for millwork and cabinetwork shall conform to AWI manual Section 200, "Premium Grade" for exposed members; "Custom Grade" for semi-exposed members; "Economy Grade" for concealed members. Provide exterior grade plywood for countertops with sinks or lavs.

2.3.1 Moisture Content

The maximum moisture content of trim shall be 12 percent at the time of delivery to the jobsite and when installed.

2.4 NAILS

Nails shall be the size and type best suited for the purpose and shall conform to ASTM F 547. Nails shall be hot-dip galvanized or aluminum when used on exterior work. For siding, length of nails shall be sufficient to extend 40 mm into supports, including wood sheathing over framing. Screws for use where nailing is impractical shall be size best suited for purpose.

2.5 MILLWORK ITEMS

Items are listed by Joint Services Numbers (JSN) referenced from MIL-STD-1691.

Item A5020A, Dressing Room Bench, Built-in

Item A6105, Counter, Control, Inpatient, Built-In

Item CT030, Countertop, High Pressure Laminate

Item CT060A, Countertop, Solid surface

PART 3 EXECUTION

3.1 OMITTED

3.2 OMITTED

3.3 OMITTED

3.4 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.

-- End of Section --

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DIVISION 07 - THERMAL & MOISTURE PROTECTION

SECTION 07220

ROOF INSULATION

04/01

-- End of Section Table of Contents --

SECTION 07220

ROOF INSULATION
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 578	(1995) Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 1289	(1998) Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM D 41	(1994) Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D 312	(2000) Asphalt Used in Roofing
ASTM D 4586	(1993; R 1999) Asphalt Roof Cement, Asbestos Free

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. Felts shall be stacked on end one level high. Felt rolls shall be maintained at a temperature above 10 degrees C for 24 hours immediately before laying.

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 BITUMINOUS MATERIALS

Bituminous materials shall conform to the following requirements:

2.1.1 Asphalt Bitumen

ASTM D 312, Type III or IV. Asphalt flash point, finished blowing temperature, and equiviscous temperature (EVT) for mop and for mechanical spreader application shall be indicated on bills of lading or on individual containers.

2.1.2 Asphalt Cement

ASTM D 4586, Type I for surfaces sloped from 0 to 250 mm per meter ; Type II for slopes greater than 250 mm per meter .

2.1.3 Asphalt Primer

ASTM D 41.

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 24 degrees C, 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 an R-value of 3.52 (metric) and R-20 (english). A minimum thickness of 100 mm shall be provided. The insulation manufacturing process shall not include chlorofluoro carbons (CFC) or formaldehydes. 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 Polyisocyanurate

ASTM C 1289, Type I, or ASTM C 1289 Type II, having minimum recovered material content of 9 percent by weight of the polyisocyanurate portion of the board.

2.2.7 Polystyrene

Polystrene shall be in accordance with ASTM C 578, Type II, IV, or X.

2.2.8 Gypsum Roof Board

Provide roof and gypsum roof board as indicated in Section 07416, STRUCTURAL SEAM METAL ROOFING.

2.3 FASTENERS

Fasteners shall conform to insulation manufacturer's recommendations except that holding power, when driven, shall be not less than 534 N 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 4.3 kPa , for basic wind velocity of 36 m/sec . Metal disks, flat, and not less than 0.39 mm thickness. Disks used with fasteners shall be a minimum 50 mm

diameter for insulation boards.

2.4 OMITTED

2.5 OMITTED

2.6 OMITTED

2.7 WOOD NAILERS

Wood nailers shall conform to Section 06100 ROUGH CARPENTRY, including preservative treatment. Edge nailers shall be not less than nominal 150 mm wide and of thickness to finish flush with the top surface of the insulation. Surface mounted nailers shall be a nominal 75 mm 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. Air temperature shall be above 4 Degrees C and 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: Wind chill may affect the proper application temperatures of materials; hot materials may be blown about, creating safety dangers; insulation boards may become difficult and hazardous to handle; wrappers, coverings, and other debris may become airborne, and possibly contaminate laps and seams.

3.3 SUBSTRATE PREPARATION

The substrate construction of any bay or section of the building shall be completed before insulation work is begun thereon. Insulation to be applied on steel deck. Vents and other items penetrating the roof shall be secured in position and properly prepared for flashing.

3.4 HEATING OF ASPHALT

Asphalt shall not be heated higher than 42 degrees C above the EVT or 28 degrees C below the flash point, or 275 degrees C, whichever is lower. EVT and flash point temperatures of asphalt in the kettle shall be conspicuously posted on the kettle. Kettle shall be provided with automatic thermostatic controls and an accurate thermometer. Kettle operators shall be in attendance at all times during heating to ensure that the maximum temperature is not exceeded. Asphalt shall be applied within a range of 14 degrees C below or above the EVT, or as specified by the manufacturer. Application temperature shall be measured at the mop bucket or mechanical applicator. Asphalt at a temperature below this range shall be returned to the kettle. Flame-heated equipment shall not be placed on the roof.

3.5 VAPOR RETARDER

Shall be specified in Section 07416, STRUCTURAL SEAM METAL ROOF.

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 1.2 meters face-to-face, except that where the insulation units are less than 1.2 meters in length the nailers shall be spaced to minimize cutting of the insulation. On sloped roofs exceeding 62.5 mm per meter for modified bituminous systems and 80 mm per meter for BUR systems, nailers shall be installed in accordance with the recommendations of the membrane system manufacturer.

3.7 APPLICATION OF INSULATION

Insulation shall be laid in two or more layers. 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 6 mm. Joints in successive layers shall be staggered with respect to joints of preceding layer.

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. Application of impermeable faced insulation shall be performed without damage to the facing.

3.7.1 Mechanical Fastening

On steel decks, for any slope exceeding 40 mm/m, multiple layers of 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

All steel decks shall be insulated before receiving a roof membrane. Uninsulated steel decks shall have insulation applied to span the steel deck flutes and to act as an underlayment for the roof membrane. First layer of insulation on steel deck shall be compatible with mechanical fastening and shall meet fire resistant requirements.

3.7.3 Omitted

3.7.4 Installation

Except for the first layer on steel deck, insulation layers shall be laid in solid moppings of hot asphalt applied at a rate of at least 0.97 kg per meter (20 lbs per square). Asphalt shall not be applied further than one panel length ahead of roof insulation being installed. Where roof slopes are greater than 42 mm/m, roof insulation shall be held in place by both asphalt mopping and mechanical fasteners. Asphalt primer shall be applied at the rate of 0.4 L/square meter (1 gallon per square) over the entire surface to be mopped when the insulation is applied over concrete deck. The edges of insulation boards adjoining vented nailers shall be kept free of asphalt.

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. Storing, walking, wheeling, or trucking directly on insulation or on roofed surfaces will not be permitted. Smooth, clean board or plank walkways, runways, and platforms shall be used, as necessary to distribute weight to conform to indicated live load limits of roof construction.

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.

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DIVISION 07 - THERMAL & MOISTURE PROTECTION

SECTION 07416

STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM

04/01

-- End of Section Table of Contents --

SECTION 07416

STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
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.

ALUMINUM ASSOCIATION (AA)

AA Design Manual	(2000) Aluminum Design Manual: Specification & Guidelines for Aluminum Structures

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 307	(1994) Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
ASTM A 325	(1996) Structural Bolts, Steel, Heat Treated, 120/105 KSI Minimum Tensile Strength
ASTM A 463/A 463M	(2000) Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
ASTM A 653/A 653M	(2000) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 792/A 792M	(1999) Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
ASTM C 1177/C 1177M	(1999) Glass Mat Gypsum Substrate for Use as Sheathing
ASTM D 522	(1993a) Mandrel Bend Test of Attached Organic Coatings
ASTM D 523	(1989; R 1999) Specular Gloss
ASTM D 610	(1995) Evaluating Degree of Rusting on Painted Steel Surfaces
ASTM D 714	(1987; R 1994el) Evaluating Degree of Blistering of Paints
ASTM D 968	(1993) Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D 1308	(1987; R 1998) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D 1654	(1992) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 2244	(1995) Calculation of Color Differences from Instrumentally Measured Color Coordinates
ASTM D 2247	(1999) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D 2794	(1993; R 1999el) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 3359	(1997) Measuring Adhesion by Tape Test
ASTM D 4214	(1998) Evaluating Degree of Chalking of Exterior Paint Films
ASTM D 5894	(1996) Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)

ASTM E 1592 (1998) Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7 (1998) Minimum Design Loads for Buildings and Other Structures

UNDERWRITERS' LABORATORIES, INC. (UL)

UL 580 (1994) Tests for Uplift Resistance of Roof Assemblies

1.2 GENERAL REQUIREMENTS

The Contractor shall furnish a commercially available roofing system which satisfies all requirements contained herein and has been verified by load testing and independent design analysis to meet the specified design requirements.

1.2.1 Structural Standing Seam Metal Roof (SSSMR) System

The SSSMR system covered under this specification shall include the entire roofing system; the standing seam metal roof panels, fasteners, connectors, roof securement components, and assemblies tested and approved in accordance with ASTM E 1592. In addition, the system shall consist of panel finishes, slip sheet, vapor retarder, all accessories, components, and trim and all connections with roof panels. This includes roof penetration items such as vents, curbs, skylights; interior or exterior gutters and downspouts; eaves, ridge, hip, valley, rake, gable, wall, or other roof system flashings installed and any other components specified within this contract to provide a weathertight roof system. Roof insulation material are specified in Section 07220, ROOF INSULATION.

1.2.2 Manufacturer

The SSSMR system shall be the product of a manufacturer who has been in the practice of manufacturing and designing SSSMR systems for a period of not less than 3 years and has been involved in at least five projects similar in size and complexity to this project.

1.2.3 Installer

The installer shall be certified by the SSSMR system manufacturer to have experience in installing at least three projects that are of comparable size, scope and complexity as this project for the particular roof system furnished. The installer may be either employed by the manufacturer or be an independent installer.

1.3 DESIGN REQUIREMENTS

The design of the SSSMR system shall be provided by the Contractor as a complete system. Members and connections not indicated on the drawings shall be designed by the Contractor. Roof panels, components, transitions, accessories, and assemblies shall be supplied by the same roofing system manufacturer.

1.3.1 Design Criteria

Design criteria shall be in accordance with ASCE 7.

1.3.2 Dead Loads

The dead load shall be the weight of the SSSMR system. Collateral loads such as sprinklers, mechanical and electrical systems, and ceilings shall not be attached to the panels.

1.3.3 Live Loads

1.3.3.1 Concentrated Loads

The panels and anchor clips shall be capable of supporting a 1335 N concentrated load. The concentrated load shall be applied at the panel midspan and will be resisted by a single standing seam metal roof panel assumed to be acting as a beam. The undeformed shape of the panel shall be used to determine the section properties.

1.3.3.2 Uniform Loads

The panels and concealed anchor clips shall be capable of supporting a minimum uniform live load of 960 Pa.

1.3.4 Omitted

1.3.5 Wind Loads

The design wind uplift pressure for the roof system shall be as shown on the contract drawings or, as a minimum, shall be approved to resist wind uplift pressures of UL 580, Class 90 for 137 km per hour
wind load, exposure C. Prying shall be considered when figuring fastener design loads.

a. Single fastener in each connection.....3.0

b. Two or more fasteners in each connection...2.25

1.3.6 Thermal Loads

Roof panels shall be free to move in response to the expansion and contraction forces resulting from a total temperature range of 104 degrees C during the life of the structure.

1.3.7 Framing Members Supporting the SSSMR System

See Section 05300, STEEL DECKING, for framing member support. Any additions/revisions to framing members supporting the SSSMR system to accommodate the manufacturer/fabricator's design shall be the Contractor's responsibility and shall be submitted for review and approval.

1.3.8 Roof Panels Design

Aluminum panels shall be designed in accordance with AA Design Manual. The structural section properties used in the design of the panels shall be determined using the unloaded shape of the roof panels. The calculated panel deflection from concentrated loads shall not exceed 1/180 of the span length. The calculated panel deflection under applied live load, snow, or wind load shall not exceed 1/180 times the span length. Deflections shall be based on panels being continuous across three or more supports. Deflection shall be calculated and measured along the major ribs of the panels.

1.3.9 Accessories and Their Fasteners

Accessories and their fasteners shall be capable of resisting the specified design wind uplift forces and shall allow for thermal movement of the roof panel system. Exposed fasteners shall not restrict free movement of the roof panel system resulting from thermal forces. There shall be a minimum of two fasteners per clip. Single fasteners with a minimum diameter of 9 mm will be allowed when the supporting structural members are prepunched or predrilled.

1.4 PERFORMANCE REQUIREMENTS

The SSSMR shall be tested for wind uplift resistance in accordance with ASTM E 1592; SSSMR systems previously tested and approved by the Corps of Engineers' STANDARD TEST METHOD FOR STRUCTURAL PERFORMANCE OF SSMRS BY UNIFORM STATIC AIR PRESSURE DIFFERENCE may be acceptable. Two tests shall be performed. The test shall simulate the edge condition with one end having crosswise restraint and other end free of crosswise restraint. The maximum span length for the edge condition shall be 750 mm.

1.5 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 Standing Seam Metal Roof System; G|AE.

Metal roofing drawings and specifications and erection drawings; shop coating and finishing specifications; and other data as necessary to clearly describe design, materials, sizes, layouts, standing seam configuration, construction details, provisions for thermal movement, line of panel fixity, fastener sizes and spacings, sealants and erection procedures. Drawings shall reflect the intent of the architectural detailing using the manufacturer's proprietary products and fabricated items as required. The SSSMR system shop drawings shall be provided by the metal roofing manufacturer.

SD-03 Product Data

Design Analysis; G|AE.

Design analysis signed by a Registered Professional Engineer employed by the SSSMR manufacturer. The design analysis shall include a list of the design loads, and complete calculations for the support system (when provided by the Contractor), roofing system and its components; valley designs, gutter/downspout calculations, screw pullout test results, and shall indicate how expected thermal movements are accommodated.

SD-04 Samples

Factory Color Finish; G|AE

Three 75 by 125 mm samples of each type and color.

SD-06 Test Reports

Test Report for Uplift Resistance of the SSSMR; G|AE.

The report shall include the following information:

a. Details of the SSSMR system showing the roof panel cross-section with dimensions and thickness.

b. Details of the anchor clip, dimensions, and thickness.

c. Type of fasteners, size, and the number required for each connection.

d. Description of the seaming operation including equipment used.

e. Maximum allowable uplift pressures. These pressures are determined from the ultimate load divided by a factor of safety equal to 1.65.

f. Any additional information required to identify the SSSMR system tested.

g. Signature and seal of an independent registered engineer who witnessed the test.

SD-07 Certificates

Structural Standing Seam Metal Roof System.

a. Certification that the actual thickness of uncoated sheets used in SSSMRS components including roofing panels, and concealed anchor clips complies with specified requirements.

b. Certification that materials used in the installation are mill certified.

c. Previous certification of SSSMR system tested under the Corps of Engineers' Standard Test Method in lieu of ASTM E 1592 testing.

d. Certification that the sheets to be furnished are produced under a continuing quality control program and that a representative sample consisting of not less than three pieces has been tested and has met the quality standards specified for factory color finish.

e. Certification of installer. Installer certification shall be furnished.

f. Warranty certificate. At the completion of the project the Contractor shall furnish signed copies of the 5-year Warranty for Structural Standing Seam Metal Roof (SSSMR) System, a sample copy of which is attached to this section, the 20-year Manufacturer's Material Warranties, and the manufacturer's 20-year system weathertightness warranty.

1.6 DELIVERY AND STORAGE

Materials shall be delivered to the site in a dry and undamaged condition and stored out of contact with the ground. Materials shall be covered with weathertight coverings and kept dry. Storage conditions shall provide good air circulation and protection from surface staining.

1.7 WARRANTIES

The SSSMR system shall be warranted as outlined below. Any emergency temporary repairs conducted by the owner shall not negate the warranties.

1.7.1 Contractor's Weathertightness Warranty

The SSSMR system shall be warranted by the Contractor on a no penal sum basis for a period of five years against material and workmanship deficiencies; system deterioration caused by exposure to the elements and/or inadequate resistance to specified service design loads, water leaks, and wind uplift damage. The SSSMR system covered under this warranty shall include the entire roofing system including, but not limited to, the standing seam metal roof panels, fasteners, connectors, roof securement components, and assemblies tested and approved in accordance with ASTM E 1592. In addition, the system shall consist of panel finishes, slip sheet, insulation, vapor retarder, all accessories, components, and trim and all connections with roof panels. This includes roof penetration items such as vents, curbs, and skylights; interior or exterior gutters and downspouts; eaves, ridge, hip, valley, rake, gable, wall, or other roof system flashings installed and any other components specified within this contract to provide a weathertight roof system; and items specified in other sections of these specifications that are part of the SSSMR system. All material and workmanship deficiencies, system deterioration caused by exposure to the elements and/or inadequate resistance to specified design loads, water leaks and wind uplift damage shall be repaired as approved by the Contracting Officer. See the attached Contractor's required warranty for issue resolution of warrantable defects. This warranty shall warrant and cover the entire cost of repair or replacement, including all material, labor, and related markups. The Contractor shall supplement this warranty with written warranties from the installer and system manufacturer, which shall be submitted along with Contractor's warranty; however, the Contractor shall be ultimately responsible for this warranty. The Contractor's written warranty shall be as outlined in attached WARRANTY FOR STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM, and shall start upon final acceptance of the facility. It is required that the Contractor provide a separate bond in an amount equal to the installed total roofing system cost in favor of the owner (Government) covering the Contractor's warranty responsibilities effective throughout the five year Contractor's warranty period for the entire SSSMR system as outlined above.

1.7.2 Manufacturer's Material Warranties.

The Contractor shall furnish, in writing, the following manufacturer's material warranties which cover all SSSMR system components such as roof panels, anchor clips and fasteners, flashing, accessories, and trim, fabricated from coil material:

a. A manufacturer's 20 year material warranty warranting that the aluminum, zinc-coated steel, aluminum-zinc alloy coated steel or aluminum-coated steel as specified herein will not rupture, structurally fail, fracture, deteriorate, or become perforated under normal design atmospheric conditions and service design loads. Liability under this warranty shall be limited exclusively to the cost of either repairing or replacing nonconforming, ruptured, perforated, or structurally failed coil material.

b. A manufacturer's 20 year exterior material finish warranty on the factory colored finish warranting that the finish, under normal atmospheric conditions at the site, will not crack, peel, or delaminate; chalk in excess of a numerical rating of eight, as determined by ASTM D 4214 test procedures; or change color in excess of five CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. Liability under this warranty is exclusively limited to refinishing with an air-drying version of the specified finish or replacing the defective coated material.

c. A roofing system manufacturer's 20 year system weathertightness warranty.

1.8 COORDINATION MEETING

A coordination meeting shall be held 30 days prior to the first submittal, for mutual understanding of the Structural Standing Seam Metal Roof (SSSMR) System contract requirements. This meeting shall take place at the building site and shall include representatives from the Contractor, the roof system manufacturer, the roofing supplier, the erector, the SSSMR design engineer of record, and the Contracting Officer. All items required by paragraph SUBMITTALS shall be discussed, including applicable standard manufacturer shop drawings, and the approval process. The Contractor shall coordinate time and arrangements for the meeting.

PART 2 PRODUCTS

2.1 ROOF PANELS

Panels shall be aluminum-zinc alloy coated steel and shall have a factory color finish, 22 gauge x 600 mm width. Length of sheets shall be sufficient to cover the entire length of any unbroken roof slope for slope lengths that do not exceed 9 m. When length of run exceeds 9 m and panel laps are provided, each sheet in the run shall extend over three or more supports. Sheets longer than 30 m may be furnished if approved by the Contracting Officer. Width of sheets shall provide not more than 300 mm of coverage in place.

a. 75 mm high standing seam rib, trapezoidal profile, double lock standing seam, containing a factory applied hot melt mastic, continuously locked together by a mechanical seaming device during installation. 22 gauge. Embossed texture. Factory color finish. Concealed fastening system. Uplift rating as specified by UL 90.

b. Panels shall be roll formed, galvanized steel, sheet coated on both sides with a 35 g zinc coating, G-90 conforming to ASTM A 525.

2.1.1 Steel Panels

Steel panels shall be zinc-coated steel conforming to ASTM A 653/A 653M; aluminum-zinc alloy coated steel conforming to ASTM A 792/A 792M, AZ 55 coating; or aluminum-coated steel conforming to ASTM A 463/A 463M, Type 2, coating designation T2 65. Zinc-aluminum alloy or aluminum coated panels shall be 0.584 mm minimum. Panels shall be within 95 percent of reported tested thickness as noted in wind uplift resistance testing required in paragraph PERFORMANCE REQUIREMENTS. Prior to shipping, mill finish panels shall be treated with a passivating chemical to inhibit the formation of oxide corrosion products. Panels that have become wet during shipment and have started to oxide shall be rejected.

2.2 CONCEALED ANCHOR CLIPS

Concealed anchor clips shall be the same as the tested roofing system. Clip bases shall have factory punched or drilled holes for attachment. Clips shall be made from multiple pieces with the allowance for the total thermal movement required to take place within the clip. Roof system clip assembly shall include concealed clips, yoke, triangular shaped slide bar (with cadium coating), and self-centering sleeve and shall all be provided by the same roof manufacturer.

2.3 ACCESSORIES

Flashing, trim, metal closure strips, fillers, roof panel mounting clips, caps and similar metal accessories shall be the manufacturer's standard products. Exposed metal accessories shall be finished to match the panels furnished. Molded closure strips shall be bituminous-saturated fiber, closed-cell or solid-cell synthetic rubber or neoprene, or polyvinyl chloride premolded to match configuration of the panels and shall not absorb or retain water. The use of a continuous angle butted to the panel ends to form a closure will not be allowed.

2.4 FASTENERS

Fasteners for structural connections shall provide both tensile and shear ultimate strengths of not less than 3340 N per fastener. Fasteners for accessories shall be the manufacturer's standard. Washer material shall be compatible with the roofing; have a minimum diameter of 10 mm for structural connections; and gasketed portion of fasteners or washers shall be neoprene or other equally durable elastomeric material approximately 3 mm thick. All fasteners shall be secured to the metal deck. All roof panel clips shall have a minimum of two fasteners to the steel deck.

2.4.1 Screws

Screws for attaching anchor devices shall be not less than No. 14. Actual screw pull out test results shall be performed for the actual material gage and yield strength of the steel deck to which the clip is to be anchored/attached. Other screws shall be as recommended by the manufacturer to meet the strength design requirements of the panels.

2.4.2 Bolts

Bolts shall be not less than 6 mm diameter, shouldered or plain shank as required, with locking washers and nuts. Provide zinc or cadium plated units per ASTM A 307 or ASTM A 325.

2.4.3 Structural Blind Fasteners

Blind screw-type expandable fasteners shall be not less than 6 mm diameter. Blind (pop) rivets shall be not less than 7 mm minimum diameter.

2.5 OMITTED

2.6 FACTORY COLOR FINISH

Panels shall have a factory applied premium fluorocarbon coating provided with Kynar 500 finish on the exposed side. The exterior finish shall consist of a baked-on topcoat with an appropriate prime coat. Color shall match the color indicated on the drawings. The exterior

coating shall be a nominal 0.025 mm thickness consisting of a topcoat of not less than 0.018 mm dry film thickness and the paint manufacturer's recommended primer of not less than 0.005 mm thickness. The exterior color finish shall meet the test requirements specified below.

2.6.1 Salt Spray Test

A sample of the sheets shall withstand a cyclic corrosion test for a minimum of 2016 hours in accordance with ASTM D 5894, including the scribe requirement in the test. Immediately upon removal of the panel from the test, the coating shall receive a rating of not less than 10, no blistering, as determined by ASTM D 714; 10, no rusting, as determined by ASTM D 610; and a rating of 6, over 2.0 to 3.0 mm failure at scribe, as determined by ASTM D 1654.

2.6.2 Formability Test

When subjected to testing in accordance with ASTM D 522 Method B, 3 mm diameter mandrel, the coating film shall show no evidence of cracking to the naked eye.

2.6.3 Accelerated Weathering, Chalking Resistance and Color Change

A sample of the sheets shall be tested for 2,000 total hours. The coating shall withstand the weathering test without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating that can be readily removed from the base metal with tape in accordance with ASTM D 3359, Test Method B, shall be considered as an area indicating loss of adhesion. Following the accelerated weathering test, the coating shall have a chalk rating not less than No. 8 in accordance with ASTM D 4214 test procedures, and the color change shall not exceed 5 CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. For sheets required to have a low gloss finish, the chalk rating shall be not less than No. 6 and the color difference shall be not greater than 7 units.

2.6.4 Humidity Test

When subjected to a humidity cabinet test in accordance with ASTM D 2247 for 1000 hours, a scored panel shall show no signs of blistering, cracking, creepage or corrosion.

2.6.5 Impact Resistance

Factory-painted sheet shall withstand direct and reverse impact in accordance with ASTM D 2794 13 mm diameter hemispherical head indenter, equal to 6.7 times the metal thickness in mm, expressed in Newton-meters, with no cracking.

2.6.6 Abrasion Resistance Test

When subjected to the falling sand test in accordance with ASTM D 968, Method A, the coating system shall withstand a minimum of 80 liters of sand before the appearance of the base metal. The term "appearance of base metal" refers to the metallic coating on the aluminum base metal.

2.6.7 Specular Gloss

Finished roof surfaces shall have a specular gloss value of 30 plus or minus at 60 degrees when measured in accordance with ASTM D 523.

2.6.8 Pollution Resistance

Coating shall show no visual effects when covered spot tested in a 10 percent hydrochloric acid solution for 24 hours in accordance with ASTM D 1308.

2.7 INSULATION

See Section 07220, ROOF INSULATION.

2.8 OMITTED

2.9 SEALANT

Sealants shall be elastomeric type containing no oil or asphalt. Exposed sealant shall be clear and shall cure to a rubberlike consistency. Sealant placed in the roof panel standing seam ribs shall be provided in accordance with the manufacturer's recommendations.

2.10 GASKETS AND INSULATING COMPOUNDS

Gaskets and insulating compounds shall be nonabsorptive and suitable for insulating contact points of incompatible materials. Insulating compounds shall be nonrunning after drying.

2.11 OMITTED

2.12 EPDM RUBBER BOOTS

Flashing devices around pipe penetrations shall be flexible, one-piece devices molded from weather-resistant EPDM rubber. Rubber boot material shall be as recommended by the manufacturer. The boots shall have base rings made of aluminum or corrosion resisting steel that conform to the contours of the roof panel to form a weather-tight seal.

2.13 UNDERLAYMENTS

2.13.1 Composite Self-Adhering Membrane Rubberized Underlayment

Rubberized underlayment shall be equal to "Vycor Ice and Water Shield" as manufactured by Grace Construction Products, "Winterguard", as manufactured by CertainTeed Corporation, or "Weather Watch Ice and Water Barrier," as manufactured by GAF Building Materials Corporation. Membrane shall be a polymeric sheeting integrally bonded to rubberized asphalt with a minimum thickness of 1.5 mm.

2.13.1.1 Rubberized Underlayment

Rubberized underlayment is a cold-applied, self-adhering membrane composed of a high density, cross laminated polyethylene film coated on one side with a layer of butyl rubber adhesive. An embossed, slip resistant surface is provided on the polyethylene. Rubberized underlayment is interwound with a disposable silicone-coated release sheet. Membrane shall conform to the following physical properties:

Property	Value	Test Method
Color	Gray-Black	
Thickness, Membrane	1.02 mm (40 mil)	ASTM D 3767 Method A
Tensile Strength, Membrane	1720 kN/m2 (250 psi)	ASTM D 412 (Die C Modified)
Elongation, Membrane	250%	ASTM D 412 (Die C Modified)
Low Temperature Flexibility	Unaffected @-32°C(-25°F)	ASTM D 1970
Adhesion to Plywood	525 N/m (3.0 lb/in. width)	ASTM D 903
Permeance (Max)	2.9 ng/m2s Pa (0.05 Perms)	ASTM E 96
Material Weight Installed (Max)	1.3 kg/m2 (0.3 lb/ft2)	ASTM D 461

2.13.2 Slip Sheet

Slip sheet shall be 0.24 kg per square meter rosin sized unsaturated building paper.

2.13.3 Gypsum Board Sheathing

Nailable surface sheathing shall be exterior gypsum roof board, in accordance with ASTM C 1177/C 1177M, flame spread 0, smoke developed 0, 3446 kpa, Class A non-combustible.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall be in accordance with the manufacturer's erection instructions and drawings. Dissimilar materials which are not compatible when contacting each other shall be insulated by means of gaskets or insulating compounds. Molded closure strips shall be installed wherever roofing sheets terminate in open-end configurations, exclusive of flashings. The closure strip installation shall be weather-tight and sealed. Screws shall be installed with a clutching screw gun, to assure screws are not stripped. Field test shall be conducted on each gun prior to starting installation and periodically thereafter to assure it is adjusted properly to install particular type and size of screw as recommended by manufacturer's literature. Improper or mislocated drill holes shall be plugged with an oversize screw fastener and gasketed washer; however, sheets with an excess of such holes or with such holes in critical locations shall not be used. Exposed surfaces and edges shall be kept clean and free from sealant, metal cuttings, hazardous burrs, and other foreign material. Stained, discolored, or damaged sheets shall be removed from the site.

3.1.1 Field Forming of Panels for Unique Area

When roofing panels are formed from factory-color-finished steel coils at the project site, the same care and quality control measures that are taken in shop forming of roofing panels shall be observed. Rollformer shall be operated by the metal roofing manufacturer's

representative. In cold weather conditions, preheating of the steel coils to be field formed shall be performed as necessary just prior to the rolling operations.

3.1.2 Underlayment

Underlayment types shall be installed where shown on the drawings; they shall be installed directly over the substrate. If a roof panel rests directly on the underlayments, a slip sheet shall be installed as a top layer, beneath the metal roofing panels, to prevent adhesion. All underlayments shall be installed so that successive strips overlap the next lower strip in shingle fashion. Underlayments shall be installed in accordance with the manufacturer's written instructions. The underlayments shall ensure that any water that penetrates below the metal roofing panels will drain outside of the building envelope.

3.1.3 Roof Panel Installation

Roof panels shall be installed with the standing seams in the direction of the roof slope. The side seam connections for installed panels shall be completed at the end of each day's work. Method of applying joint sealant shall conform to the manufacturer's recommendation to achieve a complete weather-tight installation. End laps of panels shall be provided in accordance with the manufacturer's instructions. Closures, flashings, EPDM rubber boots, roof curbs, and related accessories shall be installed according to the manufacturer's drawings. Fasteners shall not puncture roofing sheets except as provided for in the manufacturer's instructions for erection and installation. Expansion joints for the structural standing seam metal roof system shall be installed at locations indicated on the contract drawings and other locations indicated on the manufacturer's drawings.

3.1.4 Concealed Anchor Clips

Concealed anchor clips shall be fastened directly to the structural framing members. Attachment to the substrate (when provided) or to the metal deck is not permitted. The maximum distance, parallel to the seams, between clips shall be 750 mm on center at the corner, edge, and ridge zones, and 1500 mm maximum on centers for the remainder of the roof.

3.2 OMITTED

3.3 OMITTED

3.4 OMITTED

3.5 SLIP SHEET INSTALLATION

A slip sheet shall be laid over the rubberized underlayment facing to prevent the rubberized underlayment from adhering to the metal roofing.

3.6 CLEANING AND TOUCH-UP

Exposed SSSMR systems shall be cleaned at completion of installation. Debris that could cause discoloration and harm to the panels, flashings, closures and other accessories shall be removed. Grease and oil films, excess sealants, and handling marks shall be removed and the work shall be scrubbed clean. Exposed metal surfaces shall be free of dents, creases, waves, scratch marks, and solder or weld marks. Immediately upon detection, abraded or corroded spots on shop-painted surfaces shall be wire brushed and touched up with the same material used for the shop coat. Factory color finished surfaces shall be touched up with the manufacturer's recommended touch up paint.

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM

FACILITY DESCRIPTION_____

BUILDING NUMBER:_____

CORPS OF ENGINEERS CONTRACT NUMBER:_____

CONTRACTOR

CONTRACTOR:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

OWNER

OWNER:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

CONSTRUCTION AGENT

CONSTRUCTION AGENT:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
(continued)

THE SSSMR SYSTEM INSTALLED ON THE ABOVE NAMED BUILDING IS WARRANTED BY _____ FOR A PERIOD OF FIVE (5) YEARS AGAINST WORKMANSHIP AND MATERIAL DEFICIENCES, WIND DAMAGE, STRUCTURAL FAILURE, AND LEAKAGE. THE SSSMR SYSTEM COVERED UNDER THIS WARRANTY SHALL INCLUDE, BUT SHALL NOT BE LIMITED TO, THE FOLLOWING: THE ENTIRE ROOFING SYSTEM, MANUFACTURER SUPPLIED FRAMING AND STRUCTURAL MEMBERS, METAL ROOF PANELS, FASTENERS, CONNECTORS, ROOF SECUREMENT COMPONENTS, AND ASSEMBLIES TESTED AND APPROVED IN ACCORDANCE WITH ASTM E 1592. IN ADDITION, THE SYSTEM PANEL FINISHES, SLIP SHEET, INSULATION, VAPOR RETARDER, ALL ACCESSORIES, COMPONENTS, AND TRIM AND ALL CONNECTIONS ARE INCLUDED. THIS INCLUDES ROOF PENETRATION ITEMS SUCH AS VENTS, CURBS, SKYLIGHTS; INTERIOR OR EXTERIOR GUTTERS AND DOWNSPOUTS; EAVES, RIDGE, HIP, VALLEY, RAKE, GABLE, WALL, OR OTHER ROOF SYSTEM FLASHINGS INSTALLED AND ANY OTHER COMPONENTS SPECIFIED WITHIN THIS CONTRACT TO PROVIDE A WEATHERTIGHT ROOF SYSTEM; AND ITEMS SPECIFIED IN OTHER SECTIONS OF THE SPECIFICATIONS THAT ARE PART OF THE SSSMR SYSTEM.

ALL MATERIAL DEFICIENCIES, WIND DAMAGE, STRUCTURAL FAILURE, AND LEAKAGE ASSOCIATED WITH THE SSSMR SYSTEM COVERED UNDER THIS WARRANTY SHALL BE REPAIRED AS APPROVED BY THE CONTRACTING OFFICER. THIS WARRANTY SHALL COVER THE ENTIRE COST OF REPAIR OR REPLACEMENT, INCLUDING ALL MATERIAL, LABOR, AND RELATED MARKUPS. THE ABOVE REFERENCED WARRANTY COMMENCED ON THE DATE OF FINAL ACCEPTANCE ON _____ AND WILL REMAIN IN EFFECT FOR STATED DURATION FROM THIS DATE.

SIGNED, DATED, AND NOTARIZED (BY COMPANY PRESIDENT)

_____

(Company President) (Date)

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
(continued)

THE CONTRACTOR SHALL SUPPLEMENT THIS WARRANTY WITH WRITTEN WARRANTIES FROM THE MANUFACTURER AND/OR INSTALLER OF THE SSSMR SYSTEM, WHICH SHALL BE SUBMITTED ALONG WITH THE CONTRACTOR'S WARRANTY. HOWEVER, THE CONTRACTOR WILL BE ULTIMATELY RESPONSIBLE FOR THIS WARRANTY AS OUTLINED IN THE SPECIFICATIONS AND AS INDICATED IN THIS WARRANTY EXAMPLE.

EXCLUSIONS FROM COVERAGE

1. NATURAL DISASTERS, ACTS OF GOD (LIGHTNING, FIRE, EXPLOSIONS, SUSTAINED WIND FORCES IN EXCESS OF THE DESIGN CRITERIA, EARTHQUAKES, AND HAIL).

2. ACTS OF NEGLIGENCE OR ABUSE OR MISUSE BY GOVERNMENT OR OTHER PERSONNEL, INCLUDING ACCIDENTS, VANDALISM, CIVIL DISOBEDIENCE, WAR, OR DAMAGE CAUSED BY FALLING OBJECTS.

3. DAMAGE BY STRUCTURAL FAILURE, SETTLEMENT, MOVEMENT, DISTORTION, WARPAGE, OR DISPLACEMENT OF THE BUILDING STRUCTURE OR ALTERATIONS MADE TO THE BUILDING.

4. CORROSION CAUSED BY EXPOSURE TO CORROSIVE CHEMICALS, ASH OR FUMES GENERATED OR RELEASED INSIDE OR OUTSIDE THE BUILDING FROM CHEMICAL PLANTS, FOUNDRIES, PLATING WORKS, KILNS, FERTILIZER FACTORIES, PAPER PLANTS, AND THE LIKE.

5. FAILURE OF ANY PART OF THE SSSMR SYSTEM DUE TO ACTIONS BY THE OWNER TO INHIBIT FREE DRAINAGE OF WATER FROM THE ROOF AND GUTTERS AND DOWNSPOUTS OR ALLOW PONDING WATER TO COLLECT ON THE ROOF SURFACE. CONTRACTOR'S DESIGN SHALL INSURE FREE DRAINAGE FROM THE ROOF AND NOT ALLOW PONDING WATER.

6. THIS WARRANTY APPLIES TO THE SSSMR SYSTEM. IT DOES NOT INCLUDE ANY CONSEQUENTIAL DAMAGE TO THE BUILDING INTERIOR OR CONTENTS WHICH IS COVERED BY THE WARRANTY OF CONSTRUCTION CLAUSE INCLUDED IN THIS CONTRACT.

7. THIS WARRANTY CANNOT BE TRANSFERRED TO ANOTHER OWNER WITHOUT WRITTEN CONSENT OF THE CONTRACTOR; AND THIS WARRANTY AND THE CONTRACT PROVISIONS WILL TAKE PRECEDENCE OVER ANY CONFLICTS WITH STATE STATUTES.

**

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
(continued)

**REPORTS OF LEAKS AND SSSMR SYSTEM DEFICIENCIES SHALL BE RESPONDED TO WITHIN 48 HOURS OF RECEIPT OF NOTICE, BY TELEPHONE OR IN WRITING, FROM EITHER THE OWNER OR CONTRACTING OFFICER. EMERGENCY REPAIRS TO PREVENT FURTHER ROOF LEAKS SHALL BE INITIATED IMMEDIATELY; A WRITTEN PLAN SHALL BE SUBMITTED FOR APPROVAL TO REPAIR OR REPLACE THIS SSSMR SYSTEM WITHIN SEVEN (7) CALENDAR DAYS. ACTUAL WORK FOR PERMANENT REPAIRS OR REPLACEMENT SHALL BE STARTED WITHIN 30 DAYS AFTER RECEIPT OF NOTICE, AND COMPLETED WITHIN A REASONABLE TIME FRAME. IF THE CONTRACTOR FAILS TO ADEQUATELY RESPOND TO THE WARRANTY PROVISIONS, AS STATED IN THE CONTRACT AND AS CONTAINED HEREIN, THE CONTRACTING OFFICER MAY HAVE THE SSSMR SYSTEM REPAIRED OR REPLACED BY OTHERS AND CHARGE THE COST TO THE CONTRACTOR.

IN THE EVENT THE CONTRACTOR DISPUTES THE EXISTENCE OF A WARRANTABLE DEFECT, THE CONTRACTOR MAY CHALLENGE THE OWNER'S DEMAND FOR REPAIRS AND/OR REPLACEMENT DIRECTED BY THE OWNER OR CONTRACTING OFFICER EITHER BY REQUESTING A CONTRACTING OFFICER'S DECISION UNDER THE CONTRACT DISPUTES ACT, OR BY REQUESTING THAT AN ARBITRATOR RESOLVE THE ISSUE. THE REQUEST FOR AN ARBITRATOR MUST BE MADE WITHIN 48 HOURS OF BEING NOTIFIED OF THE DISPUTED DEFECTS. UPON BEING INVOKED, THE PARTIES SHALL, WITHIN TEN (10) DAYS, JOINTLY REQUEST A LIST OF FIVE (5) ARBITRATORS FROM THE FEDERAL MEDIATION AND CONCILIATION SERVICE. THE PARTIES SHALL CONFER WITHIN TEN (10) DAYS AFTER RECEIPT OF THE LIST TO SEEK AGREEMENT ON AN ARBITRATOR. IF THE PARTIES CANNOT AGREE ON AN ARBITRATOR, THE CONTRACTING OFFICER AND THE PRESIDENT OF THE CONTRACTOR'S COMPANY WILL STRIKE ONE (1) NAME FROM THE LIST ALTERNATIVELY UNTIL ONE (1) NAME REMAINS. THE REMAINING PERSON SHALL BE THE DULY SELECTED ARBITRATOR. THE COSTS OF THE ARBITRATION, INCLUDING THE ARBITRATOR'S FEE AND EXPENSES, COURT REPORTER, COURTROOM OR SITE SELECTED, ETC., SHALL BE BORNE EQUALLY BETWEEN THE PARTIES. EITHER PARTY DESIRING A COPY OF THE TRANSCRIPT SHALL PAY FOR THE TRANSCRIPT. A HEARING WILL BE HELD AS SOON AS THE PARTIES CAN MUTUALLY AGREE. A WRITTEN ARBITRATOR'S DECISION WILL BE REQUESTED NOT LATER THAN 30 DAYS FOLLOWING THE HEARING. THE DECISION OF THE ARBITRATOR WILL NOT BE BINDING; HOWEVER, IT WILL BE ADMISSIBLE IN ANY SUBSEQUENT APPEAL UNDER THE CONTRACT DISPUTES ACT.

A FRAMED COPY OF THIS WARRANTY SHALL BE POSTED IN THE MECHANICAL ROOM OR OTHER APPROVED LOCATION DURING THE ENTIRE WARRANTY PERIOD.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 07 - THERMAL & MOISTURE PROTECTION

SECTION 07600

SHEET METALWORK, GENERAL

04/00

-- End of Section Table of Contents --

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 ARCHITECTURAL MANUFACTURER'S ASSOCIATION (AAMA)

AAMA 606.1	(1976) Integral Color Anodic Finishes for Architectural Aluminum
AAMA 608.1	(1977) Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum

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 209M	(1995) Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B 221M	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
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 412	(1992) Test Methods for Vulcanized Rubber and Thermosplastic Rubbers and Theromoplastic Elastomers - Tension
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

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. Application of bituminous strip flashing over various sheet metal items is covered in Section 07416 STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM. 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 221M , 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 Reglets

2.1.7.1 General

5.7 mm thick stainless steel or 7.6 mm anodized aluminum units of type, and profile indicated, with prefabricated factory mitered and sealed corners, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.

2.1.7.2 Concrete Type

Provide temporary closure tape to keep reglet free of concrete materials, special non-corrosive fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.

2.1.7.3 Flexible Flashing Retainer

Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where drawings show reglet

without metal counterflashing.

2.1.7.4 Counterflashing Wind-Restraint Clips

Provide clips to be installed before counterflashing to prevent wind uplift of the counter-flashing lower edge.

2.1.8 Aluminum Alloy Sheet and Plate

ASTM B 209M . Color as indicated on drawings.

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

a. ASTM B 32, 95-5 tin-antimony.

b. Solder all flashing joints and corner flashing joints. Provide mastic only at expansion/lap joints.

2.1.12 Through-Wall Flashing

a. Electro-sheet copper not less than 0.14 kg, factory coated both sides with acid- and alkali-resistant bituminous compound not less than 1.8 kg per square meter or factory covered both sides with asphalt-saturated cotton fabric, asphalt saturated glass-fiber fabric, or with 18 kg reinforced kraft paper bonded with asphalt.

b. Stainless steel, Type 304, not less than 0.08 mm (24 gauge) thick, completely encased by and permanently bonded on both sides to 23 kg high strength bituminized crepe kraft paper, using hot asphalt, heat, and pressure.

c. Nonreinforced, waterproof, impermeable extruded elastomeric single ply sheeting not less than 0.76 mm thick.

d. 0.09 kg copper sheet, with 0.05 mm of dense, clear, polyethylene sheet bonded to each side of the copper.

e. Other through-wall flashing material will not be allowed.

f. Provide stainless steel turnbars (1/8 inch x 1 inch) at all through-wall flashing locations.

2.1.13 Preformed Metal Coping

Formed aluminum, minimum 1.3 mm thick, profile as indicated on drawings. Factory preformed and prefinished; coping shall be securely fastened to parapet walls with gutter/splice plates and anchor plate; joints shall be gutter/splice plates, concealed, in accordance with manufacturer's product data.

a. Gutter/Splice Plates: Minimum 0.8 millimeter thickness aluminum, 150 millimeter minimum length, same finish as copings, with extruded butyl sealant for concealed installation, to withstand local wind and seismic forces.

b. Anchor Plates: Galvanized steel of manufacturer's standard design.

c. Fasteners: As recommended by coping system manufacturer.

d. Prefabricated Sections: Factory-assembled mitered corners, and welded joints to match copings in design and finish.

e. Class I, color anodic finish: AA-M12C22A42/A44 (Mechanical Finish); nonspecular as fabricated; chemical finish, etched, medium matte, anodic coating; Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker, complying with AAMA 606.1 or AAMA 608.1. `

2.1.13.1 Finish

Exposed exterior sheet metal items of aluminum shall have an anodized finish: Class I, color anodic finish: AA-M12C22A42/A44 (Mechanical Finish); nonspecular as fabricated; chemical finish, etched, medium matte, anodic coating; Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker, complying with AAMA 606.1 or AAMA 608.1.

2.1.13.2 Membrane Flashing

Self-adhering membrane composed of a high-strength polyethelene film coated on one side with a layer of rubberized asphalt adhesive; 40 mils thick. Tensile strength of 250 psi per ASTM D 412. Elongation: 250% per ASTM D 412.

2.1.14 Gutters

Aluminum, 0.8 mm minimum, in profiles indicated on drawings. Finish: as indicated on finish schedules.

2.1.15 Downspouts

Aluminum, 0.6 mm minimum, in profiles indicated on drawings. Finish: as indicated on finish schedules.

2.1.16 Sheet Metal Trim

Eave location, identified on drawings, shall be factory formed aluminum, minimum 1.3 mm thick.

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 13 mm (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 other than built-up roofing.

3.2 ROOF EXPANSION JOINTS

Expansion joints shall be provided as specified in Section 07416, STRUCTURAL STANDING SEAM METAL ROOF SYSTEM.

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 1.0 mm or less in thickness shall be mechanically made.

3.4.3 Seaming

Flat-lock and soldered-lap seams shall finish not less than 25 mm wide. Unsoldered plain-lap seams shall lap not less than 75 mm 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 3 mm apart. The cleat shall be fastened to supporting wood construction with nails evenly spaced not over 300 mm 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 915 mm (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, roof, 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 75 mm on centers. Metal base flashing shall not be used on built-up roofing.

3.7.2 Counter Flashings

Except as otherwise indicated, counter flashings shall be provided over base flashings. Counter flashing shall be installed as shown in SMACNA Arch. Manual. Where bituminous base flashings are provided, the counter flashing shall extend down as close as practicable to the top of the cant strip. 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 50 mm, 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 100 mm 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 OMITTED

3.9 OMITTED

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 300 mm 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 300 mm to crimp the reglet and counter flashing together.

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 --

SECTION TABLE OF CONTENTS

DIVISION 07 - THERMAL & MOISTURE PROTECTION

SECTION 07840

FIRESTOPPING

08/00

-- End of Section Table of Contents --

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 C 612	(1993) Specification for Mineral Fiber Block and Board Thermal Insulation
ASTM E 84	(1999) Surface Burning Characteristics of Building Materials
ASTM E 119	(1998) Fire Tests of Building Construction and Materials
ASTM E 136	(1999) Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C
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. Firesafing 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. Firesafing 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.

2.2 FIRESAFING

2.2.1 Slag-Wood-Fiber Board Safing Insulation

Semirigid boards or blankets produced by combining slag-wool fibers with thermo-setting resin binders to comply with ASTM C 612, Type IA and IB; nominal density of 63.7 kg/cubic meter; passing ASTM E 136 for combustion characteristics; thermal resistivity of 15.5 deg C x h x meter/watts/Btu x in. at 23.88 deg C., designed for use as fire stop at openings between edge of slab and exterior wall components, and for sealing the top of masonry and other type walls at intersection of wall to deck.

2.2.2 Safing Clips

Galvanized steel safing clips approved by manufacturer of safing insulation for holding safing insulation in place, where required.

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 and firesafing materials shall completely fill void spaces regardless of geometric configuration, subject to tolerance established by the manufacturer. Firestopping systems for filling floor voids 100 mm 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 INSTALLATION OF FIRESAFING MATERIAL

Install firesafing insulation of proper size as needed per manufacturer's recommendation. Compress and install in all openings indicated and in walls as required, to provide a positive seal at all locations around telephone cables, ducts, piping, and other utilities. Provide smoke seal calking compound to assure a positive seal against smoke penetration.

3.3.1 Installation of Top of Partitions

Firesafing materials for filling voids at interface of decks above and partitions, as indicated on drawings. Compress firesafing above masonry partitions and other areas indicated to fill all voids. Provide smoke seal calking compound to assure a positive seal against smoke penetration, prior to installation of steel angles.

3.4 INSPECTION

Firestopped and firesafing 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.

-- End of Section --

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DIVISION 07 - THERMAL & MOISTURE PROTECTION

SECTION 07900

JOINT SEALING

06/97

-- End of Section Table of Contents --

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 734	(1993) Low-Temperature Flexibility of Latex Sealants After Artificial Weathering
ASTM C 834	(1995) Latex Sealants
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 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 4 to 32 degrees C 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 4 and 32 degrees C 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 Backing

Cellular rubber sponge backing shall be ASTM D 1056, Type 1, open cell, or Type 2, closed cell, Class A, Grade A, round cross section.

2.1.2 Omitted

2.1.3 Omitted

2.1.4 Neoprene

Neoprene backing shall be ASTM D 1056, closed cell expanded neoprene cord Type 2, Class C, Grade 2C2 or open cell neoprene sponge Type 1, Class C, Grade 1C3.

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 OMITTED

2.5 SEALANT

2.5.1 LATEX

Latex Sealant shall be ASTM C 834. Application: Interior, non-humid areas.

2.5.2 ELASTOMERIC

Elastomeric sealants shall conform to ASTM C 920 and the following:

a. Polyeurathane sealant: Grade NS, Class 25.
Application: Exterior materials of the building envelope between brick or stucco and adjacent surfaces, such as control joints and other conditions indicated.

b. Mildew resistant silicone sealant: Provide products formulated with fungicide that are intended for sealing interior ceramic tile joints and other nonporous substrate that are subject to in - service exposures of high humidity and temperature extremes. Type S and NS; Class 25; NT 0.
Application: Toilets, showers and other high humidity areas.

2.5.3 Acoustical Sealant

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. Application: Exposed and concealed joints, sound rated partitions, top and bottom of partitions, where indicated on drawings.

2.5.4 Omitted

2.5.5 PREFORMED COMPRESSIVE SEALANT

Preformed sealant shall be polybutylene or isoprene-butylene based pressure sensitive weather resistant tape or bead sealant capable of sealing out moisture, air and dust when installed as recommended by the manufacturer. At temperatures from minus 34 to plus 71 degrees C , the sealant shall be non-bleeding and shall have no loss of adhesion.

2.5.5.1 Omitted

2.5.5.2 Omitted

2.5.5.3 Foam Strip

Foam strip shall be polyurethane foam. Foam strip shall be capable of sealing out moisture, air, and dust when installed and compressed as recommended by the manufacturer. Service temperature shall be minus 40 to plus 135 degrees C . Untreated strips shall be furnished with adhesive to hold them in place. Adhesive shall not stain or bleed into adjacent finishes. Treated strips shall be saturated with butylene waterproofing or impregnated with asphalt.

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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DIVISION 08 - DOORS & WINDOWS

SECTION 08110

STEEL DOORS AND FRAMES

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SECTION 08110

STEEL DOORS AND FRAMES
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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 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 A250.8	(1998) Steel Doors and Frames

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 653/A 653M	(1998) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) 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 665	(1998) Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
ASTM D 2863	(1997) Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)

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	(1995) Fire Doors and Fire Windows
NFPA 105	(1993) Smoke-Control Door Assemblies
NFPA 252	(1995) Fire Tests of Door Assemblies

STEEL DOOR INSTITUTE (SDI)

ANSI/SDI 100	(1991) Standard Steel Doors and Frames
SDI 105	(1992) Recommended Erection Instructions for Steel Frames
SDI 106	(1996) Standard Door Type Nomenclature
SDI 107	(1984) Hardware on Steel Doors (Reinforcement - Application)
SDI 111F	Recommended Completed Opening Anchors for Standard Steel Doors and Frames
SDI 113	(1979) Apparent Thermal Performance for Steel Door and Frame Assemblies

UNDERWRITERS LABORATORIES INC. (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

Steel Doors and Frames

Drawings using standard door type nomenclature in accordance with SDI 106 indicating the location of each door and frame, elevation of each model of door and frame, details of construction, method of assembling sections, location and extent of hardware reinforcement, hardware locations, type and location of anchors for frames, and thicknesses of metal. Drawings shall include catalog cuts or descriptive data for the doors, frames, and weatherstripping including air infiltration data and manufacturers printed instructions.

SD-07 Certificates

Thermal Insulated Doors.

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 6 mm 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/SDI 100, except as specified otherwise. Prepare doors to receive hardware specified in Section 08710, "Door Hardware." Undercut where indicated. Exterior doors shall have top edge closed flush and sealed to prevent water intrusion. Doors shall be 45 mm thick, unless otherwise indicated.

2.1.1 Door Grades

2.1.1.1 Omitted

2.1.1.2 Heavy Duty Doors

ANSI/SDI 100, Grade II, Model 1, with Type b, c, e or f for exterior doors, of size(s) and design(s) indicated. Where Type f cores are specified or scheduled, the space between the stiffeners shall be filled with mineral-fiber insulation as specified in paragraph "INSULATION CORES." Exterior doors and frames shall be designation G60 galvanized. Indicated interior doors and frames shall be designation A40 galvanized. Doors and frames shall be prepared to receive hardware conforming to the templates and information provided under Section 08710 DOOR HARDWARE. Doors and frames shall be reinforced, drilled, and tapped to receive mortised hinges, locks, latches, and flush bolts as required. Doors and frames shall be reinforced for surface applied hardware. Frames shall be welded type. Door frames shall be furnished with a minimum of three jamb anchors and one floor anchor per jamb. Anchors shall be not less than 1.2 mm (18 gauge) steel or 4.5 mm (7 gauge) diameter wire. For wall conditions that do not allow the use of a floor anchor, an additional jamb anchor shall be provided. Rubber silencers shall be furnished for installation into factory predrilled holes in door frames; adhesively applied silencers are not acceptable. Where frames are installed in plaster or masonry walls, plaster guards shall be provided on door frames at hinges and strikes. Full glass doors shall conform to ANSI A250.8, Model 3, and shall include provisions for glazing. Reinforcing of door assemblies for closers and other required hardware shall be in accordance with ANSI A250.8 and the conditions of the fire door assembly listing when applicable. Exterior doors shall have top edges closed flush and sealed against water penetration.

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 0.7 mm thick, 1.5 mm thick, and 1.5 mm 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 08710, "Door Hardware." Doors shall be 44.5 mm thick. Provide insulated steel doors and frames at all exterior door locations.

2.4 OMITTED

2.5 ACCESSORIES

2.5.1 Omitted

2.5.2 Omitted

2.5.3 Omitted

2.5.4 Moldings

Provide moldings around glass of exterior doors. Provide nonremovable moldings on outside of exterior 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, shall provide maximum assembly U-value 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 Fiber: ASTM C 665, Type I.

2.6.1 Thermal Insulated Doors

a. Certification of Oversized Fire Doors: Certificates of compliance in accordance with the requirements of NFPA 252 for fire doors exceeding the sizes for which label service is available.

b. Certification of Thermal Insulating Rating: Certification or test report for thermal insulated doors shall show compliance with the specified requirements. The certification, or test report, shall list the parameters and the type of hardware and perimeter seals used to achieve the rating.

2.7 STANDARD STEEL FRAMES

ANSI/SDI 100, except as otherwise specified. Form frames to sizes and shapes indicated, with welded corners. Provide steel frames for doors, transoms and sidelights, 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 0.9 mm thick 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 300 to 400 mm on centers. Miter molded shapes at corners. Butt or miter square or rectangular beads at corners.

2.7.5 Terminated Stops

Where indicated, terminate interior door frame stops 150 mm above floor. Do not terminate stops of frames for lightproof, soundproof, or lead-lined doors.

2.7.6 Cased Openings

Fabricate frames for cased openings of same material, gage, and assembly as specified for metal door frames, except omit door stops and preparation for hardware.

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 1.2 mm thick.

2.7.7.1 Wall Anchors

Provide at least three anchors for each jamb. For frames which are more than 2285 mm in height, provide one additional anchor for each jamb for each additional 760 mm or fraction thereof.

a. Masonry: Provide anchors of corrugated or perforated steel straps or 5 mm 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 111F; and

d. Solid plaster partitions: Secure anchors solidly to back of frames and tie into the lath. Provide adjustable top strut anchors on each side of frame for fastening to structural members or ceiling construction above. Size and type of strut anchors shall be as recommended by the frame manufacturer.

2.7.7.2 Floor Anchors

Provide floor anchors drilled for 10 mm anchor bolts at bottom of each jamb member.

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 Corporation (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 Omitted

2.8.3 Astragal on Fire and Smoke Doors

On pairs of labeled fire doors, conform to NFPA 80 and UL requirements.

2.9 WEATHERSTRIPPING

As specified in Section 08710, "Door Hardware."

2.10 HARDWARE PREPARATION

Reinforce, drill, and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of SDI 107 and 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/SDI 100, as applicable. Punch door frames, with the exception of frames that will have weatherstripping or lightproof or soundproof 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

Unless specified otherwise, phosphate treat and factory prime metal doors and frames as specified in ANSI/SDI 100, or paintable A25 galvannealed steel without primer. Where coating is removed by welding, apply touchup of factory primer. Field paint doors and frames in accordance with Section 09900, PAINTS AND COATINGS. Color as indicated on the drawings.

2.11.2 Hot-Dip Zinc-Coated and Factory-Primed Finish

Fabricate exterior doors and frames from galvanized steel, ASTM A 653/A 653M, Coating Designation G90. Repair damaged zinc-coated surfaces by the application of zinc dust paint. Phosphate treat and factory prime zinc-coated surfaces as specified in ANSI/SDI 100.

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.

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/SDI 100. 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.

3.4 SCHEDULE

Some metric measurements in this section are based on mathematical conversion of inch-pound measurements, and not on metric measurement commonly agreed to by the manufacturers or other parties. The inch-pound and metric measurements are as follows:

PRODUCTS	INCH-POUND	METRIC
Door thickness	1 3/4 inches	44.5 mm
Steel channels	16 gage	1.5 mm
Steel Sheet	23 gage	0.7 mm
	16 gage	1.5 mm
	20 gage	0.9 mm
	18 gage	1.2 mm
Anchor bolts	3/8 inches	10 mm

-- End of Section --

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DIVISION 08 - DOORS & WINDOWS

SECTION 08120

ALUMINUM DOORS AND FRAMES

09/99

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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.

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 605	(1998) Voluntary Specification for High Performance Organic Coatings on Architectural Aluminum Extrusions and Panels
AAMA 1503	(1998) Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1997; Rev. A) Carbon Structural Steel
ASTM B 209M	(1995) Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B 221M	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
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 1.4 kilopascals 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 1.25 mm nominal thickness.

1.2.2 Air Infiltration

When tested in accordance with ASTM E 283, air infiltration shall not exceed 2.63 by 10-5 cms per square meter of fixed area at a test pressure of 0.30 kPa (80 kilometers 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 0.38 kPa of fixed area.

1.2.4 Blast Resistance Criteria

Frames, mullions, and window hardware need to be designed to resist a static load of , about 7 kilopascales, applied to the surface of the glazing. Frame and mullion deformations can not exceed 1/160 of the unsupported member lengths. Frame connections to surrounding walls need to be designed to resist a combined loading consisting of a tension force of 36-kg/cm and a shear force of 13.5-kg/cm .

1.3 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Aluminum Doors, frames and window wall systems

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, frames and window wall systems

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, FRAMES AND WINDOW WALL SYSTEMS

Swing-type aluminum doors and window frames of size, design, and location indicated. Provide doors complete with frames, framing members, subframes, transoms, adjoining window wall, 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 221M, Alloy 6063-T5 for extrusions. ASTM B 209M, 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. Finish as indicated on drawings.

2.3 FABRICATION

2.3.1 Aluminum Frames

Frames shall be double-glazed window wall system and shall have a minimum total average unit thermal resistance of 0.34 square meter degree K per W (R value 1.92) and shall have a minimum condensation resistance factor of 68 in accordance with AAMA 1503. Frames shall be fabricated of extruded aluminum shapes to contours as shown on the drawings. Shapes shown are representations of design, function, and required profile. Dimensions shown are minimum. Shapes of equivalent design may be submitted, subject to approval of samples. Minimum metal wall thickness shall be 4.76 mm, except glazing beads, moldings, and trim shall be not less than 1.27 mm. Joints in frame members shall be milled to a hairline tight fit so that raw edges of the assembly are not visible, sealed internally to prevent water infiltration, reinforced, and secured mechanically by appropriate screws or by screw spline attachment.

a. The framing system shall provide a flush glass appearance to the outside with no

vertical exterior stops. Top and bottom glass edge shall be retained by the head and fill members. Perimeter framing members shall have a face dimension of 57.2 mm . Overall depth shall be 133.4 mm. Entrance framing members shall be compatible with glass framing in appearance. All single acting entrance frames shall include a positive barrier weathering. "Kawneer FA-SET S.S.G.1 inch system" meets this specification.

b. Air infiltration shall be tested in accordance with ASTM E 283. Infiltration shall mot exceed .0003 m3/s-m2 of fixed area at 300 Pa. Water infiltration shall be tested in accordance with ASTM E 331, no water penetration at a test pressure of 480 Pa

2.3.2 Aluminum Doors

Of type, size, and design indicated and not less than 45 mm thick. Minimum wall thickness, 3 mm, except beads and trim, 1.25 mm. Door sizes shown are nominal and shall include standard clearances as follows: 2.5 mm at hinge and lock stiles, 3 mm between meeting stiles, 3 mm at top rails, 5 mm between bottom and threshold, and 17 mm between bottom and floor. Bevel single-acting doors 2 or 3 mm at lock, hinge, and meeting stile edges. Double-acting doors shall have rounded edges at hinge stile, lock stile, and meeting stile edges.

2.3.2.1 Full Glazed Stile and Rail Doors

Doors shall have medium stiles bottom rails shall be 165 mm; top and side rails shall be 90 mm. 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 10 or 13 mm 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

Locate welds on unexposed surfaces. 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, and adjustable at meeting rails of pairs of doors. Installation shall allow doors to swing freely and close positively. Air leakage of a single leaf weatherstripped door shall not exceed 2.19 x 10-5 cubic meter per second of air per square meter 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 635 mm apart.

2.3.6 Provisions for Hardware

Hardware is specified in Section 08710, "Door 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."

2.3.7.1 Provisions for Glazing

a. Design windows and rabbets suitable for glass thickness specified. On all exterior windows, design and fabricate frames to have a 25 mm bite on glazing, all edges. Design sash for inside glazing and for securing glass with metal beads.

b. Frames, mullions, and window hardware need to be designed to resist a static load of about 7 kilopascales, applied to the surface of the glazing. Frame and mullion deformations can not exceed 1/160 of the unsupported member lengths. Frame connections to surrounding walls need to be designed to resist a combined loading consisting of a tension force of 36-kg/cm and a shear force of 13.5- kg/cm .

c. Provide removable "snap-in" muntins where indicated.

2.3.8 Finishes

Exposed surfaces of aluminum windows shall be finished with a two-coat fluoropolymer coating system containing at least 70 percent by weight polyvinylidene fluoride, PVF2 resin, factory-applied, oven-baked conforming to AAMA 605, with a primer coat of 0.005 to 0.008 mm, 0.20 to 0.30 mils and a color coat of minimum 0.25 mm, 1.0 mil, total dry film thickness of 0.030 to 0.33 mm. Finish shall be free of scratches and other blemishes. Color shall be as indicated on drawings.

2.4 ALUMINUM BLACK OUT PANELS

Provide aluminum black out break metal panels at all storefront locations where metal stud partitions obscure the glazing, as indicated. Provide a black anodized finish. The panel should have three sides: front, left side, and right side. The top should be open for venting. The panels should be field measured to ensure a pressure fitting (do not use screws, bolts or any other attachment). Minimum thickness: 14 gage. Remove integral blind glazing panel as requried.

PART 3 EXECUTION

3.1 INSTALLATION

Plumb, square, level, and align frames and framing members to receive doors transoms, adjoining sidelights and adjoining window walls. 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 2.4 mm 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 SEALING. 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.

-- End of Section --

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DIVISION 08 - DOORS & WINDOWS

SECTION 08210

WOOD DOORS

09/99

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SECTION 08210

WOOD DOORS
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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 152	(1981; Rev. A) Fire Tests of Door Assemblies

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 Fire Windows
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
NWWDA I.S.6	(1991) Wood Stile and Rail Doors
NWWDA TM-5	(1990) Split Resistance Test
NWWDA TM-7	(1990) Cycle - Slam Test
NWWDA TM-8	(1990) Hinge Loading Resistance Test

UNDERWRITERS LABORATORIES INC. (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

Submit drawings or catalog data showing each type of door unit; descriptive data of head and jamb weatherstripping with installation instructions shall be included. Drawings and data shall indicate door type and construction, sizes, thickness, methods of assembly and glazing.

SD-03 Product Data

Doors

Accessories

Water-resistant sealer

Sample warranty

Fire resistance rating

SD-04 Samples

Doors

Prior to the delivery of wood doors, submit a sample section of each type of door which shows the stile, rail, veneer, finish, and core construction.

Door finish colors

Submit a minimum of three color selection samples for selection by the Contracting Officer.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors to the site in an undamaged condition and protect against damage and dampness. Stack doors flat under cover. Support on blocking, a minimum of 100 mm thick, located at each end and at the midpoint of the door. Store doors in a well-ventilated building so that they will not be exposed to excessive moisture, heat, dryness, direct sunlight, or extreme changes of temperature and humidity. Do not store in a building under construction until concrete, masonry work, and plaster are dry. Replace defective or damaged doors with new ones.

1.4 WARRANTY

Warranty shall warrant doors free of defects as set forth in the door manufacturer's standard door warranty.

PART 2 PRODUCTS

2.1 DOORS

Provide doors of the types, sizes, and designs indicated and specified.

2.1.1 Stile and Rail Doors

Premium grade Ponderosa Pine doors or premium or select stile and rail doors conforming to NWWDA I.S.6. When laminated panels are furnished, they shall be not less than three ply. Flat panels shall have a minimum finished panel thickness of 13 mm. Raised panels shall have a minimum finished panel thickness of 20 mm.

2.1.2 Flush Doors

Flush doors shall conform to NWWDA I.S.1-A. Stile edge bands of doors to receive natural finish shall be hardwood, compatible with face veneer. Stile edge bands of doors to be painted shall be mill option specie. No visible finger joints will be accepted in stile edge bands. When used, locate finger-joints under hardware.

2.1.2.1 Omitted

2.1.2.2 Interior Flush Doors

Provide solid core, Type II flush doors conforming to NWWDA I.S.1-A with faces of premium grade natural birch. Hardwood veneers shall be book matched.

2.1.3 Omitted

2.1.4 Omitted

2.1.5 X-Ray Resistant Doors

X-ray resistant doors are specified in Section 13090, "X-Ray Shielding."

2.1.6 Omitted

2.1.7 Fire Rated Doors

Doors specified or indicated to have a fire resistance rating shall conform to the requirements of UL 10B, ASTM E 152, or NFPA 252 for the class of door indicated. Affix a permanent metal label with raised or incised markings indicating testing agency's name and approved hourly fire rating to hinge edge of each door.

2.2 ACCESSORIES

2.2.1 Omitted

2.2.2 Door Light Openings

Provide glazed openings with the manufacturer's standard wood moldings. Moldings for flush doors shall be lip type. Provide glazed openings in fire-rated doors with fire rated frames. Glazing is specified in Section 08810, "Glass and Glazing."

2.3 FABRICATION

2.3.1 Marking

Each door shall bear a stamp, brand, or other identifying mark indicating quality and construction of the door.

2.3.2 Quality and Construction

Identify the standard on which the construction of the door was based, identify the standard under which preservative treatment was made, and identify doors having a Type I glue bond.

2.3.3 Preservative Treatment

Exterior doors shall be water-repellent preservative treated and so marked at the plant in accordance with NWWDA I.S.4.

2.3.4 Adhesives and Bonds

NWWDA I.S.1-A. Use Type I bond for exterior doors and Type II bond for interior doors. Adhesive for doors to receive a natural finish shall be nonstaining.

2.3.5 Prefitting

At the Contractor's option, doors may be provided factory pre-fit. Doors shall be sized and machined at the factory by the door manufacturer in accordance with the standards under which they are produced. The work shall include sizing, bevelling edges, mortising, and drilling for hardware and providing necessary beaded openings for glass and louvers. Provide the door manufacturer with the necessary hardware samples, and frame and hardware schedules as required to coordinate the work.

2.3.6 Finishes

2.3.6.1 Omitted

2.3.6.2 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 number TR3 or TR4. Color as indicated on the drawings.

2.3.6.3 Omitted

2.3.6.4 Color

Provide door finish colors as indicated.

2.4 SOURCE QUALITY CONTROL

Stiles of "B" and "C" label fire doors utilizing standard mortise leaf hinges shall meet the following performance criteria:

a. Split resistance: Average of ten test samples shall be not less than 225 kilograms load when tested in accordance with NWWDA TM-5.

b. Cycle-slam: 200,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with the requirements of NWWDA TM-7.

c. Hinge loading resistance: Average of ten test samples shall be not less than 315 kilograms load when tested for direct screw withdrawal in accordance with NWWDA TM-8 using a No. 12, 30 mm long, steel, fully threaded wood screw. Drill 4 mm pilot hole, use 40 mm opening around screw for bearing surface, and engage screw full, except for last 3 mm. Do not use a steel plate to reinforce screw area.

PART 3 EXECUTION

3.1 INSTALLATION

Before installation, seal top and bottom edges of doors with the approved water-resistant sealer. Seal cuts made on the job immediately after cutting using approved water-resistant sealer. Fit, trim, and hang doors with a 2 mm minimum, 3 mm maximum clearance at sides and top, and a 5 mm minimum, 6 mm maximum clearance over thresholds. Provide 10 mm minimum, 11 mm maximum clearance at bottom where no threshold occurs. Bevel edges of doors at the rate of 3 mm in 50 mm. Door warp shall not exceed 6 mm when measured in accordance with NWWDA I.S.1-A.

3.1.1 Fire Doors

Install fire doors in accordance with NFPA 80. Do not paint over labels.

-- End of Section --

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DIVISION 08 - DOORS & WINDOWS

SECTION 08305

ACCESS DOORS

01/02

-- End of Section Table of Contents --

SECTION 08305

ACCESS DOORS
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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1996) Carbon Structural Steel
ASTM A 123/A 123M	(1997; Rev. A) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(1995) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 276/A 276M	(1998; Rev. A) Stainless Steel Bars and Shapes
ASTM A 480/A 480M	(1998) Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
ASTM A 591/A 591M	(1998) Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications
ASTM A 666/A 666M	(1996; Rev. b) Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
ASTM E 119	(1998) Fire Tests of Building Construction and Materials

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1999) Fire Doors and Fire Windows
NFPA 252	(1999) Standard Methods of Fire Tests of Door Assemblies

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-P-664	(Rev. D) Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 20	(1991) Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic

UNDERWRITERS LABORATORIES (UL)

UL 10B	(1997) Fire Tests of Door Assemblies
UL 263	(1997) Fire Tests of Building Construction and 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

Access door, non-fire rated

Access door, fire rated

Provide schedule of sizes, types and locations of access doors required. Provide installation drawing details and rough opening sizes required in wall and ceiling

framing.

SD-03 Product Data

Access door, non-fire rated

Access door, fire rated

Identify each model number in product data on schedule furnished with shop drawings.

1.3 QUALITY ASSURANCE

1.3.1 Fire-Rated Access Doors and Frames

Units complying with NFPA 80 and that are labeled and listed by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction per test method indicated.

a. Vertical Access Doors: NFPA 252 or UL 10B.

b. Horizontal Access Doors and Frames: ASTM E 119 or UL 263.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Steel Plates, Shapes, and Bars

ASTM A 36/A 36M

2.1.1.1 Hot-Dip Galvanized Steel

Coat to comply with ASTM A 123/A 123M for steel and iron products and ASTM A 153/A 153M for steel and iron hardware

2.1.1.2 Electrolytic Zinc Coated

ASTM A 591/A 591M, Commercial Steel (CS), with Class C coating and phosphate treatment to prepare surface for painting.

2.1.2 Omitted

2.1.3 Omitted

2.1.4 Stainless-Steel Sheet, Strip, Plate, and Flat Bars

ASTM A 666/A 666M, Type 304; with minimum sheet thickness indicated representing specified thickness according to ASTM A 480/A 480M.

2.1.5 Stainless-Steel Bars and Shapes

ASTM A 276/A 276M, Type 304.

2.1.6 Drywall Beads

Edge trim formed from 0.76 mm zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum panels indicated.

2.1.7 Plaster Bead

Casing bead formed from 0.76 mm zinc-coated steel sheet with flange formed out of expanded metal lath and in size to suit thickness of plaster.

2.1.8 Paint

2.1.8.1 Shop Primer for Ferrous Metal

Fast curing, lead- and chromate-free, universal modified alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide sound foundation for field-applied topcoats despite prolonged exposure.

2.1.8.2 Shop Primer for Metallic-Coated Steel

Organic zinc-rich primer complying with SSPC SP 20 and compatible with topcoat.

2.1.8.3 Galvanizing Repair Paint

High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC SP 20.

2.2 ACCESS DOOR, NON-FIRE RATED

Pre-manufactured flush type access doors for non-fire rated walls and ceilings.

2.2.1 Drywall Access Door

Provide flush type access door designed for installation in gypsum board walls and ceilings.

a. Frame: 1.5 mm steel with prepunched holes to facilitate fastening flange to framing member. Frame trim shall be galvanized steel drywall bead.

b. Door: 1.9 mm steel with stiffened edges and reinforcing angles on inside face to prevent warping, except provide 1.6 stainless steel exposed surfaces at doors located in ceramic tile wall finishes.

2.2.2 Plaster Access Door

Provide flush type access door designed for installation in plaster walls and ceilings.

a. Frame: 1.5 mm steel with prepunched holes to facilitate fastening flange to framing member. Frame trim shall be galvanized steel expansion casing bead with metal lath.

b. Door: 1.9 mm steel with stiffened edges and reinforcing angles on inside face to prevent warping.

2.2.3 Door Size

Provide opening size sufficient for comfortable access to the component requiring access. Minimum size for hand/arm access shall be 500 mm x 350 mm; minimum size for body access shall be 610 mm x 1220 mm.

2.2.4 Finish

Manufacturers standard prime coat of rust inhibitive baked-on grey or white enamel, except stainless steel access doors in ceramic tile finishes shall be directional satin polish.

2.2.5 Hardware

a. Hinges: Concealed continuous piano hinge.

b. Latch: Flush, screwdriver operated stainless steel cam latch. Provide one latch for each 350 mm of door height.

c. Fasteners: Sheet metal screws for metal studs; wood screws for wood studs or wood blocking.

2.3 ACCESS DOOR, FIRE RATED

Premanufactured flush type fire-rated access doors for fire rated walls and ceilings. Provide fire rating as required by the wall or ceiling rating.

2.3.1 Non-Insulated Fire Rated Access Door

Provide flush type non-insulated, fire-rated access door designed for installation in gypsum board walls and ceilings.

a. Frame: 1.5 mm steel with anchor straps and prepunched holes to facilitate fastening flange to framing member. Frame trim shall be minimum 25 mm wide galvanized steel drywall bead.

b. Door: 1.5 mm steel with stiffened edges and reinforcing angles on inside face to prevent warping, except provide 1.6 stainless steel exposed surfaces at doors located in ceramic tile wall finishes.

2.3.2 Omitted

2.3.3 Door Size

Provide opening size as indicated or, if not indicated, provide opening size sufficient for comfortable access to the component requiring access. Minimum size for hand/arm access shall be 400 mm x 400 mm; minimum size for body access shall be 610 mm x 1220 mm.

2.3.4 Finish

Manufacturers standard prime coat of rust inhibitive baked-on grey or white enamel, except stainless steel access doors in ceramic tile finishes shall be directional satin polish.

2.3.5 Hardware

a. Hinges: Exposed continuous piano hinge.

b. Latch: Self-latching with automatic spring closer, allowing opening of door to 3.05 rad. Provide bolt type latch with ring turn. Provide one latch for each 350 mm of door height.

c. Fasteners: Sheet metal screws for metal studs; wood screws for wood studs or wood blocking.

2.4 FABRICATION AND WORKMANSHIP

Finished access 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. Design frames in exposed masonry walls or partitions to allow sufficient space between the inside back of trim and masonry to receive calking compound.

PART 3 EXECUTION

3.1 LOCATION

a. Provide access panels directly below each valve, flow indicator, trap, damper, air splitter, cleanout, and other control items of mechanical, and conveyor work that are above ceilings of gypsum board or plaster.

b. Provide access panels directly below each electrical junction box, light fixture and communication devices that are concealed above ceilings of gypsum board or plaster.

c. Use fire rated doors in fire rated ceilings.

d. Use flush panels in partitions and gypsum board or plaster ceilings.

3.2 INSTALLATION

Contractor shall provide access doors where indicated or, if not indicated, directly below or adjacent to each operable component concealed within walls and ceilings including, but not limited to, valves, flow indicators, dampers, air splitters, and equipment requiring access for repair and maintenance.

a. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

b. Install access doors flush with adjacent finish surfaces.

c. Provide type door required by wall type. Provide fire rated access doors in fire rated walls and ceilings.

d. Weld in accordance with AWS D1.3.

3.3 ANCHORAGE

a. Secure frames to adjacent construction using anchors attached to frames or by use of bolts or screws through the frame members.

b. Type, size and number of anchoring device suitable for the material surrounding the opening, maintain alignment, and resist displacement during normal use of access door.

c. Anchors for fire rated access doors shall meet requirements of applicable fire test.

3.4 ADJUSTMENT

Adjust doors and hardware after installation for proper operation.

-- End of Section --

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DIVISION 08 - DOORS & WINDOWS

SECTION 08331

METAL ROLLING COUNTER GRILLS

09/98

-- End of Section Table of Contents --

SECTION 08331

METAL ROLLING COUNTER GRILLS
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 A 240/A 240M	(1999b) Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels
ASTM B 209M	(1995) Aluminum and Aluminum-Alloy Sheet and Plate (Metric)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1999) Fire Doors and Fire Windows

1.2 GENERAL

Rolling counter grills 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 grill 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 Grills

Manufacturer's descriptive data and catalog cuts.

Installation

Cleaning

Manufacturer's preprinted installation and cleaning instructions.

SD-10 Operation and Maintenance Data

Operation

Four 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 1 year and 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 (Coiling Grill)

a. The curtain shall be fabricated of 5056 H32 aluminum alloy, formed with a series of horizontal rods 8 mm (5/16") in diameter. Vertical separation between rods may be 50 mm or 38 mm (2" or 1.5"). Cornell Coiling Grill, "Visionaire"' meets this specification.

b. Bottom Bar: 2x3-1/2 inch (50x90 mm) extruded aluminum tubular section.

c. Finish: Curtain: Mill finish.

d. Bottom Bar: Mill finish.

2.1.2 Jamb Guides

Guides shall be of 13 gauge minimum thickness stainless steel conforming to ASTM A 240/A 240M, Type 304 or Type 430.

2.1.3 Counterbalance Shaft Assembly

The curtain shall be coiled around a steel tube of sufficient thickness and diameter to prevent deflection exceeding 2.5 mm per meter. 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 19 mm width.

2.1.5 Hood

The hood shall be of 1.02 mm minimum thickness aluminum sheet conforming to ASTM B 209M , 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. Keying shall conform to Section 08710 DOOR HARDWARE.

2.2 ROLLING COUNTER GRILLS (NON-RATED)

Rolling counter doors shall conform to the requirements specified herein and shall be constructed of stainless steel curtains, guides and hood components. Doors to be counterheight as indicated on the drawings.

2.3 OMITTED

2.4 INTEGRAL FRAME ROLLING COUNTER GRILL

Integral frame rolling counter door shall be stainless steel. Jambs shall be formed to create guides for the curtain. Head and jambs shall be 16 gauge thickness. Counter shall be 14

gauge thickness. Rolling counter doors in exit corridor walls shall be provided with perimeter smoke and draft control gasketing.

2.5 OPERATION

2.5.1 Omitted

2.5.2 Power Operation

A high-starting torque, reversible type motor of sufficient power and torque output to move the door in either direction from any position at the required speed shall be furnished. Power operator shall have an emergency push-up operation, limit switch, three-button type control marked "OPEN", "CLOSE", and "STOP". Control voltage shall be 120 vac. Conduit and wiring necessary for proper operation shall be provided in accordance with Section 16415 ELECTRICAL WORK, INTERIOR.

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. Stainless steel shall have a No. 4 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. Fire-door installation shall be in conformance with NFPA 80 for the class indicated and the manufacturer's instructions.

3.2 FIELD FINISHING

Doors to receive field finishing shall be factory primed, as required, and then shall be finished in accordance with Section 09900 PAINTING, GENERAL.

3.3 CLEANING

Aluminum and stainless steel doors shall be cleaned in accordance with manufacturer's approved instructions.

3.4 TESTS

The fire doors shall be drop tested in accordance with NFPA 80 to show proper operation and full automatic closure and shall be reset in accordance with the manufacturer's instructions. A written record of initial test shall be provided to the Contracting Officer.

-- End of Section --

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DIVISION 08 - DOORS & WINDOWS

SECTION 08462

AUTOMATIC ENTRANCE DOORS

10/01

-- End of Section Table of Contents --

SECTION 08462

AUTOMATIC ENTRANCE DOORS
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 ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

ANSI AAMA 101	(1988) Aluminum Prime Windows and Sliding Glass Doors
AAMA 1503.1	(1988) Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A156.10	(1985) Power Operated Pedestrian Doors

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(1993) Minimum Design Loads for Buildings and Other Structures

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 1048	(1992) Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass
ASTM E 283	(1991) Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimens
ASTM E 330	(1990) Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference

CODE OF FEDERAL REGULATIONS (CFR)

16 CFR 1201	Safety Standard for Architectural Glazing Materials

UNDERWRITERS LABORATORIES (UL)

UL 325	Door, Drapery, Gate, Louver and Window Operators and Systems

1.2 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 in accordance with Section 01330, SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Aluminum sliding glass doors

Submit drawings for automatic entrance doors, and accessories that indicate elevations of each door type, full size sections, thickness, nominal gages of metal, fastenings, proposed method of installation and anchoring, the size and spacing and method of glazing, details of operating hardware, method and material for weatherstripping and type of finish. Include interfacing details with adjacent substrates.

SD-03 Product Data

Automatic entrance doors with emergency break-out feature (and fixed Sidelights, where indicated).

Hardware

Glazing

Weatherstripping

Finish

Door operators

Describe each type of automatic entrance door, hardware, fastener, accessory, and finish. Include descriptive literature, detailed specifications, and performance test data.

SD-04 Samples

Submit 150 mm length of aluminum frames with finish as indicated, for Contracting Officer review.

SD-08 Manufacturer's Instructions

Automatic entrance doors

Submit data in accordance with Division 1 requirements for OPERATION AND MAINTENANCE DATA.

1.3 TEMPORARY PROTECTIVE COVERING

Prior to shipment from the factory, finished surfaces of aluminum sliding glass doors shall receive a protective covering of waterproof tape, strippable plastic, or cardboard to protect against discoloration and surface damage that may occur during transportation, storage, and construction activities. Also, no coatings or lacquers shall be applied to surfaces to which caulking and glazing compounds must adhere. Covering shall be readily removable after installation.

1.4 PERFORMANCE REQUIREMENTS

General: Provide exterior automatic entrance assemblies that have been designed and fabricated to comply with requirements for system performance characteristics listed below as demonstrated by testing manufacturer's corresponding stock systems according to test methods designated.

a. Thermal Movement: Fabricate, assemble, and erect system with adequate allowances for expansion and contraction of components and fastenings to prevent buckling damage, joint seal failure, glass breakage, undue stress on fastenings or other detrimental effects. For design purposes, base provisions for thermal movement on assumed ambient temperature range of from -7 degrees C to 82 degrees C.

b. Wind Loading: Provide capacity to withstand loading indicated below tested per ASTM E 330. Based on wind velocity of 95 mph per ASCE 7; positive pressures of 22 psf and negative pressures of -22 psf Category III design factor of 1.23.

c. Transmission Characteristics of Entrances: Provide entrance doors with jamb and head frames which comply with requirements indicated below, for transmission characteristics and test methods.

(1) Air Leakage: Air infiltration per linear foot of perimeter crack of not more than 0.3 L/S/sq. m for single doors and 1.0 cfm for pairs of doors per ASTM E 283 at pressure differential of 75.2 Pa.

(2) Thermal Conductance: "U" value of not more than 3.57 W/sq. M x K per AAMA 1503.1.

d. BHMA Standard: Automatic entrance doors shall comply with applicable requirements of ANSI A156.10, Power Operated Pedestrian Door Standard.

e. UL Standard: Powered door operators shall comply with UL 325, Electric Door, Drapery, Gage, Louver and Window Operators and Systems.

f. Emergency Exit Doors: Automatic entrance doors serving as a required means of egress shall comply with requirements of authorities having jurisdiction for emergency exits.

g. Operator: Provide operators that will open and close doors and maintain them in fully

closed position when subjected to the designated wind velocity or the equivalent inward differential pressure.

1.5 QUALITY ASSURANCE

a. Manufacturer Qualifications: A firm with not less than 5 years successful experience in fabrication of automatic entrance doors of type required for this project.

b. Installer's Qualifications: An authorized representative of the manufacturer for both installation and maintenance of type of units required. Minimum experience: Not less than 3 years experience in installation and service of automatic entrance doors of same manufacturer.

1.6 DELIVERY AND STORAGE

Inspect aluminum sliding glass doors, hardware and accessories, for damage and unload and store doors upright on platforms in accessible spaces with a minimum of handling. The storage spaces shall be dry, adequately ventilated, free from heavy dust and not subject to combustion products, sources of water or other conditions that could damage the door. Storage spaces shall have easy access for inspection and handling of doors.

PART 2 PRODUCTS

2.1 ALUMINUM AUTOMATIC SLIDING GLASS DOORS AND FRAMES

a. Design and construct with sliding panels, emergency breakouts, and fixed panels in the sizes and arrangements indicated.

b. Aluminum doors and frames for automatic sliding units shall be fabricated of 6063-T5 aluminum alloy, narrow stile doors. Sidelight base frame section for supporting bottom rollers shall allow for 300 mm frame setting adjustment and shall be a minimum 4 mm thick wall sections. Guide track and other extruded sections which serve as structural members shall be made up from 6061-T6 alloy.

c. Interior face of sidelights shall be protected by a 9.5 mm x 150 mm aluminum rail 1067 mm above floor, finished to match frame finish.

d. Frame shall be constructed to accept door operator mounted in head position.

e. Steel used within assembly shall be coated with bituminous paint to resist corrosion where in contact with aluminum.

f. Roller assembly shall consist of extruded aluminum track and plastic rollers. Each door carrier containing a breakaway swing door leaf shall include a vertical steel reinforcement member to prevent sagging when door is disengaged from panic latch steel brackets and fitting shall be coated with bituminous paint for corrosion resistance.

g. Automatic sliding units shall have swing type door leaves attached to door carriers by top and bottom pivots and shall contain an adjustable breakaway latch release for holding door in closed position for normal operation. Breakaway shall be adjustable to increase or decrease holding pressure as required.

h. Provide all operating hardware, related trim, closers, thresholds, anchors, and other miscellaneous items necessary to complete installation.

i. Portions of frame which will contact masonry or steel surfaces shall be coated with bituminous paint.

j. Mark panels identically and permanently to visibly interrupt the span of glass. Use markings approximately 25.8 cm2of opaque, pressure-sensitive vinyl film with precoated adhesive. Sliding door glazing shall be set in aluminum frames and roller assemblies of sufficient strength to withstand lateral live stresses and static load or weight requirements.

2.1.1 Electro-Mechanical Power Unit

Power unit shall be self-contained electro-mechanical mechanism utilizing dripless lubrication for its mechanical parts. Operator shall be header mounted and concealed with removable cover.

2.1.1.1 Actuating Controls - Motion Detector

a. Motion detector shall be self-contained micro-wave unit installed in housing above door.

b. Detection pattern shall be 138 x 183 cm wide.

c. Detector shall be located on both sides of door opening at center-line of opening.

d. Glazing: Provide factory glazing; comply with requirements of Section 08810, GLASS AND GLAZING.

e. Glass and panels shall be glazed from interior of building. Snap-on glass stops shall be used with no exposed screws.

f. Setting blocks, spacers, and clips shall be provided as necessary to meet glass manufacturer's requirements, recommendations of FGMA Glazing Manual and requirements of drawings.

2.1.2 Hardware

Sliding door panel shall have a manually operated adjustable latch operable by a five-pin tumbler cylinder lock from either side. Provide cylinders as specified in Section 08710, DOOR HARDWARE. Provide pulls for both inside and outside of sliding panel and the sliding screen panel. Provide auxiliary pin lock bottom on inner side of sliding glass door panel opposite manually operated adjustable latch. Exposed hardware is to be stainless steel. Door to be fully equipped with motion detection system and electric operation.

2.1.3 Glazing

Factory glazed sliding glass doors, including fixed panel and emergency break-out feature, single glazed with glass conforming to ASTM C 1048, Kind FT, Condition A, Type I and II, Class 1, not less than 6 mm thick. Glazing material must be certified as meeting CPSC 16 CFR 1201, Category II. Set glazing unit in polyvinyl-chloride or synthetic rubber glazing channels. Channels shall be reusable when replacing glass and have mitered or continuous corners. Channels exposed to view shall blend in color with the aluminum frame finish.

2.1.4 Weatherstripping

Provide four sides of each sliding panel and interlocking stiles and jambs with weatherstripping. Weatherstripping shall conform to ANSI AAMA 101 and shall provide maximum protection against the elements and be designed for ease of replacement.

2.1.5 Finish

Surfaces exposed to exterior and interior view shall be anodized color coated meeting AA-M10-C22-A44 applied per published specifications of respective manufacturer, to a 0.7 mil minimum thickness. Match the color anodized finish of the windows.

2.2 SEALANTS AND SEALING

Comply with requirements of Section 07900, JOINT SEALING.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Doors, Frames, and Accessories

Install doors, frames, framing members, hardware, and accessories in accordance with approved shop drawings and the requirements specified herein. Set frames securely anchored in place to straight, plumb, square, level condition without distortion and in alignment. Install door panels to retain proper weathering contact with frames. Caulk metal-to-metal joints between frame members and remove excess material. Caulking around perimeter of door frame and wall openings to provide weathertight installation shall be accomplished in accordance with manufacturer's recommendations. Finished work shall be rigid, neat in appearance, and free from defects. Upon completion, adjust sliding doors to operate properly. Thoroughly clean aluminum frames and glass in accordance with manufacturer's recommendation. Doors damaged prior to completion and acceptance shall be restored to original manufactured condition or replaced with new doors as directed.

3.1.2 Protection of Aluminum from Dissimilar Materials

3.1.2.1 Aluminum to Dissimilar Metals

Prevent aluminum surfaces from contacting dissimilar metals other than stainless steel, zinc, or white bronze by one or a combination of the following:

a. Paint & dissimilar metal with one coat of heavy-bodied bituminous paint.

b. Apply sealants between aluminum and dissimilar metal.

c. Paint dissimilar metal with primer, followed by one coat of aluminum paint or other suitable lead-free coating.

d. Use nonabsorptive tape or gasket in permanently dry locations.

3.1.2.2 Drainage from Dissimilar Metals

Paint dissimilar metals located in areas where their drainage washes over aluminum to prevent the staining of aluminum and finishes.

3.1.2.3 Aluminum to Masonry and Concrete

Prevent aluminum surfaces from coming into contact with mortar, concrete, or other masonry materials by applying one coat of heavy-bodied bituminous paint to the aluminum surfaces.

3.1.2.4 Aluminum to Wood

Prevent aluminum surfaces from coming into contact with dissimilar materials.

a. Paint aluminum surfaces with two coats of aluminum paint or one coat of heavy-bodied bituminous paint.

b. Paint the other absorptive surfaces with two coats of aluminum paint and seal contiguous joints with joint sealers.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 08 - DOORS & WINDOWS

SECTION 08520

ALUMINUM AND ENVIRONMENTAL CONTROL ALUMINUM WINDOWS

03/00

-- End of Section Table of Contents --

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 605	(1998) voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels
AAMA 1503.1	(1988) Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections

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 331	(1996) Water Penetration 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

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

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101	(1997; Errata 97-1; TIA-97-1) Life Safety Code

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 and ASTM E 331.

1.2.4 Thermal Performance

Thermal transmittance for thermally broken aluminum windows with insulating glass shall not exceed a U-factor of 4.3 W/m^2K (0.75 $Btu/hr\text{-}ft^2\text{-}F$) determined according to NFRC 100, and a solar heat gain coefficient (SHGC) of 2.3 W/m^2K (0.40 $Btu/hr\text{-}ft^2\text{-}F$) determined according to NFRC 200. Window units shall comply with the U.S. Department of Energy, Energy Star Window Program for the Southern Climate Zone.

1.2.5 Condensation Index Rating

The condensation index rating shall be 85 as determined using NFRC approved software THERM.

1.2.6 Life Safety Criteria

Windows shall conform to NFPA 101 Life Safety Code when rescue and/or second means of escape are indicated.

1.2.7 Blast Resistance Criteria

Frames, mullions, and window hardware need to be designed to resist a static load of 1 lb per square in, about 7 kilopascales, applied to the surface of the glazing. Frame and mullion deformations can not exceed 1/160 of the unsupported member lengths. Frame connections to surrounding walls need to be designed to resist a combined loading consisting of a tension force of 36-kg/cm (200-lbs/in) and a shear force of 13.5- kg/cm (75 lbs/in).

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.

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 MOCK-UPS

Before fabrication, full-size mock-up of one window unit complete with glass and AAMA certification label for structural purposes and NFRC Temporary and Permanent Label for certification of thermal performance raitingwill be required for review of window construction and quality of hardware operation.

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, integral blinds, and hardware. Windows shall conform to AAMA 101. Windows shall be double-glazed. Window members shall be heli-arc welded or angle-reinforced and mechanically joined and sealed. Exposed welded joints shall be dressed and finished. Joints shall be permanent and weathertight. Frames shall be constructed to provide a minimum 6 mm thermal break between the exterior and interior frame surfaces. Sash corners shall be internally sealed to prevent air and water leaks. Inner sash shall be key-controlled to swing to the interior to allow maintenance and replacement of the glass. Operable windows shall permit cleaning the outside glass from inside the building.

Aluminum windows with integral "between-glass" blinds shall consist of complete factory-glazed units including sash, glass, frame, screens, weatherstripping and hardware. Muntins for windows shall consist of 77.8 mmthick "sight line", inside and outside. Windows shall conform to AAMA 101, optional performance class. Windows shall be double-glazed where indicated on drawings. Double glazed units shall have a minimum condensation resistance factor of 40 when tested in accordance with AAMA 1503.1. Operable windows shall permit cleaning the outside glass from inside the building.

a. Integral Venetian Blinds, (where indicated on drawings):

Slats: spring tempered 0.008 inch aluminum, 25 mm wide. Color: Refer to Finish Identification Schedules.
Minimum: 10 slats per foot.
Operation: (tilting, raising and lowering) by single gear operated control. Tilting or rod mechanisms aluminum or stainless steel centered through a continuous plastic guide, brass cord protectors in head rail mounting holes, plastic end caps at bottom rail, dacron cords and webbing and nylon tilt control knob.
Tilt control knob shall incorporate a "slip-clutch" feature.
Provide 15 mm long snap-in mounting clips. Locating leg is on one side of clip only, and located 30 mm away from any ladder cord.

Fabricate all exterior windows with additional reinforcing and heavier thickness metal as required to meet requirements specified in paragraph entitled Blast Resisitance Criteria herein.

2.1.1 Awning Windows

Aluminum awning windows shall conform to AAMA 101 Designation AP-HC40 type consisting of hinged ventilators arranged in a single or vertical series within a common frame. Ventilators shall be operated by a device which shall securely close the ventilator at both jambs without the use of additional manually-controlled locking device. Operating hardware, except ventilator arms and rotary operators, shall be concealed within frame and sill. Ventilator arms shall be concealed when windows are closed.

2.1.1.1 Hardware for Top-Hinged, Outswinging (Awning) Windows

Each vent shall be supported on a continuous integrally extruded hinge, completely concealed, when window is closed. Provide key-operated and removable handles where directed. Hinges and handle shall be as selected by Contracting Officer. Each vent shall have a sill-mounted key limit lock to limit access to "open" position. Locking method by custodial locks operated by single removable hex key. All locking lugs, frame-mounted adjustable wedge clamps, and hold-open arms shall be plated steel or cast metal compatible with aluminum. Provide hold-open with supporting arms.

2.1.2 Omitted

2.1.3 Omitted

2.1.4 Omitted

2.1.4.1 Fixed Windows

Aluminum fixed windows shall conform to AAMA 101 HS-HC40 type, non-operable glazed frame, complete with provisions for reglazing in the field. Provide removable "snap-in" mullions where indicated.

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 on all operable drawings. Insect screens shall be fabricated of roll-formed tubular-shaped aluminum frames conforming to SMA ANSI/SMA 1004 and (18 x 16).

2.4 ACCESSORIES

2.4.1 Fasteners

Fastening devices shall be window manufacturer's standard design made from non-magnetic 300 Series 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 2 mm .

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

Anchoring devices for installing windows shall be made of aluminum, cadmium-plated steel, stainless steel, or zinc-plated steel conforming to AAMA 101.

2.4.4 Extruded Aluminum Window Stool and Trim

Provide aluminum stools and trim as standard with the window manufacturer. Include concealed

hold-down clips and accessories for a complete installation.

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.

2.5.1 Provisions for Glazing

a. Design windows and rabbets suitable for glass thickness specified. On all exterior windows, design and fabricate frames to have a 95 mm bite on glazing systems that are structurally glazed, and a 25 mm bite on glazing systems that are not structurally glazed, all edges. Design sash for inside glazing and for securing glass with metal beads.

b. Frames, mullions, and window hardware need to be designed to resist a static load of 1 lb per square in, about 7 kilopascales, applied to the surface of the glazing. Frame and mullion deformations can not exceed 1/160 of the unsupported member lengths. Frame connections to surrounding walls need to be designed to resist a combined ultimate loading consisting of a tension force of 36-kg/cm and a shear force of 13.5- kg/cm. Supporting elements and their connections may be designed based on their ultimate capacities.

c. Provide removble "snap-in" muntins where indicated.

2.6 FINISH

2.6.1 Omitted

2.6.2 Omitted

2.6.3 High-Performance Coating

Exposed surfaces of aluminum windows shall be finished with a two-coat fluoropolymer coating system containing at least 70 percent by weight polyvinylidene fluoride, PVF2 resin, factory-applied, oven-baked, conforming to AAMA 605, with a primer coat of 0.005 to 0.008 mm (0.20 to 0.030 mils) and a color coat of minimum 0.025 mm (1.0 mils), total dry film thickness of 0.030 to 0.033 mm (1.2 to 1.3 mils). Finish shall be free of scratches and other blemishes.

2.6.4 Color

Color shall be as indicated on the drawings.

2.7 SLIDING GLASS WINDOW

Aluminum windows with integral "between-glass" blinds shall consist of complete factory-glazed units including sash, glass, frame, screens, and hardware.

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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DIVISION 08 - DOORS & WINDOWS

SECTION 08710

DOOR HARDWARE

09/99

-- End of Section Table of Contents --

SECTION 08710

DOOR HARDWARE
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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 283	(1991) Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC. (BHMA)

ANSI/BHMA A156.1	(1997) Butts and Hinges (BHMA 101)
ANSI/BHMA A156.2	(1996) Bored and Preassembled Locks and Latches (BHMA 601)
ANSI/BHMA A156.3	(1994) Exit Devices (BHMA 701)
ANSI/BHMA A156.4	(1992) Door Controls - Closers (BHMA 301)
ANSI/BHMA A156.5	(1992) Auxiliary Locks & Associated Products (BHMA 501)
ANSI/BHMA A156.6	(1994) Architectural Door Trim (BHMA 1001)
ANSI/BHMA A156.7	(1988) Template Hinge Dimensions
ANSI/BHMA A156.8	(1994) Door Controls - Overhead Holders (BHMA 311)
ANSI/BHMA A156.12	(1992) Interconnected Locks & Latches (BHMA 611)
ANSI/BHMA A156.13	(1994) Mortise Locks & Latches (BHMA 621)
ANSI/BHMA A156.16	(1997) Auxiliary Hardware
ANSI/BHMA A156.18	(1993) Materials and Finishes (BHMA 1301)
ANSI/BHMA A156.21	(1996) Thresholds

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1999) Fire Doors and Fire Windows
NFPA 101	(1997) Life Safety Code

STEEL DOOR INSTITUTE (SDI)

ANSI/SDI 100	(1991) Standard Steel Doors and Frames

UNDERWRITERS LABORATORIES INC. (UL)

UL BMD	(1999) Building Materials Directory

1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Hardware schedule; G|RE

Keying system G|RE

SD-03 Product Data

Hardware items; G|RE

SD-08 Manufacturer's Instructions

Installation

SD-10 Operation and Maintenance Data

Hardware Schedule items, Data Package 1

SD-11 Closeout Submittals

Key bitting

1.3 HARDWARE SCHEDULE

Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publication Type No.	Finish	Mfr. Name and Catalog No.	Key Control Symbols	UL Mark (If fire rated and listed)	ANSI/BHMA Finish Designation

1.4 KEY BITTING CHART REQUIREMENTS

Submit key bitting charts to the Contracting Officer prior to completion of the work. Include:

a. Complete listing of all keys (AA1, AA2, etc.).

b. Complete listing of all key cuts (AA1-123456, AA2-123458).

c. Tabulation showing which key fits which door.

d. Copy of floor plan showing doors and door numbers.

e. Listing of 20 percent more key cuts than are presently required in each master system.

1.5 QUALITY ASSURANCE

1.5.1 Hardware Manufacturers and Modifications

Provide, as far as feasible, locks, hinges, pivots, and closers of one lock, hinge, pivot, or closer manufacturer's make. Modify hardware as necessary to provide features indicated or specified.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver hardware in original individual containers, complete with necessary appurtenances including fasteners and instructions. Mark each individual container with item number as shown in hardware schedule. Deliver permanent keys and removable cores to the Contracting Officer, either directly or by certified mail. Deliver construction master keys with the locks.

PART 2 PRODUCTS

2.1 TEMPLATE HARDWARE

Hardware to be applied to metal or to prefinished doors shall be made to template. Promptly furnish template information or templates to door and frame manufacturers. Template hinges shall conform to ANSI/BHMA A156.7. Coordinate hardware items to prevent interference with other hardware.

2.2 HARDWARE FOR FIRE DOORS AND EXIT DOORS

Provide all hardware necessary to meet the requirements of NFPA 80 for fire doors and NFPA 101 for exit doors, as well as to other requirements specified, even if such hardware is not specifically mentioned under paragraph entitled "Hardware Schedule." Such hardware shall bear the label of Underwriters Laboratories, Inc., and be listed in UL BMD or labeled and listed by another testing laboratory acceptable to the Contracting Officer.

2.3 HARDWARE ITEMS

Hinges, pivots, locks, latches, exit devices, bolts, and closers shall be clearly and permanently marked with the manufacturer's name or trademark where it will be visible after the item is installed. For closers with covers, the name or trademark may be beneath the cover.

2.3.1 Hinges

ANSI/BHMA A156.1, 114 by 114 millimeters unless otherwise specified. Construct loose pin hinges for exterior doors and reverse-bevel interior doors so that pins will be nonremovable when door is closed.

2.3.2 Pivots

ANSI/BHMA A156.4.

2.3.3 Omitted

2.3.4 Locks and Latches

2.3.4.1 Mortise Locks and Latches

ANSI/BHMA A156.13, Series 1000, Operational Grade 1, Security Grade 2. Provide mortise locks with escutcheons not less than 178 by 57 mm with a bushing at least 6 mm long. Cut escutcheons to suit cylinders and provide trim items with straight, beveled, or smoothly rounded sides, corners, and edges. Lever handles and roses of mortise locks shall have screwless shanks and no exposed screws.

2.3.4.2 Omitted

2.3.4.3 Residential Bored Locks and Latches

ANSI/BHMA A156.2, Series 4000, Grade 2. Locks for exterior doors shall have threaded roses or concealed machine screws.

2.3.4.4 Interconnected Locks and Latches

ANSI/BHMA A156.12. Provide F96 or F97, unless otherwise specified.

2.3.4.5 Hospital Latches

Push-pull latchset similar and equal to Glynn-Johnson HL6, 13 mm throw, 70 mm backset, to fit 161 cutout. Cover approximately 64 by 140 mm, handle approximately 38 by 114 mm, projection approximately 64 mm, covers and handles of stainless steel, BHMA 630 finish, engraved "PUSH" and "PULL" on handles, push handle pointing up, pull handle pointing down. Provide factory installed lead lining in latches for lead-shielded doors.

2.3.4.6 Auxiliary Locks

ANSI/BHMA A156.5, Grade 1.

2.3.5 Exit Devices

ANSI/BHMA A156.3, Grade 1. Provide adjustable strikes for rim type and vertical rod devices. Provide open back strikes for pairs of doors with mortise and vertical rod devices. Touch bars shall be provided in lieu of conventional crossbars and arms. Provide escutcheons, not less than 178 by 57 mm.

2.3.6 Omitted

2.3.7 Cylinders and Cores

Provide cylinders and cores for new locks, including locks provided under other sections of this specification. Cylinders and cores shall have seven pin tumblers. Cylinders shall be products of one manufacturer, and cores shall be the products of one manufacturer. Mortise cylinders shall have interchangeable cores which are removable by special control keys. Stamp each interchangeable core with a key control symbol in a concealed place on the core.

2.3.8 Keying System

Provide a master keying system. Provide construction interchangeable cores. Provide key cabinet as specified.

2.3.9 Lock Trim

Cast, forged, or heavy wrought construction and commercial plain design.

2.3.9.1 Roses

In addition to meeting test requirements of ANSI/BHMA A156.2 and ANSI/BHMA A156.13, roses and escutcheons shall be 1.25 mm thick if unreinforced. If reinforced, outer shell shall be 0.89 mm thick and combined thickness shall be 1.78 mm, except knob shanks shall be 1.52 mm thick.

2.3.9.2 Lever Handles

Provide lever handles in lieu of knobs. Lever handles for exit devices shall meet the test requirements of ANSI/BHMA A156.13 for mortise locks. Lever handle locks shall have a breakaway feature (such as a weakened spindle or a shear key) to prevent irreparable damage to the lock when a force in excess of that specified in ANSI/BHMA A156.13 is applied to the lever handle. Lever handles shall return to within 13 mm of the door face.

2.3.10 Keys

Furnish one file key, one duplicate key, and one working key for each key change. Furnish one additional working key for each lock of each keyed-alike group. Furnish 4 master keys, 2 construction master keys, and 2 control keys for removable cores. Furnish a quantity of key blanks equal to 20 percent of the total number of file keys. Stamp each key with appropriate key control symbol and "U.S. property - Do not duplicate." Do not place room number on keys.

2.3.11 Door Bolts

ANSI/BHMA A156.16. Provide dustproof strikes for bottom bolts, except for doors having metal thresholds. Automatic latching flush bolts: ANSI/BHMA A156.3.

2.3.12 Closers

ANSI/BHMA A156.4, Series C02000, Grade 1, with PT 4C. Provide with brackets, arms, mounting devices, fasteners, full size covers, except at storefront mounting and other features necessary for the particular application. Size closers in accordance with manufacturer's recommendations, or provide multi-size closers, Sizes 1 through 6, and list sizes in the Hardware Schedule. Provide manufacturer's 10 year warranty.

2.3.12.1 Identification Marking

Engrave each closer with manufacturer's name or trademark, date of manufacture, and manufacturer's size designation located to be visible after installation.

2.3.13 Overhead Holders

ANSI/BHMA A156.8.

2.3.14 Omitted

2.3.15 Door Protection Plates

ANSI/BHMA A156.6.

2.3.15.1 Sizes of Armor and Kick Plates

Width for single doors shall be 50 mm less than door width; width for pairs of doors shall be 25 mm less than door width. Height of kick plates shall be 200 mm. Height of armor plates shall be not less than 900 mm.

2.3.16 Omitted

2.3.17 Door Stops and Silencers

ANSI/BHMA A156.16. Silencers Type L03011. Provide three silencers for each single door, two for each pair.

2.3.18 Omitted

2.3.19 Thresholds

ANSI/BHMA A156.21. Use vinyl or silicone rubber insert in face of stop, for exterior doors opening out, unless specified otherwise.

2.3.20 Weather Stripping

A set shall include head and jamb seals and, for pairs of doors, astragals. Air leakage of weather stripped doors shall not exceed 5.48 x 10-5 cms per minute of air per square meter of door area when tested in accordance with ASTM E 283. Weather stripping shall be one of the following:

2.3.20.1 Extruded Aluminum Retainers

Extruded aluminum retainers not less than 1.25 mm wall thickness with vinyl, neoprene, silicone rubber, or polyurethane inserts. Aluminum shall be bronze anodized.

2.3.21 Omitted

2.3.22 Rain Drips

Extruded aluminum, not less than 2.03 mm thick, bronze anodized. Set drips in sealant conforming to Section 07900, "JOINT SEALING," and fasten with stainless steel screws.

2.3.22.1 Door Rain Drips

Approximately 38 mm high by 16 mm projection. Align bottom with bottom edge of door.

2.3.22.2 Overhead Rain Drips

Approximately 38 mm high by 64 mm projection, with length equal to overall width of door frame. Align bottom with door frame rabbet.

2.3.23 Key-Box

Recessed mounted high security commercial key box with lift-off door, without tamper switches. Construct unit with minimum 6 mm thick steel plate housing and 12 mm thick steel door with interior gasket seal. Box and lock shall be UL listed. Provide with options for recessed mounting anchorage kit. Provide only Knox-Box 3200 series by Knox Company, with station approved type of lock.

2.3.23.1 Locks

UL listed. Double-action rotating tumblers and hardened steel pins accessed by a biased cut key.

2.3.23.2 Finish

Pre-treat surfaces with zinc-phosphate primer. Finish coat with exterior polyester powder coat. Color: Bronze.

2.3.24 Special Tools

Provide special tools, such as spanner and socket wrenches and dogging keys, required to service and adjust hardware items.

2.4 FASTENERS

Provide fasteners of proper type, quality, size, quantity, and finish with hardware. Fasteners exposed to weather shall be of nonferrous metal or stainless steel. Provide fasteners of type necessary to accomplish a permanent installation.

2.5 FINISHES

ANSI/BHMA A156.18. Hardware shall have BHMA 630 finish (satin stainless steel), unless specified otherwise. Provide items not manufactured in stainless steel in BHMA 626 finish (satin chromium plated) over brass or bronze, except surface door closers which shall have prime coat finish, and except steel hinges which shall have BHMA 652 finish (satin chromium plated). Hinges for exterior doors shall be stainless steel with BHMA 630. Exit devices shall be provided in BHMA 630 finish. Exposed parts of concealed closers shall have finish to match lock and door trim. Hardware for aluminum doors shall be finished to match the doors.

2.6 KEY CABINET AND CONTROL SYSTEM

ANSI/BHMA A156.5, Type E8341 (125 hooks).

PART 3 EXECUTION

3.1 INSTALLATION

Install hardware in accordance with manufacturers' printed instructions. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Provide machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Provide toggle bolts where required for fastening to hollow core construction. Provide through bolts where necessary for satisfactory installation.

3.1.1 Weather Stripping Installation

Handle and install weather stripping so as to prevent damage. Provide full contact, weather-tight seals. Doors shall operate without binding.

3.1.1.1 Stop-Applied Weather Stripping

Fasten in place with color-matched sheet metal screws not more than 225 mm o.c. after doors and frames have been finish painted.

3.1.2 Omitted

3.1.3 Threshold Installation

Extend thresholds the full width of the opening and notch end for jamb stops. Set thresholds in a full bed of sealant and anchor to floor with cadmium-plated, countersunk, steel screws in expansion sleeves.

3.2 FIRE DOORS AND EXIT DOORS

Install hardware in accordance with NFPA 80 for fire doors, NFPA 101 for exit doors.

3.3 HARDWARE LOCATIONS

ANSI/SDI 100, unless indicated or specified otherwise. Kick and Armor Plates: Push side of single-acting doors. Both sides of double-acting doors.

3.4 KEY CABINET AND CONTROL SYSTEM

Locate where directed. Tag one set of file keys and one set of duplicate keys. Place other keys in appropriately marked envelopes, or tag each key. Furnish complete instructions for setup and use of key control system. On tags and envelopes, indicate door and room numbers or master key.

3.5 FIELD QUALITY CONTROL

After installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work. Submit notice of testing 15 days before scheduled, so that testing can be witnessed by the Contracting Officer. Adjust hinges, locks, latches, bolts, holders, closers, and other items to operate properly. Demonstrate that permanent keys operate respective locks, and give keys to the Contracting Officer. Correct, repair, and finish, as directed, errors in cutting and fitting and damage to adjoining work.

3.6 HARDWARE SETS

Hardware for aluminum doors shall be provided under this section. Deliver Hardware templates and hardware, except field-applied hardware to the aluminum door and frame manufacturer for use in fabricating the doors and frames.

HW-1

1-1/2 pr.	Hinges	A2112 x 626
1 ea.	Lockset	F04 x 626
1 ea.	Wall bumper	L02101

(Door 128 - Key side in Room 122)
(Door 277 - Provide kickplates)

HW-2

1-1/2 pr.	Hinges	A2111 x 626
1 ea.	Lockset	F04 x 626
1 ea.	Closer	C02021 x 715
1 ea.	Kickplate	J102 x B3E x 630
1 ea.	Wall bumper	L02101

HW-3

1-1/2 pr.	Hinges	A2111 x 626
1 ea.	Dead Lock	E06091 x 626
1 ea.	Closer	C02011 x 715
1 ea.	Push Plate	J304 x B4E x 630
1 ea.	Pull Plate	J407 x B4E x 630
1 ea.	Kickplate	J102 x B3E x 630
1 ea.	Wall bumper	L02101

HW-4

1-1/2 pr.	Hinges	A2112 x 626
1 ea.	Lockset	F07 x 626
1 ea.	Wall bumper	L02101

HW-5

1-1/2 pr.	Hinges	A2112 x 626
1 ea.	Lockset	F02 x 626
1 ea.	Wall bumper	L02101

HW-6

1-1/2 pr.	Hinges	A2111 x 626
1 ea.	Lockset	F07 x 626
1 ea.	Closer	C02021 x 715
1 ea.	Kickplate	J102 x B3E x 630
1 ea.	Wall bumper	L02101

HW-7

1-1/2 pr.	Hinges	A2112 x 626
1 ea.	Lockset	F03 x 626
1 ea.	Wall bumper	L02101

HW-8

1-1/2 pr.	Hinges	A5111 x 630
1 ea.	Lockset	F07 x 626
1 ea.	Closer	C02021 x 715
1 ea.	Kickplate	J102 x B3E x 630
1 ea.	Threshold	J36180 x 628
1 ea.	Door Rain Drip	As specified
1 ea.	Overhead Rain Drip	As specified
1 set	Weatherstripping	As specified

HW-9

2 ea.	Cylinders	

Remainder of hardware by door manufacturer.

HW-10

1-1/2 pr.	Hinges	A2111 x 626
1 ea.	Lockset	F04 x 626
1 ea.	Closer	C02021 x 715
1 ea.	Kickplate	J102 x B3E x 630
1 ea.	Wall bumper	L02101

(Dr. 201 Key side in Room 227)

HW-11

1 Set	Offset Pivots	C07111
1 ea.	Hospital Latch*	As specified
1 ea.	Armor Plate	J101 x B3E x 630
1 ea.	Floor bumper	L02131

* Provide with lead lining

HW-12

2 pr.	Hinges	A2111 x 626

1 ea.	Lockset	F07 x 626
1 ea.	Closer	C02021 x 715
1 ea	Armor Plate	J101 x B3E x 630
1 ea.	Wall bumper	L02101

HW-13

1-1/2 pr.	Hinges	A2112 x 626
1 ea.	Latchset	F01 x 626
1 ea.	Armor Plate	J101 x B3E x 630
1 ea.	Wall bumper	L02101

HW-14

3 pr	Hinges	A5112 x 630
1 ea.	Lockset	F07 x 626
2 ea.	Overhead Rod Holder	C08511 x Type 8
2 ea.	Flush Bolts	L04081 x 626
1 ea.	Threshold	J36180 x 628
2 ea.	Door Rain Drips	As specified
1 ea.	Overhead Rain Drip	As specified
1 set	Weatherstripping	As specified

HW-15

Hardware by manufacturer / fabricator.

HW-16

3 pr.	Hinges	A2111 x 709
2 ea.	Exit Devicces	Type 6 x 04 x 630
2 ea.	Cylinders	
2 ea.	Offset Pulls	J402 x 630
2 ea.	Closers	C02021 x 694
1 ea.	Threshold	J32130 x 628

HW-17 - Not Used

HW-18

1-1/2 pr.	Hinges	A5112 x 630
1 ea.	Lockset	F07 x 626
1 ea.	Overhead Rod Holders	C08511 x Type 8
1 ea.	Threshold	J36180 x 628
1 ea.	Door Rain Drip	As specified
1 ea.	Overhead Rain Drip	As specified
1 set	Weatherstripping	As specified

HW-19

1-1/2 pr	Hinges	A2111 x 626
1 ea.	Lockset	F07 x 626
1 ea.	Closer	C02021 x 694
1 ea.	Armor Plate	J101 x B3E x 630
1 ea.	Floor Stop/Holder	L01371

HW-20

4 pr.	Hinges	A5112 x 626
1 ea.	Lockset	F07 x 626
2 ea.	Overhead Rod Holders	C08511 x Type 8
2 ea.	Flush Bolts	L04081 626
2 ea.	Armor Plates	J101 x B3E x 630
1 ea.	Threshold	J36180 x 628
1 set	Weatherstripping	As specified

HW-21

3 pr.	Hinges	A8111 x 652
1 ea.	Lockset	F07 x 626
2 ea	Closers	C01011 x 715
1 set	Auto Latching Bolts	Type 24
1 ea	Threshold	J32100

HW-22

2 pr.	Hinges	A2112 x 626
1 ea.	Hospital Latch	As specified
1 ea.	Armor Plate	J101 x B3E x 630
1 ea.	Wall bumper	L02101

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 08 - DOORS & WINDOWS

SECTION 08810

GLASS AND GLAZING

05/97

-- End of Section Table of Contents --

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

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 203 x 254 mm samples of each of the following: tinted glass and 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 5 degrees C 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.

1.6.2 Laminated Glass

Manufacturer's Special Project Warranty on Laminated Glass: Provide written warranty signed by manufacturer of laminated glass agreeing to furnish f.o.b. point of manufacture freight

allowed project site, within specified warranty period indicated below, replacements for those laminated glass units which develop manufacturing defects. Manufacturing defects are defined as edge separation or delamination which may materially obstruct vision through glass.

PART 2 PRODUCTS

2.1 FLOAT GLASS

2.1.1 Annealed Glass

Annealed glass shall be Type I transparent flat type, Class 1 - clear, Quality q3 - glazing select, 82 percent light transmittance, 0.9 percent shading coefficient, conforming to ASTM C 1036.

2.1.2 Omitted

2.1.3 Tinted (Light-Reducing) Glass

Tinted (light-reducing) glass shall be Type I transparent flat type, Class 3-tinted, Quality q3 - glazing select, 53 percent light transmittance, 34 percent shading coefficient, conforming to ASTM C 1036. Color shall be as shown on the drawings.

2.2 OMITTED

2.3 INSULATING GLASS

Refer to Section 08520, ALUMINUM WINDOWS and Section 08120, ALUMINUM DOORS AND FRAMES, for requirements of insulated glazing with integral "between glass" blinds. Insulating glass shall be Class A preasembled units of dual-seal construction consisting of lites of glass separated by an aluminum spacer and dehydrated space conforming to ASTM E 773 and ASTM E 774. Aluminum spacer shall be roll-formed, with bent or tightly soldered joins 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 secondary seal shall be a specially formulated silicone. Glazing pocket design for insulated glass with integral venetian blinds shall be in accord with FGMA glazing manual. Glass performance shall be K-Value/Winter Nighttime 3.65, (U-Valve/Winter Nighttime 0.48). Provide tempered glass where indicated on drawings. Shading coefficient shall be a minimum of 0.34. Color shall be as indicated on the drawings. Glass types shall be as follows:

2.3.1 Tinted Insulating Glass

(Interior Light) Use a minimum of 6-mm nominal laminated glass for the interior light of all exterior windows and glazed doors. The 6-mm laminated glass consists of two nominal 3-mm glass, complying with ASTM C 1172 for kinds of laminated glass indicated and other requirements specified. Refer to primary and heat-treated glass requirements relating to properties of glass products compromising laminated glass products. Kind LT (two lights of fully tempered Type I glass, Class 1 - clear, Quality q3 - glazing select): clear outer lite, 3.0 mm thick; clear inner lite, 3.0 mm thick with interlayer.

a. Interior Light: Two 3 mm glass panes shall be bonded together with a minimum of a 0.8-mm polyvinyl butyral sheet (PVB) interlayer, with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lights and installation. Use a minimum of 6-mm nominal laminated glass for the interior light of all exterior windows and glazed doors.

b. Exterior Light: Use a minimum of 3 mm nominal annealed glass, a tinted, Quality q3-glazing select, conforming to ASTM C 1036.

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, 88 percent light transmittance, 95 percent shading coefficient 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 annealed glass, Class 1-clear Quality q3 - glazing select, conforming to ASTM C 1036. Glass shall be bonded together with 0.76 mm 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 as shown on drawings.

2.7 DUAL GLAZED TEMPERED GLASS WITH INTEGRAL BLINDS

Blinds are specified in Section 08520, ALUMINUM WINDOWS.

2.8 OMITTED

2.9 OMITTED

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 match adjacent surfaces.

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-378for 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.

3.5 SCHEDULE

a. Exterior windows and Storefront windows (types W1, S1 through S2):
Tinted, laminated, insulating glass with integral blinds.

b. Clerestory windows and Mall end window walls (W2 through W7 and W8 through W15):
Tinted, laminated, insulating glass without integral blinds.

c. Exterior doors: Tinted, laminated, glass without integral blinds.

d. Interior doors: clear tempered glass.

e. Interior glazed openings and sliding windows (S3 and W16): clear dual glazed tempered glass with integral blinds.

f. Radiology windows: lead glazing - See Section 13090, X-RAY SHIELDING.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 09 - FINISHES

SECTION 09000

BUILDING COLOR AND FINISH SCHEDULE

12/95

-- End of Section Table of Contents --

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.

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 are met.

1.3 ABBREVIATIONS: MANUFACTURERS AND MATERIALS

Abbreviations are indicated on the drawings.

1.4 EXTERIOR COLOR/FINISH INSTRUCTIONS

1.4.1 Bollard Guards

Bollard Guards shall be painted in stripes of colors FSN 595 #11302 red and #13538 yellow.

1.4.2 Brick

Brick shall be as indicated on the drawings.

1.4.3 Omitted

1.4.4 Brick Grout

Brick grout shall be as indicated on the drawings.

1.4.5 Doors and Frames

Aluminum.

Steel: Painted, color - as indicated on the drawings.

1.4.6 Glazing

Glazing is specified in Section 08810 GLASS AND GLAZING and as indicated on the drawings.

1.4.7 Handrails

Handrails shall be painted, color as indicated on the drawings.

1.4.8 Metal Roofing and Siding

Color finish of metal roofing shall be as indicated on the drawings.

1.4.9 Sheet Metalwork

1.4.9.1 Coping

Color finish as indicated on the drawings.

1.4.9.2 Omitted

1.4.9.3 Gutters and Downspouts

Color finish as indicated on the drawings.

1.4.9.4 Louvers

Louvers shall be painted as indicated on the drawings

1.4.10 Stucco

Stucco shall be as indicated on the drawings.

1.4.11 Windows

Color as indicated on the drawings.

1.5 INTERIOR COLOR/FINISH INSTRUCTIONS

1.5.1 Omitted

1.5.2 Ceramic Tile Grout

In men's and women's toilets, shower and locker areas, a grout as indicated on the drawings.

1.5.3 Doors

1.5.3.1 Steel Doors

Steel doors shall be as indicated on the drawings.

1.5.3.2 Wood Doors

Wood doors shall be as indicated on the drawings.

1.5.4 Door Hardware

Door hardware finish is specified in Section 08710 DOOR HARDWARE.

1.5.5 Elevators

1.5.5.1 Omitted

1.5.5.2 Handrails

Handrails shall be as indicated on the drawings.

1.5.5.3 Omitted

1.5.5.4 Floor

Floor shall be as indicated on the drawings.

1.5.5.5 Reveals

Reveals shall be as indicated on the drawings.

1.5.5.6 Ceiling

Ceiling shall be as indicated on the drawings.

1.5.6 Omitted

1.5.7 Handrails

Handrails shall be as indicated on the drawings.

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 Exposed Ducts

Ducts shall be as indicated on the drawings.

1.5.9 Omitted

1.5.10 Omitted

1.5.11 Omitted

1.5.12 Plastic Laminate

1.5.12.1 Counters

Counters shall be as indicated on the drawings.

1.5.13 Omitted

1.5.14 Omitted

1.5.15 Signs

Exterior signs are specified in Section 10430 EXTERIOR SIGNAGE and interior signs in Section 10440, INTERIOR SIGNAGE.

1.5.16 Suspended Ceiling Grid

Suspended Ceiling Grid shall match ceiling tiles in manufacturer's standard as indicated on the drawings.

1.5.17 Omitted

1.5.18 Toilet Partitions

Toilet Partitions shall be as indicated on the drawings.

1.5.19 Walls

All interior walls of gypsum board shall be as indicated on the drawings.

1.5.20 Window Frames (Interior, Glazing)

Steel, Painted to match adjacent walls in color.

PART 2 PRODUCTS (NOT USED)

PART 3 NOT USED

-- End of Section --

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LATHING AND PLASTERING

06/97

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SECTION 09200

LATHING AND PLASTERING
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 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 28	(1996el) Gypsum Plasters
ASTM C 29/C 29M	(1997) Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C 35	(1995) Inorganic Aggregates For Use in Gypsum Plaster
ASTM C 37/C 37M	(1999) Gypsum Lath
ASTM C 150	(1999a) Portland Cement
ASTM C 206	(1984; R 1997) Finishing Hydrated Lime
ASTM C 472	(1999) Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete
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 841	(1999) Installation of Interior Lathing and Furring
ASTM C 842	(1999) Application of Interior Gypsum Plaster
ASTM C 844	(1999) Application of Gypsum Base to Receive Gypsum Veneer Plaster
ASTM C 847	(1995) Metal Lath
ASTM C 897	(1996) Aggregate for Job-Mixed Portland Cement-Based Plasters
ASTM C 926	(1998a) Application of Portland Cement-Based Plaster
ASTM C 955	(1998) 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	(1998) Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases
ASTM D 256	(1993) Determining the Pendulum Impact Resistance of Notched Specimens of Plastics
ASTM D 695	(1996) Compressive Properties of Rigid Plastics
ASTM D 696	(1991) Coefficient of Linear Thermal Expansion of Plastics Between -30 Degrees C and 30 Degrees C

ASTM D 790	(1996) Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM E 84	(1996) 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-02 Shop Drawings

Approved Detail Drawings.

Drawings including installation details, framing, and furring.

SD-03 Product Data

Lathing Installation.

Manufacturer's pre-printed descriptive data, catalog cuts, and installation instructions for plastering materials and accessories.

SD-04 Samples

Gypsum Plaster.

One 1 m square sample panel of each specified finish.

SD-07 Certificates

Qualifications.

Manufacturer's experience in specified work.

Gypsum Plaster.

Certification indicating that factory-mixed plaster provides a minimum compressive strength of not less than 6.9 MPa (1000 psi) when tested in accordance with ASTM C 472.

1.3 QUALIFICATIONS

Manufacturer shall specialize in manufacturing the types of material specified, and shall have a minimum of 5 years of documented successful experience. Applicator shall specialize in the type of lath and plaster work required to meet requirements, with a minimum of 3 years of documented experience.

1.4 DELIVERY, STORAGE AND HANDLING

Materials shall be delivered to project site in the original containers bearing the name of manufacturer, contents, and brand name. Plaster, cement, and lime shall be stored off the ground under weathertight cover and away from sweating walls and other damp surfaces until ready for use. Accessories shall be stored off the ground in a weathertight structure for protection. Damaged or deteriorated materials shall be removed from project site.

1.5 ENVIRONMENTAL CONDITIONS

A temperature between 4 degrees C and 27 degrees Cshall be evenly maintained in the building for a period of not less than 1 week prior to application of plaster, and for a period of at least 1 week after the gypsum plaster is set, in accordance with ASTM C 842. Interior spaces shall be ventilated in accordance with ASTM C 842 immediately after applying plaster.

PART 2 PRODUCTS

2.1 OMITTED

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, 1.52 mm thick.

2.2.2 Runner Tracks

Floor and ceiling runner tracks shall conform to ASTM C 955. Tracks shall be prefabricated, U-shaped with minimum 19 mm flanges, unpunched web, made from G60 hot-dip galvanized coated sheet.

2.2.3 Bridging

Bridging in loadbearing walls shall conform to ASTM C 955. Bridging shall be minimum 19 mm wide x 11 mm deep cold-rolled steel channel with weld attachment clips at each stud location 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 METAL WALL FURRING

Metal wall furring channels shall conform to ASTM C 645. Furring channels shall be formed from cold-rolled steel, 19 mm wide x 11 mm deep, made from G40 hot-dip galvanized coated sheet.

2.4 OMITTED

2.5 ACCESSORIES

2.5.1 Hangers

Suspended ceiling runner channel hangers shall be soft, annealed steel wire not less than No. 8 SWG nominal diameter, conforming to ASTM A 853 or flat iron or steel straps, at least 2 x 22 mm size, coated with zinc, cadmium, or rust-inhibiting paint.

2.5.2 Fastenings

Tie wire, 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. Walls, partitions, and other vertical surfaces not incorporated in ceiling construction may be erected with soft, annealed steel conforming to ASTM A 853.

2.5.2.1 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 diameter. Tie wire for all other applications shall be not less than No. 16 SWG diameter.

2.5.2.2 Clips

Clips used in lieu of tie wire for securing furring channels to the runner channels in ceiling construction shall be made from strips not less than 3 mm thick or shall be hairpin clip formed of No. 8 SWG wire. 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.

2.5.3 Omitted

2.5.4 Expanded Flange Corner Beads

Expanded flange corner beads shall be fabricated of vinyl or aluminum, 0.50 mm thick (0.0210 in) galvanized steel, 0.76 mm (0.030 inch) thick zinc alloy, with 64 mm wide flanges and 3 mm wide bead.

2.5.5 Omitted

2.5.6 Omitted

2.5.7 Striplath

Striplath shall conform to ASTM C 847. Striplath shall be fabricated of galvanized steel sheet, 1.4 kg per square meter.

2.5.8 Base or Parting Screed

Base screeds shall be fabricated of 0.50 mm thick (0.0210 in) galvanized steel, 13 mm depth, with not less than 50 mm wide expansion flanges.

2.5.9 Casing Beads

Casing beads shall be fabricated of galvanized 0.70 mm (0.0276 inch) thick steel, 19 mm depth, 50 mm wide expansion wings, front edge of face flange shaved for intended use, back slightly arched to provide a spring effect.

2.5.10 Control Joints

Control joints shall be designed for expansion and contraction of plaster work due to thermal exposure. Control joints shall be fabricated of 0.76 mm (0.030 inch) thick zinc alloy for exterior applications, with perforated or expanded-metal wings.

2.5.11 Omitted

2.5.12 Omitted

2.5.13 Screws

Self-drill steel screws shall conform to ASTM C 1002. Screws shall be Type S for use with steel framing.

2.5.14 Soffit Vents

Provide continuous soffit vent, pre-finished aluminum alloy, 1.5 mm thick; with a minimum of 3226 square millimeters of venting per 300 linear millimeters. Pre-finish in color, as approved by Contracting Officer.

2.6 METAL LATH

2.6.1 Expanded Metal Lath

Expanded metal lath shall conform to ASTM C 847. Lath shall be galvanized self-furring lath, expanded from cold-rolled carbon sheet steel of commercial quality, coated with rust-inhibitive paint after fabrication, 1.8 kg per square meter, with backing.

2.7 GYPSUM LATH AND VENEER PLASTER BASE

2.7.1 Gypsum Lath

Gypsum lath shall conform to ASTM C 37/C 37M. Lath shall be plain designed to be used as a base for gypsum plaster.

2.8 GYPSUM PLASTER

2.8.1 Ready-Mixed Gypsum Plaster

Ready-mixed plaster for use over gypsum or metal lath shall conform to ASTM C 28 for the following: ready-mixed plaster with vermiculite aggregate; ready-mixed plaster with perlite aggregates; ready-mixed plaster with sand aggregate.

2.9 CEMENT PLASTER MATERIALS

2.9.1 Portland Cement

Portland cement shall conform to ASTM C 150, white portland cement Type I with 13 mm chopped alkali-resistant fiberglass strands or polypropylene fibers, minimum 680 g per sack of cement.

2.9.2 Aggregates

The unit weight of aggregates shall be determined in accordance with ASTM C 29/C 29M. Gypsum aggregates shall conform to ASTM C 35. Portland cement based plaster aggregates shall conform to ASTM C 897, except that the gradation of natural or manufactured sand for portland-cement plaster shall be as follows:

Sieve Size (mm)	Sand, Percentage by Weight Retained on Each Sieve	
	Maximum	Minimum
4.75	0	--
2.36	8	2

Sieve Size (mm)	Sand, Percentage by Weight Retained on Each Sieve Maximum	Minimum
1.18	38	22
0.60	78	52
0.30	97	65
0.15	100	97

2.9.3 Water

Water shall be clean, fresh, potable, and free from injurious amounts of oils, acids, alkalis and organic matter injurious to the plaster and to any metal in the system.

2.9.4 Lime

Lime shall conform to ASTM C 206, Type S-Special hydrated finishing lime suitable for use in scratch brown and finish coats of portland-cement plaster.

2.10 GLASS REINFORCED CEMENT COLUMN ENCLOSURES

a. Material: Glass Fiber Reinforced Concrete (GFRC) fabricated using long strand continuous glass fiber mats laminated with polymer modified Portland Cement.

b. Physical Properties

Glass Fiber:	5-6 percent by weight Type E chopped to 25 mm length.
Weight:	0.002 kg/sq. cm.
Thickness:	9.5 mm (Nominal)
Flexural Strength:	182 kg/sq. cm.
Tensile Strength (ASTM D 790):	78 kg/sq. cm.
Impact Strength (ASTM D 256):	12.5 ft. lb./in.
Density:	1853 kg/cu. cm
Thermal Coefficient of Expansion ASTM D 696:	5.4 x 106 in./in./°F
Compressive Strength (ASTM D 695):	669 kg/sq. cm.
Flammability (ASTM E 84):	
Flame Spread Index	0
Smoke Development Value	0
Fuel Contributed Value	0

c. Fabrication: Fabricate enclosures as required on drawings with tapered profiles. Take field measurements prior to commencement of shop fabrication and finishing of fabricated units. Provide all required embeds and galvanized metal reinforcing. Do not delay job progress; allow for trimming where final dimensions cannot be established before fabrication.

1. Coordinate attachment and fastener requirements of fabrication.

2. Product Fabrication: There shall be no combustible material in the product design. Finished product shall conform to profiles indicated.

3. All panels: formed to specified dimensions with tolerances to accommodate expansion and contraction between panels and structural members. Panels shall be accurately formed to radii in plant of manufacturer with factory finish surface.

4. Accessory and trim components with supports and fastening devices shall be factory fabricated and ready for installation on indicated substrates.

d. Finishes

1. Fabrications shall be free of scratches and blemishes; with all mould voids filled, and over-spray trimmed and sanded with factory applied primer. Field finish: comply with requirements of Section 09900, PAINTING, GENERAL.

PART 3 EXECUTION

3.1 PREPARATION

Project conditions shall be verified as ready to receive the work. Field measurements shall be verified for compliance with approved detail drawings and manufacturer's published recommendations. Beginning of installation means installer accepts existing conditions.

3.2 SUSPENDED CEILING FRAMING INSTALLATION

Suspended system shall be installed in accordance with ASTM C 841. Where channels are spliced, the ends shall be overlapped not less than 300 mm for 38 mm channels and not less than 200 mm for 20 mm channels with flanges of channels interlocked and securely tied near each end of the splice with two loops of the tie wire. Splices shall be staggered.

3.2.1 Hangers

Wire or strap hangers shall be attached to structural members in accordance with ASTM C 841, except hangers shall be spaced not more than 1220 mm along runner channels and 900 mm in the other direction or 1050 mm in both directions unless otherwise indicated or approved. Locations of hangers shall be coordinated with other work. Hangers at ends of runner channels shall be located not more than 150 mm from wall. Hanger wire shall be looped around bottom chord of open-web steel joist or secured to structural elements with suitable fasteners. Sags or twists in the suspended system shall be adjusted. Damaged or faulty parts shall be replaced.

3.2.2 Main Runners

Main runner channels shall be installed in accordance with ASTM C 841. Hanger wire shall be saddle-tied to runner channels, and the end of hanger wires shall be twisted three times around itself. Main runners shall not come in contact with abutting masonry or concrete walls and partitions. Main runners shall be located within 150 mm of the paralleling wall to support the ends of cross furring.

3.2.3 Furring Channels

Furring channels shall be spaced in accordance with ASTM C 841 for the type of lath used. Furring channels shall be securely saddle-tied to the runner channels and to structural supports at each crossing with tie wire, hairpin clips, or equivalent clips or fastenings. Furring channels shall be located within 50 mm of parallel walls and beams, and 15 mm from abutting walls. When gypsum lath is used on ceilings, hat-shaped sheetmetal furring channels may be used in lieu of 19 mm rolled steel furring channels. Gypsum lath shall be screw-applied at 200 mm on centers along supports and not less than 10 mm from edges of lath.

3.2.4 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 FURRED CEILING FRAMING INSTALLATION

Ceiling runners at continuous furred ceilings shall be applied directly to furring channels and secured thereto with tie wire, bolts, or screws at not more than 600 mm centers.

3.4 WALL FRAMING INSTALLATION

3.4.1 Loadbearing Wall Framing

Load-bearing steel studs shall be spaced for the type of lath used at external corners, partition ends, and approximately 50 mm each side of internal corners. Floor and ceiling runners shall be firmly secured to structural members with screws or bolts in expansion shields, hard-tempered stub nails, powder-actuated anchors, or by other approved methods at not more than 600 mm centers. Studs shall be attached to runner tracks with rivets or screws. Runner to tracks shall be aligned to partition layout at floor and ceiling, and shall be secured to concrete slabs with minimum 22 mmpowder-driven pins or 19 mm concrete stub nails at no more than 1200 mm on centers. Each stud shall be aligned, plumb and true to top and bottom runner tracks.

3.4.2 Omitted

3.4.3 Adjoining Walls and Columns

Studs which adjoin walls or columns shall be secured near the top and bottom, and at least one intermediate point, but not more than 1.5 m on centers, with wire inserts, dovetail anchors, toggle bolts, or bolts set in expansion shields.

3.4.4 Wall Bracing

Partitions more than 3 m long or 2.7 m high shall be braced with 19 mm steel channel stiffeners concealed horizontally. Stiffeners shall be spaced vertically not more than 2 m and shall be secured to each stud. Unsupported partitions 6 m or more in height shall be braced with 40 mm channel type horizontal stiffeners.

3.4.5 Corners and Intersection

Corners and intersections of partitions shall be formed of three studs. Studs at internal corners shall be placed not more than 50 mm from partition intersection.

3.4.6 Wall Openings

One loadbearing metal stud shall be installed at each jamb of door openings continuous from floor to ceiling, and shall be welded to jamb anchors and runner tracks. Jack studs shall be attached to runner track on interior of head of frame, and to runner track or 19 mm channel at ceiling. A 19 mm channel reinforcement shall be placed inside the partition 150 to 200 mm above door openings continuously through two stud spaces on each side of jambs, and welded to the flange. Studs shall be doubled at wall openings, with not more than 50 mm each side of openings. Stud placement shall be coordinated with supports and attachments. Intermediate studs above and below openings shall be secured at same spacing as wall studs. Stud framing shall extend to ceiling or through ceiling as indicated on drawings. Clearance shall be maintained between partition and structure to avoid deflection transfer to studs of partitions which extend through ceiling to structure. Placement of insulation in stud spaces shall be made inaccessible after studs are installed.

3.4.7 Bucks, Anchors and Blocking

Installation of bucks, anchors, and blocking shall be coordinated with electrical and mechanical work to be placed in or behind stud framing, and shall be coordinated with blocking requirements for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware and similar items scheduled for installation.

3.5 WALL FURRING INSTALLATION

Metal furring shall be installed in accordance with ASTM C 754 and ASTM C 841.

3.6 OMITTED

3.7 LATHING INSTALLATION

3.7.1 Metal Lath on Vertical Surfaces

Metal lath shall be applied with the long dimension across the supports, with true even surfaces, and without sags or buckles in accordance with ASTM C 841. Metal lath on vertical surfaces shall be oriented to provide maximum mechanical bond with plaster and the upper sheet shall be attached to overlap the lower sheet. When paper-backed lath is used, the upper sheet shall be attached to overlap the lower sheet. The lath shall be secured to supports at intervals not exceeding 150 mm. Nails or staples shall be used for securing lath to wood supports. Tie wires, rings, clips, or other approved fasteners having equivalent holding power of the tie wires shall be used for securing the plaster base to metal supports and to concrete or masonry. Side-laps or junction of sides of plaster base shall be tied or otherwise secured at intervals not exceeding 225 mm between supports, in addition to being secured to supports.

3.7.2 Metal Lath on Ceilings

Metal lath on ceilings shall be in accordance with ASTM C 841. Lath on unrestrained ceilings shall not be turned down at junction with wall or tied to wall lath or furring. Lath on restrained ceilings shall be turned down at junction with wall, or shall be applied to cornerite or corner bead.

3.7.3 Side and End Laps

Side and end laps of metal plaster bases shall be performed in accordance with ASTM C 841 for flat lath and ribbed lath.

3.7.4 Chases and Recesses

Chases and recesses shall be lathed for plastering. Openings over 300 mm wide shall be bridged with furring channels spaced 300 mm on centers. Openings 300 mm wide and less do not need to be bridged. Lath shall extend 75 mm beyond the edges of opening. Lath shall be securely fastened by nailing or tying. Lath shall be securely fastened with nails, screws or wire ties.

3.7.5 Installation of Gypsum Lath

Gypsum lath shall be installed in accordance with ASTM C 841. Spring clips or floating-wall-type attachment may be used in lieu of nails. Lath shall be cut and fitted to allow slight clearance around openings. Horizontal or vertical joints are not acceptable at corners of openings. End joints shall be made over supports. Where clip systems are approved, end joints shall be staggered in alternate courses. End joints shall not coincide with ceiling joints, and shall not occur in the same course on opposite side of support. Internal corners shall be reinforced with cornerites, and external corners shall be reinforced with corner beads. Internal corners of unrestrained ceilings shall not be reinforced with cornerites.

3.8 INSTALLATION OF GYPSUM BASE TO RECEIVE VENEER PLASTER

Gypsum base shall be installed in accordance with ASTM C 844. Base shall be cut and fitted to allow slight clearance around openings. Horizontal or vertical joints are not acceptable at corners of openings. End joints shall be made over supports. Where clip systems are approved, end joints shall be staggered in alternate courses. End joints shall not coincide with ceiling joints, and shall not occur in the same course on opposite side of support. Internal corners shall be reinforced with cornerites, and external corners shall be reinforced with corner beads. Internal corners of unrestrained ceilings shall not be reinforced with cornerites.

3.9 OPENINGS

Reinforcement shall be provided at corners of openings in plastered areas extending 300 mm or more in any dimension by securing striplath diagonally at corners. Striplath shall be at least 150 mm wide by 400 mm long. Shorter lengths shall be used to preclude lapping striplath. Striplath shall be secured to lathing without extending fastenings into or around supporting members. Where plaster is applied directly to concrete or masonry surfaces, striplath shall be secured to the concrete or masonry.

3.9.1 Steel Frames

Steel frames shall be securely attached through built-in anchors to the nearest stud on each side of opening with tie wire, bolts, screws, or welding or bracing where bracing is specified. Steel frames shall be grouted solid with plaster grout and a groove shall be formed within the frame returns to receive lath and plaster.

3.9.2 Wood Frames

Wood frames shall be securely attached to the nearest stud in frame partitions and to wood bucks built into the solid partition. Sizes shall be as indicated for each type and size of wall or partition.

3.9.3 Ceiling Openings

Framing shall be provided for ceiling openings and supplemental supporting members for items mounted in ceiling or attached to ceiling suspension system. Frames for openings shall be secured to lath support members. Frames provided with expanded metal flanges shall be secured to lath. Intermediate structural members shall be provided for attachment or suspension of support members.

3.9.4 Openings in Hollow Partitions

Hollow partition door openings shall be additionally braced by tying together each set of double-jamb studs with not less than four solid metal column clips evenly spaced along each jamb.

3.9.5 Openings in Partitions Not To Structure

Partitions not extending to the structural ceiling or structural supports or frame shall be strengthened at openings with angle bracing from each jamb location anchored to the structural ceiling or supports.

3.9.6 Cross Bracing

Cross bracing between partitions or similar bracing may be substituted for angle bracing as approved. Minor frames such as those required for access panels may be provided with expanded metal flanges which shall be attached to lath.

3.10 INSTALLATION OF TRIM, MOLDINGS, AND ACCESSORIES

Trim, moldings, and accessories shall be installed in standard lengths level and plumb to straight lines and as indicated on drawings. Fastenings shall be spaced not over 300 mm on centers for single-flanged accessories and not over 600 mm on centers on each flange of double-flanged accessories. Items shall be mitered or coped at corners, or prefabricated corners shall be used. Joints in straight runs shall be formed with splice or tie plates.

3.10.1 Base Screeds

Base screeds shall be installed approximately 75 mm above finished floor elevation unless indicated otherwise.

3.10.2 Corner Beads

Corner beads shall be installed in standard lengths at external plastered corners, and shall be secured to furring members or supports.

3.10.3 Omitted

3.10.4 Casing Beads

Casing beads shall be installed at the joints of dissimilar base materials in the same plane and at exposed edges of plaster including junctions of walls and ceilings except that beads shall not be installed at restrained ceilings abutting plastered surfaces. At the perimeter of unrestrained suspended ceilings, the casing bead shall be secured to the ceiling to provide a 10 mm opening between the abutting surfaces. The opening shall be sealed prior to plastering with sealant as specified in Section 07900 JOINT SEALING.

3.10.5 Expansion and Control Joint Beads

Expansion joint beads shall be installed as control joints in plasterwork at the locations indicated. Plaster base shall not be run continuous through control joints. Additional supports shall be installed as required to support the beads.

3.10.6 Trim

Trim shall be installed where indicated and as required to complete the plaster work.

3.11 PLASTER THICKNESS AND SURFACE EVENNESS

Plaster thickness and surface evenness shall be controlled by grounds or screeds of metal, wood, or plaster. Wood grounds are specified under Section 06100 ROUGH CARPENTRY. Plaster thickness shall be as shown.

3.11.1 Grounds and Screeds

Grounds shall be used for securing trim items, and for finished corners and terminations. Screeds shall be installed for base screeds when wood or metal grounds are not required. Temporary screeds shall be installed when permanent screeds or grounds cannot be used. On completion of approved base coats, temporary screeds shall be removed and voids immediately filled with plaster.

3.11.2 Plaster Screeds

Plaster screeds shall be used within the plastered areas to supplement wood and metal grounds and screeds.

3.12 PLASTER GROUT

Plaster grout shall be scratch-coat material mixed to a non-fluid consistency. Plaster grout shall be used to fill steel door frames and partition bases. Grout shall be placed and grooved prior to gypsum lathing operations. Heads and jambs of frames shall be filled solid with grout, and 13 mm deep grooves shall be formed in the grout, while plastic, to receive gypsum lath.

3.13 PROPORTIONS AND MIXING

3.13.1 Portland Cement Plaster Base Coat

Base coat shall be proportioned and mixed in accordance with ASTM C 926 coat C.

3.13.2 Omitted

3.13.3 Omitted

3.13.4 Omitted

3.13.5 Omitted

3.13.6 Portland Cement-Plaster Finish

The finish coat shall be proportioned and mixed in accordance with ASTM C 926, coat F.

3.14 MACHINE APPLICATION

A plastering machine may be used for the application of scratch and brown coats. Plaster for machine application shall be a special plaster compounded and packaged by the manufacturer for this purpose. Slump cone equipment shall be present on the jobsite when base-coat plastering begins, and until completion. Testing of the mix shall be the responsibility of the Contractor, but equipment shall be available for use by the Government. Additional water shall not be added to the mix to allow pumping through extended hose lines to the plastering nozzle. The amount of water added to each batch of plaster shall be that quantity which results in a plaster slump of not more than 75 mm for gypsum and 65 mm for portland cement using a standard plaster slump cone or 150 mm for gypsum and 125 mm for portland cement using a concrete slump cone. Application of plaster shall conform to the provisions of ASTM C 842.

3.15 QUALITY CONTROL

Fluidity or stiffness of plaster shall be tested with a standard 50 x 100 x 150 mm plaster slump testing cone or by a 100 x 200 x 300 mm concrete slump testing cone. Method of making slump test shall be as follows:

a. Place cone on center of dry base plate located on a level, firm surface. Hold cone tightly against plate.

b. Fill the cone with plaster obtained from the hose or nozzle, without air on the nozzle, puddling with tamping rod during the operation to eliminate air bubbles or voids.

c. Screed plaster level with top of cone.

d. Lift cone straight up from base plate in a slow and uniform motion, and place it on the base plate next to plaster sample.

e. Lay a straightedge across top of cone, being careful not to disturb or jostle the plate, and measure the slump in millimeters from the bottom of the straightedge to the top of the plaster sample.

3.16 APPLICATION OF FINISHES

3.16.1 Omitted

3.16.2 Omitted

3.16.3 Omitted

3.16.4 Omitted

3.16.5 Omitted

3.16.6 Portland Cement-Based Plaster

Three-coat portland cement-based plaster shall be applied in accordance with ASTM C 926. The final coat shall be finished to a true and even surface free from rough areas, checks, or blemishes. Nominal plaster finish thickness shall be 20 mm .

3.17 PATCHING

Plaster showing oversanding, cracks, blisters, pits, checks, discoloration or other defects is

not acceptable. Defective plaster work shall be removed and replaced with new plaster at the expense of Contractor. Patching of defective work will be permitted only when approved by the Contracting Officer. Patching shall match existing work in texture and color.

3.18 SAMPLES OF COMPLETED WORK

Samples of completed work may be taken by the Contracting Officer at any time for laboratory inspection and tests to determine conformance.

3.19 INSTALLATION OF GLASS REINFORCED CEMENT COLUMN ENCLOSURES

Manufacturer's Instructions: Comply with manufacturer's written instructions. Scribe and cut units as required for uniform appearance and fit.

a. Tolerances (Installed Units)

Face Width of Joint:	+5 mm
Out of Plane (Unit to Unit):	+6 mm
Warpage or Bowing:	+2 mm

b. Preparation: Upon completion of each individual unit, bed and sand smooth all joints (ready for painting). Comply with manufacturer instructions for finishing of joints.

c. Examine system components for proper fit. Adjust, repair, or replace components not conforming to requirements. Repair or replacement of an individual unit shall be as instructed by the Contracting Officer.

d. Protection: Protect finished work from damage during remainder of construction period. Finished units shall be without damage at time of Government acceptance. Repair all damage at no additional costs.

-- End of Section --

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DIVISION 09 - FINISHES

SECTION 09216

INTEGRAL COLOR VENEER PLASTER

09/99

-- End of Section Table of Contents --

SECTION 09216

INTEGRAL COLOR VENEER PLASTER
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 basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1308	(1987; R: 1993) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D 3363	(1992) Film Hardness by Pencil Test

1.2 GENERAL REQUIREMENTS

Except where otherwise indicated or specified, conform to plaster manufacturer's directions to provide the desired finish. Apply the veneer plaster as a two coat system over gypsum wallboard and gypsum plaster wall surfaces. The extent and location of veneer plaster shall be as shown on the drawings.

1.3 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-03 Product Data

Integral color veneer plaster

Descriptive data and installation instructions.

SD-04 Samples

Integral color veneer plaster; G|AE

Submit 600 mm by 600 mm panels of each finish and color required. Furnish panels of the same materials as the surfaces to which the coating system is to be applied.

1.4 DELIVERY AND STORAGE

Deliver and store plaster materials in the manufacturer's original unopened containers. Store materials off the ground within a completely enclosed structure or enclosed within a weathertight covering. Area to be well ventilated with a minimum temperature of 7 Degrees C .

1.5 SCHEDULING

Commence application only after the area scheduled for veneer plaster work is completely weathertight. The heating, ventilating, and air-conditioning systems shall be complete and in operation prior to application of the plaster. If the mechanical system cannot be activated before veneer plastering is begun, the plastering may proceed in accordance with an approved plan to maintain the environmental conditions specified below. Apply plaster prior to the installation of finish flooring and acoustic ceiling.

1.6 ENVIRONMENTAL REQUIREMENTS

Maintain a continuous uniform temperature of not less than 7 degrees C and not more than 35 degrees C for at least one week prior to the application of veneer plaster, while the plastering is being done, and for at least one week after the plaster is set. Shield air supply and distribution devices to prevent any uneven flow of air across the plastered surfaces. Provide ventilation to exhaust moist air to the outside during plaster application and set, and until plaster is dry. In glazed areas, keep windows open top and bottom or side to side 75 to 100 mm. Openings can be reduced in cold weather. For enclosed areas lacking natural ventilation, provide temporary mechanical means for ventilation. Avoid rapid drying. During periods of low indoor humidity, provide minimum air circulation following plastering and until plaster is dry. Do not apply coatings when relative humidity exceeds 85%, at temperatures less than 3 degrees C above the dew point. Do not apply coatings to damp or wet

surfaces.

1.7 QUALITY ASSURANCE

Provide primers and undercoat materials recommended by the same manufacturer as the finish coats. Contract a company specializing in performing work of this section with a minimum of 3 years commercial experience and 3 projects of similar scope.

PART 2 PRODUCTS

2.1 INTEGRAL COLOR VENEER PLASTER

Wall coating composed of natural fillers and modified cement lime. Conform to the requirements specified below. Miscellaneous items not otherwise specified shall be as recommended by the veneer plaster system manufacturer and approved prior to use.

2.1.1 Plaster Material

Modified seasoned cement lime (calcium hydroxide) with synthetic binders in aqueous solution and boiled linseed oil.

a. Keycoat: Install prior to the polished plaster finish coat, a 20 mils bonding coat of silica sand with gypsum/cement in a polymeric dispersion to provide a mechanical key and to even out suction.

b. Plaster Coats: Three, four or five thin coats of Armourcoat pre-mixed plaster applied in successively thinner layers to a build of 75 to 100 mils in one day. Exact number of coats to specialists requirements.

c. Performance Criteria

1. Flame Spread: Class A-Not greater than 10.

2. Smoke Contribution: Class A-Not greater than 10.

3. Chemical Exposure: ASTM D 1308 passes.

4. Hardness: ASTM D 3363 (highest rating achievable 5-H).

5. Scrub resistance ASTM D 2486 after 10,000 cycles; passes.

2.1.2 Color Pigment

Lightfast, weatherproof pigments as recommended by plaster manufacturer. Pre-mixed colored plaster materials may be provided in lieu of field mixing. Provide marble dust and additional fillers as required to obtain the desired surface effect.

2.1.3 Sealer

Impregnating, penetrating sealer as recommended by plaster manufacturer.

2.2 MIXING

Plaster shall be pre-mixed in aqueous solution, white color or pre-mixed color material, and ready to apply. Add potable water to obtain consistency required for application.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Interior Drywall

Verify that gypsum drywall is taped, sanded, or floated as required to apply finish plaster. Apply primer to wall surface as recommended by the plaster applicator.

3.1.2 Plaster Surfaces

Verify that plaster surface is smooth and clean prior to application of finish plaster.

3.2 APPLICATION

Apply integral color veneer plaster with a stainless steel trowel in 2 cycles (i.e. wet on wet) with a maximum overcoating interval of 9 to 18 meters. The smoothing shall be carried

out before perfectly dry, burnishing repeatedly with a smaller trowel. Keep surfaces constantly wet, especially when the wall base has a high degree of absorption at high temperatures.

3.2.1 Finish and Color

Finish and color to be as indicated on drawings.

3.3 CLEANUP AND PATCHING

Remove plaster splashes from adjacent surfaces. Repair defects in the veneer plaster. Plaster surfaces shall be smooth, clean, and in condition to receive the finishing materials that will be applied.

-- End of Section --

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DIVISION 09 - FINISHES

SECTION 09250

GYPSUM WALLBOARD

04/01

-- End of Section Table of Contents --

SECTION 09250

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 568	(1996) Specification for Steel, Sheet, Carbon and High Strength Low Alloy, Hot Rolled and Cold Rolled, General Requirements for
ASTM A 653	(1996) Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process
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 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
ASTM C 1178/C 1178M	(1999) Glass Mat Water-Resistant Gypsum Backing Panel

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.

1.3 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

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 4 degrees C shall be maintained. During the application of gypsum board with adhesive, a room temperature of not less than 10 degrees C 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 nonloadbearing walls shall conform to ASTM C 645. Studs shall be prefabricated 1.214 mm (18 gage) thick steel, C-shaped, punched web for utility access, G60 hot-dip galvanized after fabrication, or truss?designed studs fabricated of 1.519 mm thick steel angles with a single No. 7 gauge rod forming an open web truss like pattern between flanges with all points contact welded. Maximum spacing, unless noted otherwise, shall be 400 mm o.c.

2.1.2 Runner Tracks

Floor and ceiling runner tracks shall conform to ASTM C 645. Tracks shall be prefabricated, U-shaped with minimum 22 mm flanges, unpunched web, gauge to match studs, G60 hot-dip galvanized after fabrication. Provide double track slip joints where indicated, for deflection requirements. Where indicated, top runner shall allow partition heads to expand and contract with movement of structure above while maintaining continuity of the assembly.

2.1.3 Resilient Steel Furring Channels

Steel Resilient Furring Channels: Manufacturer's standard product designed for STC rating indicated, and to reduce sound transmission, fabricated from steel sheet complying with ASTM A 653 or ASTM A 568 to form 12.7 mm deep channel of the following configuration:

a. Double-Leg Configuration: hat-shaped channel, with 38.1 mm wide face connected to flanges by double-slotted or expanded-metal legs (webs).

2.2 LOADBEARING STUD WALLS

Refer to Section 04220, NON-BEARING MASONRY VENNEER, STEEL STUD WALLS, for exterior stud walls.

2.2.1 Omitted

2.2.2 Omitted

2.2.3 Bridging

Bridging for loadbearing walls shall conform to ASTM C 955. Bridging shall be minimum 19 x 19 mm 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

Main carrying channels and cross furring members for suspended gypsum board ceilings shall conform to ASTM C 645. 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. Pre-engineered system of main vault tees, 40 mm high by 25 mm knurled face with cross tees spaced 200 mm on center, fabricated of hot dip galvanized steel. Cross tees shall be 40mm high with a 40mm wide face. Tees must have quick release cross tee ends to provide positive locking. Furring channels shall be 22 mm by 1200 mm with a 40 mm wide face. Provide with transition clips, splice clips, wall angle moulding, stabilizer bars, and other accessory components to provide the support indicated.

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 on drawngs.

2.4.1 Standard Gypsum Board

Regular gypsum board shall conform to ASTM C 36/C 36M, and shall be 1200 mm 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, 1200 mm wide.

2.4.3 Cementitious Backer Units

Cementitious Backer Units shall comply with ANSI A118.9 and shall be 15 mm (1/2 inch) thick. Provide a vapor barrier to be applied over or behind cementitious board and manufacturer's tape and joint treatment. Fasteners: non-corrosive, lengths as required, by manufacturer to secure to steel framing component.

2.4.4 Water Resistant Gypsum Board

Glass mat water-resistant gypsum backing panels shall conform to ASTM C 1178/C 1178M, shall have a water-resistant cove with water and mold/mildew resistant fiberglass faces imbeddded into cove and shall have square edges 1200 mm wide. Thickness is indicated on the drawings.

2.4.5 Omitted

2.4.6 Omitted

2.4.7 Omitted

2.4.8 Exterior Sheathing Board

Exterior sheathing board is specified in Section 04220, NON-BEARING MASONRY VENEER, STEEL STUD WALLS.

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 and Reveal Joints

Items used to protect edges, corners, and to provide architectural features, including reveal joints, shall be in accordance with ASTM C 1047.

2.6 FASTENINGS AND ADHESIVES

2.6.1 Omitted

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.

2.6.3 Omitted

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 2 x 22 mm 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 1.2 mm diameter. Tie wire for other applications shall be not less than 1.6 mm diameter.

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 3 mm thick or shall be hairpin clip, formed of wire not less than 0.4 mm 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.

PART 3 EXECUTION

3.1 INTERIOR WALL FRAMING

Steel framing and furring members shall be installed in accordance with ASTM C 754. 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 750 mm wide. Studs at openings shall be 0.912 mm (20 gauge) 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, doors over 900 mm wide and extra-heavy doors such as X-ray room doors. Framing shall be secured to floor and to structure above.

3.1.2 Wall Control Joints

Control joints for expansion and contraction in the walls shall be constructed with double studs installed 13 mm apart in interior walls or wall furrings where indicated on drawings. Control joint spacing shall not exceed 9 m. 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 OMITTED

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 1200 mm along runner channels and 900 mm in the other direction or 1050 mm 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 150 mm 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 150 mm 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 300 mm 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 50 mm of parallel walls and beams, and shall be cut 13 mm 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 38 mm 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 15 m in either direction nor more than 230 square meters.

3.3.6.2 Interior Ceilings Without Perimeter Relief

Control joints shall be installed so that linear dimensions between control joints shall not exceed 9 m in either direction nor more than 84 square meters.

3.3.6.3 Exterior Ceilings

Control joints shall be installed so the linear dimensions between control joints shall not exceed 9 m in either direction nor more than 84 square meters.

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. Paragraph 17.3.1 GENERAL of ASTM C 840 which permits usage of water resistant gypsum board as a base for adhesive application of ceramic or plastic tile on ceilings, does not apply. 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 3 m 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. The use of adhesive shall be in accordance with ASTM C 840.

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 as a substrate in all areas to receive ceramic tile and 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.

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DIVISION 09 - FINISHES

SECTION 09310

CERAMIC TILE

07/98

-- End of Section Table of Contents --

SECTION 09310

CERAMIC TILE
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.

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 A108.5	(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 A137.1	(1988) Ceramic Tile

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 33	(1997) Concrete Aggregates
ASTM C 144	(1997) Aggregate for Masonry Mortar
ASTM C 150	(1997) 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	(1990) 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 648	(1998) Breaking Strength of Ceramic Tile
ASTM C 1026	(1987; R 1996) Measuring the Resistance of Ceramic Tile to Freeze-Thaw Cycling
ASTM C 1027	(1984; R 1990) 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

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 99 (1999) Health Care Facilities

TILE COUNCIL OF AMERICA (TCA)

TCA Hdbk (1997) Handbook for Ceramic Tile Installation

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

Drawings

Drawings showing ceramic tile patterns for wall tile with clear indications as to what tile will be installed in each location.

SD-03 Product Data

Tile

Setting-Bed

Mortar and Grout, and Adhesive

Manufacturer's catalog data.

Tile

Mortar and Grout

Manufacturers preprinted installation and cleaning instructions.

SD-04 Samples

Tile

Marble Thresholds

600 x 600 mm square boards mounted showing colors, finish, patterns and form of each type, with joints between tiles grouted.

SD-06 Test Reports

Testing

Copy of results for electrical resistance tests.

SD-07 Certificates

Tile

Mortar and Grout

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 10 degrees C and rising. Temperature shall be maintained above 10 degrees C 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 41 kg and 113 kg 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 for CT-1 and CT-2, and 3.0 max. % for CT-3 and CT-4 in accordance with ASTM C 373. Floor tile shall have a minimum coefficient of friction of 0.60 wet and dry for CT-1 and 0.70 dry / 0.80 wet for CT-1 with abrasive content for use in showers in accordance with ASTM C 1028. Floor tile shall be Class IV-Heavy Traffic, durability classification as rated by the manufacturer when tested in accordance with ASTM C 1027for abrasion resistance as related to foot traffic.

2.1.1 Mosaic Tile CT-1

Ceramic mosaic tile and trim shall be unglazed with cushion edges porcelain unpolished. Tile size shall be 50 x 50 mm. Color shall be as indicated on drawings. Provide preformed ceramic core base to match.

2.1.2 Omitted

2.1.3 Omitted

2.1.4 Glazed Wall Tile - CT-2, CT-3 and CT-4

Glazed wall tile and trim shall be cushion edged with matte glaze. Tile shall be 50 x 50 mm. Color shall be as indicated on drawings. Provide preformed corners and trim pieces to match.

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.

2.3 WATER

Water shall be potable.

2.4 MORTAR AND GROUT

Mortar and grout 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; latex-portland cement grout.

2.4.5 Omitted

2.4.6 Omitted

2.4.7 Omitted

2.4.8 Cementitious Backer Board

Refer to Section 09250, GYPSUM BOARD.

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 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
Latex portland cement mortar	3 mm in 2.4 meters	3.0 mm in 3 meters

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 W244.

3.3.1 Omitted

3.3.2 Latex-Portland Cement Mortar

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.

3.4 INSTALLATION OF FLOOR TILE

Floor tile shall be installed in accordance with TCA Hdbk, method F113. Shower receptors shall be installed in accordance with TCA Hdbk, method B414.

3.4.1 Omitted

3.4.2 Latex-Portland Cement

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.

3.5 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 6 mm in width and shall be grouted full as specified for ceramic tile.

3.7 TESTING

Electrical resistance tests shall be performed on conductive flooring in the presence of the Contracting Officer by a technician experienced in such work and a copy of the test results shall be furnished. Test procedures, testing apparatus, and test results shall be in accordance with the provisions for Conductive Flooring in NFPA 99.

3.8 OMITTED

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. Floor tile with resinous grout or with factory mixed grout shall be cleaned in accordance with instructions of the grout manufacturer. 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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DIVISION 09 - FINISHES

SECTION 09510

ACOUSTICAL CEILINGS

04/01

-- End of Section Table of Contents --

SECTION 09510

ACOUSTICAL CEILINGS
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 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

ENGINEERING TECHNICAL INSTRUCTIONS AND ENERGY SAVINGS ANALYSIS

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 Units

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; G|AE

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 contains 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 Contractor has the option to substitute inch-pound (I-P) Recessed Light Fixtures (RLF) for metric RLF. If the Contractor opts to furnish I-P RLF, other ceiling elements like acoustical ceiling tiles, air diffusers, air registers and grills, shall also be I-P products. 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. If I-P products are used, the Contractor shall be responsible for all associated labor and materials and for the final assembly and performance of the specified work and products. 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 16 degrees C nor more than 29 degrees C 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 plastering, concrete and terrazzo 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

Acoustical units shall conform to EPA requirements. Acoustical units shall conform to ASTM E 1264, Class A, and the following requirements:

2.1.1 Units for Exposed-Grid System ACT-1

Type: III (mineral fiber with painted finish). Type III acoustical units shall have a minimum recycled material content of 68 percent.

Minimum NRC: 0.65 when tested on mounting No. E-400

Pattern: E.

Nominal size: 600 by 600 mm.

Edge detail: Shadow line beveled edge.

Finish: Factory-applied standard finish.

Minimum LR coefficient: 0.82.

Minimum CAC: 40.

2.1.2 Units for Exposed-Grid System ACT-2

Type: XX (high density ceramic-like composition with scrubbable finish). Acoustical units shall have a minimum recycled material content of 45 percent.

Minimum NRC: 0.55 when tested on mounting No. E-400.

Pattern: C.

Nominal size: 600 by 600 mm.

Edge detail: Square.

Finish: Factory-applied standard finish.

Minimum LR coefficient: 0.80.

Minimum CAC: 38.

2.2 SUSPENSION SYSTEM

Suspension system shall be 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 23 mm. Standard corners 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. Suspension system shall have a minimum recycled material contenct of 25 percent.

2.3 HANGERS

Hangers shall be galvanized steel wire. Hangers and attachment shall support a minimum 1330 N ultimate vertical load without failure of supporting material or attachment.

2.4 OMITTED

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 indicated on drawings.

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 75 mm from ends of each length and not more than 400 mm on centers between end fastenings. Wall molding springs shall be provided at each acoustical unit in semi-exposed or concealed systems.

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 5 kg per square m or if required for fire resistance rating.

3.1.4 General

a. Support a maximum area of 1.48 m2 (16 sf) of ceiling per hanger.

b. Prevent deflection in excess of 1/360 of span of cross runner and main runner.

c. Provide extra hangers, minimum of one hanger at each corner of each item of mechanical, electrical and miscellaneous equipment supported by ceiling suspension system not having separate support or hangers.

d. Provide not less than 100 mm (4 inch) clearance from the exposed face of the acoustical units to the underside of ducts, pipe, conduit, secondary suspension channels, concrete beams or joists; and steel beam or bar joist unless furred system is shown.

e. Use main runners not less than 1200 mm (48 inches) in length.

3.1.5 Anchorage to Structure

3.1.5.1 Concrete

a. Install hanger inserts and wire loops required for support of hanger and bracing wire in concrete forms before concrete is placed. Install hanger wires with looped ends through steel deck if steel deck does not have attachment device.

b. Use eye pins or threaded studs with screw-on eyes in existing or already placed concrete structures to support hanger // and bracing // wire. Install in sides of concrete beams or joists at mid height.

3.1.5.2 Steel

a. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels for attachment of hanger wires.

(1) Size and space carrying channels to insure that the maximum deflection specified will not be exceeded.

(2) Attach hangers to steel carrying channels, spaced four feet on center, unless area supported or deflection exceeds the amount specified.

b. Attach hangers to bottom chord of bar joists or to carrying channels installed between the bar joists when hanger spacing prevents anchorage to joist. Rest carrying channels on top of the bottom chord of the bar joists, and securely wire tie or clip to joist.

3.1.6 Direct Hung Suspension System

a. As illustrated in ASTM C 635.

b. Support main runners by hanger wires attached directly to the structure overhead.

c. Maximum spacing of hangers, 1200 mm (4 feet) on centers unless interference occurs by mechanical systems. Use indirect hung suspension system where not possible to maintain hanger spacing.

3.1.7 Indirect Hung Suspension System

a. As illustrated in ASTM C 635.

b. Space carrying channels for indirect hung suspension system not more than 1200 mm (4 feet) on center. Space hangers for carrying channels not more than 2400 mm (8 feet) on center or for carrying channels less than 1200 mm (4 feet) or center so as to insure that specified requirements are not exceeded.

c. Support main runners by specially designed clips attached to carrying channels.

3.1.8 Seismic Ceiling Bracing System

a. Construct system in accordance with ASTM E 580.

b. Connect bracing wires to structure above as specified for anchorage to structure and to main runner or carrying channels of suspended ceiling at bottom.

3.2 CEILING ACCESS PANELS

Ceiling access panels shall be located directly under the items which require access and as indicated on drawings..

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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DIVISION 09 - FINISHES

SECTION 09650

RESILIENT FLOORING

07/96

-- End of Section Table of Contents --

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)

Ref	Title
ASTM D 2047	(1993) Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine
ASTM D 4078	(1992; R 1996) Water Emulsion Floor Polish
ASTM E 648	(1999) Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
ASTM E 662	(1997) Specific Optical Density of Smoke Generated by Solid Materials
ASTM F 510	(1999) Resistance to Abrasion of Resistive Floor Coverings Using An Abrator with a Grip-Feed Method
ASTM F 540	(1998) Squareness of Resilient Floor Tle by Dial Gauage Method
ASTM F 1066	(1999) Vinyl Composition Floor Tile
ASTM F 1303	(1999) Sheet Vinyl Floor Covering with Backing

1.2 FIRE RESISTANCE REQUIREMENTS

Flooring in corridors and exits shall have a minimum average critical radiant flux of 0.45 watts 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-02 Shop Drawings

Resilient Flooring and Accessories

3 sets of drawings showing floor patterns with clear indications as to which product is to be installed at each location. Provide detail drawings of cove base, integral cove base and transition strip installations.

SD-03 Product Data

Resilient Flooring and Accessories

Manufacturer's descriptive data and installation instructions including cleaning and maintenance instructions. Include warranty information.

SD-04 Samples

Flooring

Base and Accessories

Three samples of each indicated color and type of flooring, accessory, transition strip and base. Sample size shall be minimum 50 x 50 mm for flooring, 150 mm for accessories.

SD-06 Test Reports

Resilient Flooring and Accessories

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.

SD-07 Certificates

Resilient Flooring and Accessories

Provide statements attesting to experience and qualifications of installer in ability to installed specified products.

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 21 degrees C 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 21 degrees C and below 38 degrees C for 2 days before application, during application and 2 days after application. A minimum temperature of 13 degrees C 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 5 tiles for each 1000 tiles and 0.5 m square meters for each 92 square meters of sheet flooring installed. Extra materials shall be from the same lot as those installed. Extra base material composed of 6 m of each color shall be furnished.

PART 2 PRODUCTS

2.1 VINYL-COMPOSITION TILE TYPE VCT-1, VCT-2, VCT-3 and VCT-4

Vinyl-composition tile shall conform to ASTM F 1066, Class 2,(through pattern tile), Composition 1, asbestos-free, and shall be 305 mm square and 3.2 mm thick. 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 SHEET VINYL FLOORING TYPE SV-1

Sheet vinyl flooring shall be composed of a homogeneous, vinyl composition. Flooring shall be not less than 18OO mm wide. Sheet vinyl flooring without backing shall meet the overall thickness 2.0 mm, composition, flexibility, indentation, and the solvent resistance requirements of ASTM F 1303, Type II. The solid vinyl color and pattern shall extend through the total thickness of the material. High quality vinyl welding rods for heat welding of joints shall be provided.

2.3 FLEXIBLE TERRAZZO TILE TYPE FTT-1, FTT-2, FTT-3 AND FTT-4 (BID OPTION NO. X)

Flexible terrazzo tie flooring shall be composed of a combination of marble, granite, onyx or glass chips in a polyester resin matrix. Tile shall be 300 mm square and 3.2 mm thick. Resistance to abrasion when tested in accordance with ASTM F 510 (1000 gram load at 500 cycles): volume loss/cubic centimeter 0.0196. Binder resin casting shall have a D / 78 hardness when tested. Coefficient of friction to be 0.70 - 0.74 when tested in accordance with ASTM D 2047. Compressive strength to be 2900 - 5000 pounds per square inch when tested in accordance with ASTM-C109/D695. ASTM F 540, squareness of resilient tile by dial gauge method, .08 mm .

2.4 OMITTED

2.5 OMITTED

2.6 RESILIENT BASE RB-1

Base shall be manufacturers standard rubber coved style. Base shall be 100 mm high and a minimum 3 mm thick. Preformed outside corners shall be furnished.

2.7 INTEGRAL COVED BASE IV-1

A rubber cap strip and vinyl, rubber, or wood fillet strip with a minimum radius of 19 mm shall be provided for integral coved bases as shown.

2.8 OMITTED

2.9 TRANSITION STRIP

A rubber transition strip tapered to meet abutting material shall be provided. Color to match resilient base.

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 and be as recommended by flooring manufacturer.

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 as indicated on drawings.

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 AND FLEXIBLE TERRAZZO 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 INSTALLATION OF SHEET VINYL FLOORING

Sheet vinyl flooring shall be installed with adhesive in accordance with the manufacturer's written installation instructions. Flooring shall be fitted to the room by hand cutting, straight scribing, or pattern scribing as necessary to suit job conditions. Flooring shall be cut to, and fitted around, all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Seams shall be cut by overlapping or underscribing as recommended by the manufacturer. Seams and edges of sheet vinyl flooring in room areas shall be bonded or welded as recommended by the manufacturer. Flooring shall be installed with an integral coved base.

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 OMITTED

3.10 INSTALLATION OF INTEGRAL COVED BASE

Integral coved base shall be formed by extending the flooring material 100 mm onto the wall surface. Cove shall be supported by a plastic, rubber or wood coved filler having a minimum radius of 19 mm. Coved base shall be installed with adhesive in accordance with the manufacturer's written instructions. A vinyl cap strip shall be provided at the top of the base. Voids along the top edge of base at masonry walls shall be filled with caulk.

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, rubber tile and sheet rubber flooring, rubber stair treads, and static control vinyl tile, 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, rubber tile and sheet rubber flooring, rubber stair treads, and static control vinyl tile 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.

-- End of Section --

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DIVISION 09 - FINISHES

SECTION 09680

CARPET

10/00

-- End of Section Table of Contents --

SECTION 09680

CARPET
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 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 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	(1999) Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
ASTM E 662	(1995) Test Method for Specific Optical Density of Smoke Generated by Solid Materials

CARPET AND RUG INSTITUTE (CRI)

CRI 104	(1996) Commercial Carpet Installation Standard

CODE OF FEDERAL REGULATIONS (CFR)

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

GERMANY INSTITUTE FOR STANDARDIZATION (DIN)

DIN 54318	(1986) Machine-Made Textile Floor Coverings; Determination of Dimensional Changes Due to the Effects of Varied Water and Heat Conditions; Identical with ISO 2551 Edition 1981

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

Molding

a. Carpet: Two "Production Quality" samples 450 x 450 mm of each carpet proposed for use, showing quality, pattern, and color specified.

b. Vinyl Moldings: Two pieces of each type at least 300 mm long.

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.

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, shall submit a report stating that the carpet contains recycled materials and indicating the actual percentage of recycled material. Contractor shall, as much as possible, select material manufacturers that reduce pollutant and waste, recycle waste, reuse resources and scrap, and reclaim flooring materials instead of disposing into a landfill. 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 16 degrees C 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 16 degrees C for 2 days before installation, during installation, and for 2 days after installation. A minimum temperature of 13 degrees C 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 ten (10) year wear warranty, two (2) year material and workmanship and ten (10) year tuft bind and delamination.

1.7 EXTRA MATERIAL

Extra material from same dye lot consisting of full width continuous broadloom and uncut carpet tiles shall be provided for future maintenance. A minimum of 5 percent of total square meters of each carpet type, pattern, and color shall be provided.

PART 2 PRODUCTS

2.1 CARPET TYPE CPT-1 AND 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.

2.1.1 Physical Characteristics CPT-1

Carpet shall comply with the following:

a. Recycle Efforts: Use of nylon carpet with backing containing recovered carpet.

b. Carpet Construction: Tufted.

c. Type: Modular tile 500 x 500 mm square with 0.15 percent growth/shrink rate in accordance with DIN 54318.

d. Pile Type: Multilevel loop.

e. Pile Fiber: Commercial 100% branded (federally registered trademark) nylon continuous filament, Type 6,6.

f. Pile or Wire Height: Minimum 3.5 mm in accordance with ASTM D 418.

g. Gauge or Pitch: Minimum 47.2 per 10 cm + 5% in accordance with ASTM D 418.

h. Stitches or Rows/Wires: Minimum 35.4 per 10 cm +/ 5%.

i. Finished Pile Yarn Weight: Minimum 814 g/m^2 + 5%. This does not include weight of backings. Weight shall be determined in accordance with ASTM D 418.

j. Pile Density: Minimum 813.6 kg/m^2.

k. Dye Method: 67% Solution dyed and 33% Yarn (or Skein) dyed.

l. Primary Backing: Primary backing materials shall be those customarily used and accepted by the trade for each type of carpet.

m. Secondary Backing: Fiberglass reinforced composite backing, with a thickness of 2.3 mm +/- 0.23 mm, and a density of 3152.7 grams per square meter +/- 135.6 grams per square meter. Size: 500 x 500 mm. Class I, ASTM E 648. Smoke density < or equal to 450, ASTM E 662. Dimensional stability +/- 0.10%, AACHEN Din 54318.

2.1.2 Physical Characteristics CPT-2

Carpet shall comply with the following:

a. Recycle efforts: Use of nylon carpet with backing containing 100 percent recovered content.

b. Carpet Construction: Tufted.

c. Type: Broadloom border carpet, 1.8 m minimum useable carpet width.

d. Pile Type: Level-loop.

e. Pile Fiber: Commercial 100 percent branded (federally registered trademark) nylon continuous filament, type 6,6.

f. Pile or Wire Height: Minimum 2.2 mm in accordance with ASTM D 418.

g. Gauge or Pitch: 39.4 rows/10 cm.

h. Stitches or Rows/Wires: 36.4 pu/10 cm.

i. Finished Pile Yarn Weight: Minimum 881.4 g/sq m. This does not include weight of backings. Weight shall be determined in accordance with ASTM D 418.

j. Pile Density: 393.5 kg/cu m.

k. Dye Method: Solution dyed.

l. Primary Backing: Primary backing materials shall be those customarily used and accepted by the trade for each type of carpet.

m. Secondary Backing: 100 percent reclaimed content, nylon reinforced polymeric vinyl matrix. Density of minimum 1041 kg/cu m. Width of 1.8 m. Total weight of 3431 g/sq m.

2.1.3 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 3.0 kV when tested at 20 percent relative humidity and 21 degrees C 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 0.45 watts per square centimeter when tested in accordance with ASTM E 648, Class 1.

d. Tuft Bind: Tuft bind force required to pull a tuft or loop free from carpet backing shall be a minimum 40 N 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 440 N/m .

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. Release adhesive for modular tile carpet shall be as recommended by the carpet manufacturer. Adhesives flashpoint shall be minimum 60 degrees C 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 50 mm wide. Color shall match rubber base.

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 as indicated on drawings.

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 pre-applied adhesive 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 1.8 m shall have the carpet laid lengthwise down the corridors.

3.4.2 Modular Tile Installation

Modular tiles shall be installed with release adhesive and shall be snugly jointed together. Tiles shall be laid in the same direction with accessibility to the subfloor where required.

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 600 mm in dimension with more than 0.6 square meters total, shall be provided. Non-retained scraps shall be removed from site and recycled appropriately.

-- End of Section --

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DIVISION 09 - FINISHES

SECTION 09720

WALLCOVERINGS

04/01

-- End of Section Table of Contents --

SECTION 09720

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
ASTM F 793	(1993; R 1998) Standard Classification of Wallcovering by Durability Characteristics

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

Three samples of each indicated type, pattern, and color of wallcovering. Samples of wall covering shall be minimum 125 x 175 mm and of sufficient size to show pattern repeat.

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 16 degrees C for two days prior to installation.

1.4 ENVIRONMENTAL REQUIREMENTS

Areas to receive wallcovering shall be maintained at a temperature above 16 degrees C 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 m of full-width wallcovering for each 30 linear meters of wallcovering installed shall be provided for maintenance.

1.7 BID OPTIONS

1.7.1 Wallcovering

All wallcoverings are part of Bid Opiton No. X.

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 Vinyl Wallcovering Type VW-1 and VW-2.

Vinyl wallcovering shall be a vinyl coated woven or nonwoven fabric with germicidal additives and shall conform to ASTM F 793, Category V Type II,
(425 to 620 kg) total weight per square meter and width of 1346 mm. Tear strength shall be minimum of 82 x 80 (W x F). Backing shall be 100 percent polyester.

2.2 WALL LINER

Wall liner shall be a non-woven polyester cellulose blend having a minimum weight of 0.125 kg/square meter and a total minimum thickness of 0.33 mm. Wall liner 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.

2.3 OMITTED

2.4 OMITTED

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 as indicated on drawings.

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. Plaster surfaces shall age at least 30 days prior to installation of vinyl wallcoverings. Interior surfaces of exterior walls shall not receive

wallcovering. Moisture content of plaster, concrete, and masonry shall be tested with an electric moisture meter and reading shall be not more than 5 percent. Masonry walls shall have flush joints. Concrete and masonry walls shall be coated with a thin coat of joint compound or cement plaster as a substrate preparation. To promote adequate adhesion of wall lining over masonry walls, the walls shall be primed as recommended by the wall lining manufacturer. 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 Wall Lining

Wall lining shall be installed over masonry walls that are to receive wallcovering. Lining shall be installed in accordance with the manufacturer's installation instructions. Lining shall be installed perpendicular to wallcovering to prevent overlapping of seams between lining and wallcovering.

3.3.2 Vinyl and 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.

3.4 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.

-- End of Section --

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DIVISION 09 - FINISHES

SECTION 09840

ACOUSTICAL WALL TREATMENT

05/01

-- End of Section Table of Contents --

SECTION 09840

ACOUSTICAL WALL TREATMENT
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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 423	(1999a) Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
ASTM D 5034	(1995) Breaking Strength and Elongation of Textile Fabrics (Grab Test)
ASTM E 84	(2000a) Surface Burning Characteristics of Building Materials

INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)

ICBO Bldg Code	(1997) Uniform Building Code (3 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 plan locations, elevations and details. Drawings shall include details of method of anchorage, location of doors and other openings, base detail and shape and thickness of materials. Also to indicate panel sizes and seams.

SD-03 Product Data

Installation

Manufacturer's installation instructions and recommended cleaning instructions.

Acoustical Wall Panels

Manufacturer's descriptive data and catalog cuts.

SD-04 Samples

Acoustical Wall Panels

Manufacturer's panel fabric swatches, minimum 300 mm wide by 300 mm long 2 samples of each color range specified.

SD-07 Certificates

Acoustical Wall Panels

Certificates of compliance from an independent laboratory accredited by the National Laboratory Accreditation Program of the National Institute of Standards. A label or listing from the testing laboratory will be acceptable evidence of compliance.

1.3 DELIVERY AND STORAGE

Materials delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variations, dirt, dust, or other contaminants.

1.4 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

PART 2 PRODUCTS

2.1 FABRIC COVERED ACOUSTICAL WALL PANELS

Acoustical wall panels shall consist of prefinished factory assembled, seamless fabric covered, fiber glass or mineral fiber core system as described below. Wall panels shall be manufactured to the dimensions and configurations shown on the approved detail drawings. Perimeter edges shall be reinforced by either an aluminum frame or a formulated resin edge hardener. Acoustical wall panels installed in non-sprinklered areas must comply with the requirements of ICBO Bldg Code, Standard 42-2.

a. Panel Width: Panel width shall be as indicated on drawings.

b. Panel Height: Panel height shall be as indicated on drawings.

c. Thickness: 25 mm.

d. Fabric Covering: Seamless woven 58 percent polyester, 42% polypropylene, minimum 0.62 kg per linear meter. Tear strength shall be minimum 133 N. Tensile strength shall be 890 N min. warp and 445 N min. fill minimum in accordance with ASTM D 5034. Fabric covering shall be stretched free of wrinkles and then bonded to the edges and back or bonded directly to the panel face, edges, and back of panel a minimum distance standard with the manufacturer. Light fastness (fadeometer) shall be approximately 40 hours in accordance with AATCC TM 16.

e. Fire rating for the complete composite system: Class A, 200 or less smoke density and flame spread less than 25, when tested in accordance with ASTM E 84.

f. Substrate: Fiber glass or mineral fiber.

g. Noise Reduction Coefficient (NRC) Range: 0.80-0.90 ASTM C 423.

h. Edge Detail: Square edge.

i. Core Type: Standard acoustical medium density, 96 to 112 kg/m3 core.

j. Mounting: Acoustical panels shall be mounted by manufacturer's standard mechanical fasteners.

k. Color: Color shall be as indicated on drawings.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

Walls shall be clean, smooth, oil free and prepared in accordance with panel manufacturer's instructions. Installation shall not begin until all wet work, such as, plastering, painting, and concrete are completely dry.

3.2 INSTALLATION

Panel installation shall be by personnel familiar with and normally engaged in installation of acoustical wall panels. Panels shall be applied in accordance with the manufacturer's installation instructions.

3.3 CLEANING

Following installation, dirty or stained panel surfaces shall be cleaned in accordance with manufacturer's instructions and left free from defects. Panels that are damaged, discolored, or improperly installed shall be removed and new panels provided as directed.

-- End of Section --

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DIVISION 09 - FINISHES

SECTION 09900

PAINTING, GENERAL

07/92

-- End of Section Table of Contents --

SECTION 09900

PAINTING, GENERAL
07/92

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 CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH Limit Values	(1999) Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 150	(1998a) Portland Cement
ASTM D 3273	(1994) Resistance to Growth of Mold on the Surface of Interior Coating in an Environmental Chamber
ASTM D 3274	(1995) Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation
ASTM D 4258	(1999) Surface Cleaning Concrete for Coating

COMMERCIAL ITEM DESCRIPTIONS (CID)

CID A-A-1500	(Rev A; Notice 1) Sealer, Surface (Latex Block Filler)
CID A-A-1546	(Rev A; Canc. Notice 1)) Rubbing Varnish
CID A-A-2246	(Rev B) Paint, Latex
CID A-A-2247	(Basic) Paint, Latex (Semigloss, Interior)
CID A-A-2248	(Basic) Paint, Latex, (Flat, Interior)
CID A-A-2994	Primer Coating, Interior, for Walls and Wood

FEDERAL SPECIFICATIONS (FS)

FS TT-C-555	(Rev B; Am 1) Coating, Textured (for Interior and Exterior Masonry Surfaces)

FS TT-E-2784	(Rev A) Enamel (Acrylic-Emulsion, Exterior Gloss and Semigloss) (Metric)
FS TT-P-19	(Rev. D; Am. 1) Paint, Latex (Acrylic Emulsion, Exterior Wood and Masonry)
FS TT-P-645	(Rev. B) Primer, Paint, Zinc-Molybdate, Alkyd Type
FS TT-S-708	(Rev A; Am 2; Notice 1) Stain, Oil; Semi-Transparent, Wood, Exterior
FS TT-S-001992	(Basic; Notice 1) Stain, Latex, Exterior for Wood Surfaces

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 23	(1991) Latex Primer for Steel surfaces
SSPC SP 1	(1982) Solvent Cleaning
SSPC SP 2	(1995) Hand Tool Cleaning
SSPC SP 3	(1995) Power Tool Cleaning
SSPC SP 7/NACE 4	(1994) Brush-Off Blast Cleaning

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

Paint

The names, quantity represented, and intended use for the proprietary brands of materials proposed to be substituted for the specified materials regardless of quantities in states where VOC content limitations apply. In conjunction with data, provide detailed schedule of location of each type of paint provided.

Mixing and Thinning

Application

Manufacturer's current printed product description, material safety data sheets (MSDS) and technical data sheets for each coating system. Detailed mixing, thinning and application instructions, minimum and maximum application temperature, and curing and drying times between coats for epoxy, moisture-curing polyurethane, and liquid glaze coatings. Detailed application instructions for textured coatings shall be provided.

SD-04 Samples

Moisture-Curing Polyurethane

A complete moisture-curing polyurethane system applied to a panel of the same material as that on which the coating will be applied in the work and for each color specified. The sample panels will be used for quality control in applying the system.

Paint

While the material is at the site or source of supply, and at a time agreeable to the Contractor and the Contracting Officer, a 1 liter sample of each color and batch, except for quantities of 200 liters or less, shall be taken by random selection from the sealed containers by the Contractor in the presence of a representative of the Contracting Officer. The contents of the containers to be sampled shall be thoroughly mixed to ensure that the sample is representative. Samples shall be identified by designated name, specification number, manufacturer name and address, batch number, project contract number, intended use, and quantity involved.

SD-06 Test Reports

Paint

A statement as to the quantity represented and the intended use, plus the following test report for batches in excess of 200 L:

a. A test report showing that the proposed batch to be used meets specified requirements:

b. A test report showing that a previous batch of the same formulation as the batch to be used met specified requirements, plus, on the proposed batch to be used, a report of test results for properties of weight per liter, viscosity, fineness of grind, drying time, color, and gloss.

SD-07 Certificates

Lead

Mildewcide and Insecticide

Volatile Organic Compound (VOC) Content

Certificate stating that paints for interior use contain no mercurial mildewcide or insecticide. Certificate stating that paints proposed for use contain not more than 0.06 percent lead by weight of the total nonvolatile. Certificate stating that paints proposed for use meet Federal VOC regulations and those of the of the local Air Pollution Control Districts having jurisdiction over the geographical area in which the project is located.

1.3 PACKAGING, LABELING, AND STORING

Paints shall be in sealed containers that legibly show the designated 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 of manufacturer.

Pigmented paints shall be furnished in containers not larger than 20 liters. Paints and thinner 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 4 and 35 degrees C. Paints shall be stored on the project site or segregated at the source of supply sufficiently in advance of need to allow 30 days for testing.

1.4 APPROVAL OF MATERIALS

When samples are tested, approval of materials will be based on tests of the samples; otherwise, materials will be approved based on test reports furnished with them. If materials are approved based on test reports furnished, samples will be retained by the Government for testing should the materials appear defective during or after application. In addition to any other remedies under the contract the cost of retesting defective materials will be at the Contractor's expense.

1.5 ENVIRONMENTAL CONDITIONS

Unless otherwise recommended by the paint manufacturer, the ambient temperature shall be between 7 and 35 degrees C when applying coatings other than water-thinned, epoxy, and moisture-curing polyurethane coatings. Water-thinned coatings shall be applied only when ambient temperature is between 10 and 32 degrees C. Epoxy, and moisture-curing polyurethane coatings shall be applied only within the minimum and maximum temperatures recommended by the coating manufacturer. Moisture-curing polyurethane shall not be applied when the relative humidity is below 30 percent.

1.6 SAFETY AND HEALTH

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 the CONTRACT CLAUSES. 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.

1.6.1 Worker Exposures

Exposure of workers to hazardous chemical substances shall not exceed limits established by ACGIH Limit Values, or as required by a more stringent applicable regulation.

1.6.2 Toxic Compounds

Toxic products having ineffective physiological warning properties, such as no or low odor or irritation levels, shall not be used unless approved by the Contracting Officer.

1.6.3 Training

Workers having access to an affected work area shall be informed of the contents of the applicable material data safety sheets (MDSS) and shall be informed of potential health and safety hazard and protective controls associated with materials used on the project. An affected work area is one which may receive mists and odors from the painting operations. Workers involved in preparation, painting and clean-up shall be trained in the safe handling and application, and the exposure limit, for each

material which the worker will use in the project. Personnel having a need to use respirators and masks shall be instructed in the use and maintenance of such equipment.

1.6.4 Coordination

Work shall be coordinated to minimize exposure of building occupants, other Contractor personnel, and visitors to mists and odors from preparation, painting and clean-up operations.

PART 2 PRODUCTS

2.1 PAINT

The term "paint" as used herein includes emulsions, enamels, paints, stains, varnishes, sealers, cement-emulsion filler, and other coatings, whether used as prime, intermediate, or finish coat. Paint shall conform to the requirements listed in the painting schedules at the end of this section, except when the required amount of a material of a particular batch is 200 liters or less, an approved first-line proprietary paint material with similar intended formulation, usage and color to that specified may be used. Additional requirements are as follows:

2.1.1 Colors and Tints

Colors shall be as selected from manufacturer's standard colors, as indicated. Manufacturer's standard color is for identification of color only. Tinting of epoxy and urethane paints shall be done by the manufacturer. Stains shall conform in shade to manufacturer's standard color. The color of the undercoats shall vary slightly from the color of the next coat.

2.1.2 Mildewcide and Insecticide

Paint specified for all coats applied to fabrics and vapor barrier jackets over insulation and surfaces in toilet and shower area shall contain a mildewcide that will not adversely affect the color, texture, or durability of the coating. The mildewcide shall be incorporated into the paint by the manufacturer and shall attain a surface disfigurement rating of 8 or greater when tested in accordance with ASTM D 3273 and evaluated in accordance with ASTM D 3274. Mercurial mildewcide shall not be used in interior paint. Insecticides shall not be used in paint.

2.1.3 Lead

Paints containing lead in excess of 0.06 percent by weight of the total nonvolatile content (calculated as lead metal) shall not be used.

2.1.4 Chromium

Paints containing zinc chromate or strontium chromate pigments shall not be used.

2.1.5 Volatile Organic Compound (VOC) Content

Paints shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards and shall conform to the restrictions of the local air pollution control authority.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS NOT TO BE PAINTED

Items not to be painted which are in contact with or adjacent to painted surfaces shall be removed or protected prior to surface preparation and painting operations. Items removed prior to painting shall be replaced when painting is completed. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Surfaces contaminated by coating materials shall be restored to original condition. In rooms without a finished ceiling, as indicated on the drawings, exposed structure and ductwork do not require a finished coat of paint.

3.2 SURFACE PREPARATION

Surfaces to be painted shall be clean and free of foreign matter 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.

3.2.1 Concrete, Stucco and Masonry Surfaces

Concrete, stucco and masonry surfaces shall be allowed to dry at least 30 days before painting, except concrete slab on grade which shall be allowed to cure 90 days before painting. Surfaces shall be cleaned in accordance with ASTM D 4258. Glaze, efflorescence, laitance, dirt, grease, oil, asphalt, surface deposits of free iron and other foreign matter shall be removed prior to painting. Surfaces to receive polyurethane or epoxy coatings shall be acid-etched or mechanically abraded as specified by the coating manufacturer, rinsed with water, allowed to dry, and treated with the manufacturer's recommended conditioner prior to application of the first coat.

3.2.2 Ferrous Surfaces

Ferrous surfaces including those that have been shop-coated, shall be solvent-cleaned or detergent-washed in accordance with SSPC SP 1. Surfaces that contain loose rust, loose mill scale, and other foreign substances shall be cleaned mechanically with hand tools according to SSPC SP 2, power tools according to SSPC SP 3 or by sandblasting according to SSPC SP 7/NACE 4. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.

3.2.3 Nonferrous Metallic Surfaces

Galvanized, aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces shall be solvent-cleaned or detergent-washed in accordance with SSPC SP 1.

3.2.4 Gypsum Board Surfaces

Gypsum board surfaces shall be dry and shall have all loose dirt and dust removed by brushing with a soft brush, rubbing with a 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.

3.2.5 Mastic-Type Surfaces

Mastic-type surfaces shall be prepared by removing foreign material.

3.2.6 Plaster Surfaces

Plaster shall age at least 30 days before painting. Plaster shall be clean and free from loose matter and shall have an instrument-measured moisture content not exceeding 8 percent.

3.2.7 Wood Surfaces

Wood surfaces shall be cleaned of foreign matter. Moisture content of the wood shall not exceed 12 percent as measured by a moisture meter, unless otherwise authorized. Wood surfaces adjacent to surfaces to receive water-thinned paints shall be primed and/or touched up before applying water-thinned paints. Small, dry seasoned knots shall be scraped, cleaned, and given a thin coat of commercial knot sealer, before application of the priming coat. Pitch on large, open, unseasoned knots and all other beads or streaks of pitch shall be scraped off, or, if it is still soft, removed with mineral spirits or turpentine, and the resinous area shall be thinly coated with knot sealer. Finishing nails shall be set, and all holes and surface imperfections shall be primed. After priming, holes and imperfections in finish surfaces shall be filled with putty or plastic wood filler, colored to match the finish coat if natural finish is required, allowed to dry, and sanded smooth. Putty or wood filler shall be compatible with subsequent coatings.

3.2.7.1 Interior Wood Stain

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.

3.3 MIXING AND THINNING

When thinning is approved as necessary to suit surface, temperature, weather conditions, or application methods, paints may be thinned in accordance with the manufacturer's directions. When thinning is allowed, paints shall be thinned immediately prior to application with not more than 0.125 L of suitable thinner per liter. 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.

3.3.1 Cement-Emulsion Filler Coat

Cement and aggregate shall be dry-mixed so that uniform distribution and intermixing are obtained. Mixing liquid and one-half of the total amount of water shall be premixed and added gradually to the white portland cement and aggregate with constant stirring until a thick, smooth material is obtained. Emulsion paint shall then be added to the mixture and stirred until uniformity is obtained. The blend shall have a thick, creamy consistency. The remainder of the water shall be added if necessary to obtain a material with adequate application properties. Blending resin emulsion or emulsion paint with any other component shall be done with

caution; too rapid an agitation will cause air entrapment and foaming.

3.3.2 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.

3.4 APPLICATION

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application. 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. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. 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. Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

3.4.1 Ventilation

Affected areas shall be ventilated during paint application so that workers exposure to chemical substances shall not exceed limits as established by ACGIH Limit Values, or as required by a more stringent applicable regulation. Interior work zones having a volume of 280 cubic meters or less shall be ventilated at a minimum of 2 air exchanges per hour. Ventilation in larger work zones shall be maintained by means of mechanical exhaust. Solvent vapors shall be exhausted outdoors, away from air intakes and workers. Return air inlets in the work zone shall be temporarily sealed before start of work until the coatings have dried.

3.4.2 Respirators

Operators and personnel in the vicinity of operating paint sprayers shall wear respirators.

3.4.3 First Coat

The first coat on plaster, gypsum wallboard, and other surfaces shall include repeated touching up of suction spots or overall application of primer or sealer to produce uniform color and gloss. Excess sealer shall be wiped off after each application. The first coat on both faces of wood doors shall be applied at essentially the same time. Glazed doors and sashes shall be given the specified coating system within 3 weeks of the time they are glazed, but not before the glazing material has set; paint shall overlay glass about 1.78 mm all around. Each varnish coat shall be sanded lightly prior to application of subsequent coats.

3.4.4 Timing

Surfaces that have been cleaned, pretreated, and otherwise prepared for

painting shall be given a coat of the specified first coat as soon as practical after such pretreatment has been completed, but prior to any deterioration of the prepared surface. Sufficient time shall elapse between successive coats to permit proper drying. This period shall be modified as necessary to suit weather conditions. Oil-based or oleoresinous solvent-type paints shall be considered dry for recoating when the paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and the application of another coat of paint does not cause the undercoat to lift or lose adhesion. Manufacturer's instructions for application, curing and drying time between coats of two-component systems shall be followed.

3.4.5 Stains

Stain shall be applied at the rate specified in the manufacturer's printed directions. Oil-type stain shall be applied by brushing with the grain for the full length of the board or course of siding.

3.4.6 Fillers

Concrete and masonry surface voids shall be filled; however, surface irregularities need not be completely filled. The dried filler shall be uniform and free of pinholes. Filler shall not be applied over caulking compound.

3.4.6.1 Cement-Emulsion Filler

Immediately before filler application, surfaces shall be dampened uniformly and thoroughly, with no free surface water visible, by several applications of potable water with a fog spray, allowing time between the sprayings for water to be absorbed. Cement-emulsion filler shall be scrubbed into the surface vigorously with a stiff-bristled brush having tampico or palmyra bristles not longer than 63 mm. At least 24 hours shall elapse before applying exterior emulsion paint over cement-emulsion filler. When the ambient temperature is over 29 degrees C, cement-emulsion filler surfaces shall be dampened lightly with a fog spray of potable water immediately prior to application of the subsequent paint coat.

3.4.6.2 Latex Filler

Latex filler, CID A-A-1500, shall be applied according to the manufacturer's instructions. Surface voids shall be filled and excess filler shall be removed from the surface with a rubber squeegee. The filler shall be allowed to dry the length of time specified by the manufacturer prior to applying successive coats of paint.

3.4.7 Omitted

3.4.8 Ferrous-Metal Primer

Primer for ferrous-metal shall be applied to ferrous surfaces to receive paint other than asphalt varnish prior to deterioration of the prepared surface. 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.

3.5 OMITTED

3.6 MISCELLANEOUS PAINTING

3.6.1 Lettering

Lettering shall be provided as scheduled on the drawings, shall be block or Gothic type, and shall be water-type decalcomania, finished with a protective coating of spar varnish. Samples shall be approved before application.

3.6.2 Fire Rating Lettering

Provide lettering at Room 212, Gas Storage. Label both sides of the interior walls above the ceiling or at 2400 mm above finish floor with the following: "2-Hour Fire-Rated Enclosure."

3.7 SURFACES TO BE PAINTED

Surfaces listed in the painting schedules at the end of this section, other than those listed in paragraph SURFACES NOT TO BE PAINTED, shall be painted as scheduled.

3.8 SURFACES NOT TO BE PAINTED

Surfaces in the following areas shall not to be painted: ductwork, interior insulated piping and areas above finished ceiling. In addition, surfaces of hardware, fittings, and other factory finished items shall not be painted.

3.9 CLEANING

Cloths, cotton waste and other debris that might constitute a fire hazard shall be placed in closed metal containers and removed at the end of each day. Upon completion of the work, staging, scaffolding, and containers shall be removed from the site or destroyed in an approved manner. Paint and other deposits on adjacent surfaces shall be removed and the entire job left clean and acceptable.

3.10 PAINTING SCHEDULES

The following painting schedules identify the surfaces to be painted and prescribe the paint to be used and the number of coats of paint to be applied. Contractor options are indicated by ------or------ between optional systems or coats.

EXTERIOR PAINTING SCHEDULE

Surface	First Coat	Second Coat	Third Coat
Concrete masonry units.	Cement-emulsion filler	FS TT-E-2784 Type III	None

NOTE: Cement-emulsion filler coat shall be acrylic-based and shall consist of the following ingredients in the proportion stated: white portland cement, ASTM C 150, Type I, 7.5 kg; aggregate 15 kg; mixing liquid, factory-prepared acrylic containing 46 to 47 percent solids, 3 liters; potable water 4 liters maximum; exterior emulsion paint, FS TT-E-2784 Type III 4 liters. Aggregate shall consist of Washed silica sand of the

EXTERIOR PAINTING SCHEDULE

Surface following gradation:	First Coat	Second Coat	Third Coat
	U.S. Sieve Size	Percent Sand (by Weight) Passing Individual Sieve	
	0.850 mm (20)	100	
	0.600 mm (30)	95 - 100	
	0.300 mm (50)	30 - 65	
	0.150 mm (100)	0 - 10	
	0.075 mm (200)	0 - 1	
Concrete, unless otherwise specified.	FS TT-E-2784 Type III	FS TT-E-2784 Type III	None
Stucco.	FS TT-E-2784 Type III	FS TT-E-2784 Type III	None
	Primer as recommended by FS TT-C-555 manufacturer	FS TT-C-555 Type II	None
Wood: stain finish.	FS TT-S-708	None	None
	FS TT-S-001992 Class B	FS TT-S-001992 Class B	None
Ferrous metal unless otherwise specified	FS TT-P-645	FS-TT-E-509	
Galvanized metal and exterior above-ground piping, HVAC equipment and exterior pipe supports	FS TT-E-2784 Type III	FS TT-E-2784 Semigloss	FS TT-E-2784 Semigloss
Aluminum aluminum-alloy, and other non-ferrous metal	FS TT-P-19	FS TT-P-19	FS TT-P-19

EXTERIOR PAINTING SCHEDULE

Surface	First Coat	Second Coat	Third Coat

INTERIOR PAINTING SCHEDULE

Surface	First Coat	Second Coat	Third Coat
Gypsum board, concrete, and concrete masonry units not requiring a not requiring a smooth finish, unless otherwise specified	CID A-A-2994 Type II	CID A-A-2246	CID A-A-2246
Concrete masonry units requiring a smooth finish	CID A-A-1500	CID A-A-2994 Type II	CID A-A-2246 -----or----- CID A-A-2247 -----or----- CID A-A-2248
Gypsum board: in restrooms, unless otherwise specified.	CID A-A-2994 Type II	FS TT-E-2784 Semigloss	FS TT-E-2784 Semigloss
Gypsum board: in shower areas, and areas requiring a high degree of sanitation, unless otherwise specified.	CID A-A-2994 Type II	FS TT-E-2784 Semigloss	FS TT-E-2784 Semigloss
Concrete masonry units, plaster, and gypsum board: for walls in heavy traffic areas in space as follows:	CID A-A-1500	CID A-A-2994 Type II	CID A-A-2246 -----or------ CID A-A-2247

INTERIOR PAINTING SCHEDULE

Surface	First Coat	Second Coat	Third Coat
Gypsum board; areas scheduled to receive epoxy coating	As recommended by manufacturer *	Waterborne Epoxy-polyamide Gloss (0.7 mm)	Waterborne Epoxy-polyamide gloss (0.7 mm)
Ferrous Metal unless otherwise specified	FS TT-P-645		
		FS TT-E-2784 (Semigloss)	FS TT-E-2784 (Semigloss)
*1 Aluminum and aluminum alloy unless otherwise specified.	~~CID A-A-2867~~ FS TT-E-2784 Type III	~~CID A-A-2867~~ FS TT-E-2784 Type I	~~None~~ FS TT-E-2784 Type I
Ferrous metal factory-primed mechanical and electrical equipment.	Two coats of paint as recommended by the equipment manufacturer		None
Galvanized metal:	FS TT-E-2784 Type III	Two coats of paint to match adjacent area.	
Wood: unless otherwise specified.	CID A-A-2994 Type I	CID A-A-2246 or CID A-A-2247 or CID A-A-2248	None None None
Wood: stain and varnish finishes as follows: trim, chair rails	Commercially available stain	FS-TT-V-121 In addition a fourth coat of FS-TT-V-121	FS-TT-V-121

INTERIOR PAINTING SCHEDULE

Surface *1	First Coat	Second Coat	Third Coat
~~CID A-A-2339~~		~~CID A-A-2834 Type I~~	~~CID A-A-2834 Type I~~
		~~In addition a fourth coat of CID A-A-2834 Type I~~	
Wood: natural finish	CID A-A-1546	CID A-A-1546	CID A-A-1546
Ferrous Metal: Convector enclosures, electrical conduit runs: metallic tubing uninsulated ducts and pipes, pipe hangers, louvers, grilles, and air outlets, in areas having painted adjacent surfaces.	SSPC Paint 23	None	None
Aluminum and Galvanized Surface Metal: Convector enclosures, electrical conduit runs metallic tubing uninsulated ducts and pipes, pipe hangers, louvers, grilles, and air outlets, in areas having painted adjacent surfaces.	FS TT-E-2784	CID A-A-2246 or CID A-A-2247 or CID A-A-2248	CID A-A-2246 or CID A-A-2247 or CID A-A-2248

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SECTION TABLE OF CONTENTS

DIVISION 10 - SPECIALTIES

SECTION 10160

TOILET PARTITIONS

07/98

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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

Samples shall be of sufficient size to show patterns, color ranges, and types, as applicable, of the material proposed to be used.

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 C, ceiling overhead braced.

Width, length, and height of toilet enclosures shall be as shown. Finish surface of panels shall be laminated plastic, Finish 3. Panels indicated to receive toilet paper holders or grab bars as specified in Section 10800 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 1112 N . Grab bars shall not rotate within their fittings.

2.2 OMITTED

2.3 OMITTED

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 as indicated on drawings.

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. Where indicated, anchorage to walls shall be by through-bolting. Drilling and cutting for installation of anchors shall be at locations that will be concealed in the finished work.

3.1.1 Ceiling Hung Pilasters

Ceiling hung pilasters shall be designed for bolting to the overhead structural support through an integrally welded split channel or cross bar leveling device mounted on two stud bolts. Method of mounting shall be manufacturer's standard. One stud bolt shall be located at the jamb edge of wall pilasters.

3.2 ADJUSTING AND CLEANING

Doors shall have a uniform vertical edge clearance of approximately 5 mm 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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DIVISION 10 - SPECIALTIES

SECTION 10191

CUBICLE TRACK AND HARDWARE

09/99

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SECTION 10191

CUBICLE TRACK AND HARDWARE
09/99

PART 1 GENERAL

1.1 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Item A5180A, Cubicle track layout

SD-08 Manufacturer's Instructions

Item A5180A, Cubicle track installation

SD-10 Operation and Maintenance Data

Item A5180A, Surface Mounted Cubical Track, Data Package 1

Submit operation and maintenance data.

1.2 DRAWING REQUIREMENTS

Submit cubicle track layout drawings. Include ceiling, surface-mounted installation details and overlay drawing showing other trades installation within area.

1.3 DELIVERY AND STORAGE

Deliver cubicle tracks to site in unopened containers clearly labeled with manufacturer's name and contents. Store in safe, dry, and clean location. Do not open containers until contents are to be installed.

1.4 QUALITY CONTROL

Allow smooth, rapid, and complete screening with no gaps at corners or ends of track. The track of a standard 2400 by 2400 mm cubicle shall have no joints. Form corner bends in a single continuous piece on a 300 mm radius to exactly 90 degrees. Other track lengths to 4800 mm shall have no joints.

PART 2 PRODUCTS

2.1 MATERIALS AND COMPONENTS

2.1.1 Item A5180A, Surface Mounted Cubical Track

Cubical track, surface mounted: Extruded aluminum track, self lubricating carriers, and beaded drop chain hooks; removable end caps. Size and configuration as indicated on drawings. Crest model series 9005 meets this specification.

2.1.2 Cuticle Track and Carrier Unit

Heavy duty type, ceiling surface mounted. Bends: minimum 457 mm (18 inches) radius.

2.1.3 Curtain

Not a part of this contract.

2.2 CARRIER UNIT

Silent type with double canted wheel carrier. Wheels shall have nylon on stainless steel chromium plated steel hooks with swivel to support the curtain. Carriers shall be removable only through access aperture or through end-cap that provides room for insertion or removal of carrier. Provide 2.2 carriers for every 300 mm of track length, plus one additional carrier. Provide a safety loading unit at one end of the channel track consisting of a section of channel track equipped with a hinge and end latch to permit lowering for installation of or removal of curtains from hooks without the use of a step-ladder and without removing carriers

from track. Rivet moveable end of safety loading unit to be riveted to the hinge. Latching end of safety loading unit with a double locking fail-proof locking device for safety. Safety loading unit to be 1200 mm in length of an 2400 mm ceiling installation so latch end lowers to 1200 mm from floor, for installation or removal of curtain without the use of a step-ladder. Increase length of safety loading unit to be increased according to ceiling height. Provide a key wand for every 20 units.

2.3 END STOP AND PULL-OUT

Fabricate from aluminum or nylon with an anodized finish matching the track finish.

2.4 FASTENERS

Stainless steel.

2.5 FINISH

Satin, clear anodized.

PART 3 EXECUTION

3.1 INSTALLATION

Verify dimensions prior to installation. Install cubicle track after painting and finishing operations are complete. Provide labor and all materials indicated, specified or necessary for a complete finished installation. Install track plumb, level and true, and securely anchored to the ceiling to form a neat, rigid installation. Remove damaged or defective components and replace with new components.

3.1.1 Installation Details

Install heavy-duty cubicle tracks ceiling surface mounted. Install cubicle tracks where indicated. Install carrier units at 150 mm on center maximum. Install end cap at each end of the track and pull-out at the end where curtains are stacked to permit insertion and removal of carrier units. Securely fasten end stops to prevent their being forced out by striking weight of carrier units.

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DIVISION 10 - SPECIALTIES

SECTION 10201

METAL WALL LOUVERS

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SECTION 10201

METAL WALL LOUVERS
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.

THE ALUMINUM ASSOCIATION, INCORPORATED (AA)

AA 45	(1980) Aluminum Finishes

AIR MOVEMENT AND CONTROL ASSOCIATION, INC. (AMCA)

AMCA 500	(1991) Louvers, Dampers and Shutters
AMCA 511	(1991) Certified Ratings Program for Air Control Devices

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 653/A 653M	(1998) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B 209M	(1995) Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B 221M	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)

1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Wall louvers

Show all information necessary for fabrication and installation of louvers. Indicate materials, sizes, thicknesses, fastenings, and profiles.

SD-04 Samples

Wall louvers

Colors of finishes shall closely approximate colors indicated. Where color is not indicated, submit the manufacturer's standard colors to the Contracting Officer for selection.

1.3 DELIVERY, STORAGE, AND PROTECTION

Deliver materials to the site in an undamaged condition. Carefully store materials off the ground to provide proper ventilation, drainage, and protection against dampness. Louvers shall be free from nicks, scratches, and blemishes. Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Galvanized Steel Sheet

ASTM A 653/A 653M, coating designation Z275.

2.1.2 Aluminum Sheet

ASTM B 209M, alloy 3003 or 5005 with temper as required for forming.

2.1.3 Extruded Aluminum

ASTM B 221M, alloy 6063-T5 or -T52.

2.2 METAL WALL LOUVERS

Weather resistant type, with bird screens (exterior mounted) and made to withstand a wind load of not less than 1.44 kilopascals. Wall louvers shall bear the AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500 and AMCA 511. The rating shall show a water penetration of 0.06 kilograms or less per square meter of free area at a free velocity of 244 meters per minute.

2.2.1 Extruded Aluminum Louvers

Fabricated of extruded 6063-T5 or -T52 aluminum with a wall thickness of not less than 2 mm.

2.2.2 Formed Metal Louvers

Formed of zinc-coated steel sheet not thinner than 16 U.S. gage, or aluminum sheet not less than 2 mm thick.

2.2.3 Mullions and Mullion Covers

Same material and finish as louvers. Provide mullions where indicated. Provide mullions covers on both faces of joints between louvers.

2.2.4 Screens and Frames

For aluminum louvers, provide 12.5 mm square mesh, 1.8 or 1.5 mm aluminum or 6 mm square mesh, 1.5 mm aluminum bird screening. For steel louvers, provide 12.5 mm square mesh, 2.5 or 1.5 mm zinc-coated steel; 12.5 mm square mesh,1.5 mm copper; or 6 mm square mesh, 1.5 mm thick zinc-coated steel or copper bird screening. Mount screens in removable, rewirable frames of same material and finish as the louvers. Mount on exterior side of louver to prohibit birds nesting between louver blades.

2.3 OMITTED

2.4 FASTENERS AND ACCESSORIES

Provide stainless steel screws and fasteners for aluminum louvers and zinc-coated or stainless steel screws and fasteners for steel louvers. Provide other accessories as required for complete and proper installation.

2.5 FINISHES

2.5.1 Aluminum

Provide factory-applied anodic coating.

2.5.1.1 Anodic Coating

Clean exposed aluminum surfaces and apply an anodized finish conforming to AA 45 Designation System for Aluminum Finishes, clear (natural), M10C22A31, Architectural Class II. integral color anodized, M10C22A32, Architectural Class II, color as indicated on drawings.

2.5.2 Steel

Provide factory-applied coating. Clean and phosphate treat exposed surfaces and apply rust-inhibitive primer and baked enamel finish coat, 0.025 mm minimum total dry film thickness, color as indicated.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Wall Louvers

Install using stops or moldings, flanges, strap anchors, or jamb fasteners as appropriate for the wall construction and in accordance with manufacturer's recommendations.

3.1.2 Omitted

3.1.3 Screens and Frames

Attach frames to louvers with screws or bolts.

3.2 PROTECTION FROM CONTACT OF DISSIMILAR MATERIALS

3.2.1 Copper or Copper-Bearing Alloys

Paint copper or copper-bearing alloys in contact with dissimilar metal with heavy-bodied bituminous paint or separate with inert membrane.

3.2.2 Aluminum

Where aluminum contacts metal other than zinc, paint the dissimilar metal with a primer and two coats of aluminum paint.

3.2.3 Metal

Paint metal in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

3.2.4 Wood

Paint wood or other absorptive materials that may become repeatedly wet and in contact with metal with two coats of aluminum paint or a coat of heavy-bodied bituminous paint.

-- End of Section --

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DIVISION 10 - SPECIALTIES

SECTION 10260

WALL AND CORNER PROTECTION

12/95

-- End of Section Table of Contents --

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.

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 D 1308	(1993) Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
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

Wall Guards (Bumper Guards)

Hand Rails

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

Wall Guards (Bumper Guards)

Hand Rails

Manufacturer's descriptive data, catalog cuts, installation instructions, and recommended cleaning instructions.

SD-04 Samples

Corner Guards

Wall Guards (Bumper Guards)

Hand Rails

Provide sample of each model specified including end cap and mounting hardware, in finish specified.

SD-07 Certificates

Corner Guards

Wall Guards (Bumper Guards)

Hand Rails

Statements attesting that the items comply with specified fire and safety code requirements.

SD-10 Operation and Maintenance Data

Corner Guards

Wall Guards (Bumper Guards)

Hand Rails

Provide manufacturer maintenance data for inclusion in operating and maintenance manuals.

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 21 degrees C 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.

1.5 QUALITY ASSURANCE

All components of the wall protection systems are to be manufactured by the same company. Engage an installer who has not less than 3 years experience in installation of systems similar in complexity to those required for this project. Acquire product from manufacturer with not less than 5 years experience in the production of specified products.

PART 2 PRODUCTS

2.1 GENERAL

To the maximum extent possible, corner guards, wall guards (bumper guards), and hand rails 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 and shall conform to the following:

2.1.1.1 Minimum Impact Resistance

Minimum impact resistance shall be 960.8 N.m/m (18 ft. lb/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.

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.

2.1.1.4 Chemical and Stain Resistant

CG-1 - Resilient material shall be chemical and stain resistant and meet standards set in ASTM D 1308.

2.2 CORNER GUARDS

2.2.1 Resilient Corner Guards

Corner guard units shall be surface mounted type, radius formed to profile shown. Corner guards shall extend from floor to ceiling. 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 1.98 mm thick, mounted on a continuous aluminum retainer. Extruded aluminum retainer shall conform to ASTM B 221, alloy 6063, temper T5 or T6. Factory fabricated end closure caps shall be furnished for top and bottom of surface mounted corner guards in same color and finish. 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.

2.2.2 Polycarbonate Corner Guards CG-2

Corner guards shall be of clear extruded polycarbonate material, surface mounted, with radius formed to profile shown. Impact resistance of 16 ft. lb./inch as tested per ASTM D 256. Thickness to be 2.5 mm. Corner guards shall extend from floor to ceiling. Fasteners to be non-corrosive metal screws. Corner guard shall be applied directly to finished wall surface.

2.3 WALL GUARDS (BUMPER GUARDS) BG-1 and HR-1

2.3.1 Wall Guards, Combination Handrail/Wall Guards and Handrails

Wall guards, combination handrail/wall guards, and handrails 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, and shall be in same color and finish. Wall guards and handrails shall be profile as indicated on drawings.

2.3.1.1 Wall Guards BG-1

Wall guards shall consist of snap-on covers of high impact resistant resilient material, minimum 1.98 mm thick, mounted over 102 mm wide aluminum, minimum 1.57 mm thick retainer, anchored to wall at maximum 600 mmon center. Provide end caps and corners in same color and finish.

2.3.1.2 Omitted

2.3.1.3 Hand Rails HR-1

Handrails shall consist of snap-on covers of high impact resistant resilient material, minimum 1.98 mm thick on a continuous extruded aluminum retainer, minimum 1.83 mm thick anchored to wall at maximum 800 mm on center. Handrails shall be provided with prefabricated end closure caps, inside and outside corners, concealed splices, cushions, mounting hardware and other accessories standard with the manufacturer. End caps and corners shall be field adjustable to assure close alignment with handrails in same color and finish.

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 Omitted

2.7.2 Omitted

2.7.3 Resilient Material Finish

Finish for resilient material shall be stipple texture with colors as indicated on drawings.

2.8 ADHESIVES

Adhesive for resilient material shall be in accordance with manufacturers recommendations.

2.9 COLOR

Color shall be as indicated on drawings.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Corner Guards, Wall Guards (Bumper Guards) and Hand Rails

Material shall be mounted at location indicated in accordance with manufacturer's recommendations.

-- End of Section --

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DIVISION 10 - SPECIALTIES

SECTION 10430

EXTERIOR SIGNAGE

06/98

-- End of Section Table of Contents --

SECTION 10430

EXTERIOR SIGNAGE
06/98

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.

ALUMINUM ASSOCIATION (AA)

AA DAF-45	(1997) Designation System for Aluminum Finishes

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z97.1	(1984; Rev 1994) Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1997ael) Carbon Structural Steel
ASTM A 123/A 123M	(1997ael) 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	(1999a) 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 209M	(1995) Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B 221M	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM E 84	(1999) Surface Burning Characteristics of Building Materials

AMERICAN WELDING SOCIETY (AWS)

AWS C1.1	(1966) Recommended Practices for Resistance Welding
AWS D1.1	(2000) Structural Welding Code - Steel
AWS D1.2	(1997) Structural Welding Code - Aluminum

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE AMS 3611	(1994; Rev D) Plastic Sheet, Polycarbonate General Purpose

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.

1.3 WIND LOAD REQUIREMENTS

Exterior signage shall be designed to withstand 130 km/h windload.

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 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.

1.5 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 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 for approval by Contracting Officer.

SD-03 Product Data

Modular Exterior Signage System

Manufacturer's descriptive data and catalog cuts.

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 305 mm square sample of sign face color sample.

SD-10 Operation and Maintenance Data

Protection and Cleaning

Six copies of maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides. The instructions shall include simplified diagrams for the equipment as installed.

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 one year period shall be provided.

1.9 EXTRA STOCK

The Contractor shall provide 5% extra interchangeable message panels and extra stock of the following: 5% message bars of each color and size. 5% pressure-sensitive letters in each color and size. 5% changeable message strips.

PART 2 PRODUCTS

2.1 MODULAR EXTERIOR SIGNAGE SYSTEM

Exterior signage shall consist of a system of coordinated identification, and regulatory type signs located where shown. Dimensions, details, materials, message content, and design of signage shall be as shown.

2.1.1 Free-Standing Base Mount Pylon/Monolith Type Signs (SA)

2.1.1.1 Framing

Interior framing shall consist of aluminum or galvanized steel tube columns welded to companion plates. Perimeter framing shall consist of aluminum angle framing welded to the post and plate system as designed. Framing members shall be designed to permit panel removal. Mounting shall be provided as shown. Framing members of steel shall be finished with semi-gloss baked enamel or two-component acrylic polyurethane. Openings shall be sealed from moisture and made tamper-proof.

2.1.1.2 Exterior Sheeting Panels

Modular panels shall be provided in sizes shown on drawings. Panels shall be fabricated a minimum of 2.3 mm thick aluminum. Top and end panels shall be removable and shall be secured by 5 mm socket head jack nuts. Finish for metal panels shall be semi-gloss baked enamel.

2.1.1.3 Mounting

Mounting shall be provided by securing to concrete foundation as shown.

2.1.1.4 Finishes

Base finish shall be brick (as indicated on drawings.) Metal panel system finish shall be baked enamel.

2.1.2 Panel And Post/Panel Type Signs (SB, SD, SE and SF Series)

2.1.2.1 Posts

One-piece aluminum or galvanized steel posts shall be provided with minimum 3.2 mm wall thickness. Posts shall be designed to accept panel framing system described. The post shall be designed to permit attachment of panel framing system without exposed fasteners. 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 3.2 mm aluminum. Panels with metal return sheeting shall have welded corners, ground smooth.

2.1.2.4 Finishes

Post finish shall be semi-gloss baked enamel conforming to AA DAF-45. Metal panel system finish shall be baked enamel or two-component acrylic polyurethane.

2.1.2.5 Mounting

Permanent mounting shall be provided by embedding posts in concrete foundation or mounting to exterior of building.

2.2 EXTERIOR METAL PLAQUES

2.2.1 Chemically Etched Metal Plaques

Plaque shall be chemically double-etched one-piece zinc 6.35 mm thick with 0.80 mm raised characters as indicated. Plaque shall include 3 mm thick aluminum panel for surface applied graphics Sign panels include Grade 2 braille and pressure sensitive die-cut vinyl letters as indicated.

2.2.2 Applied Letters

Provide pressure sensitive die-cut vinyl letters with reflecting surface. Hand-cut letters are not acceptable. Ensure that edges and corners of finish letter forms and graphics are true and clean. Do not use letter forms and graphics with rounded positive or negative corners, nicked, cut or ragged edges.

2.2.3 Size

Plaque size shall be as shown.

2.2.3.1 Finish

Double-etched raised areas shall be painted as indicated and recessed areas shall be painted as indicated.

2.2.4 Panel Message

Message content shall be submitted by fabricator in message schedule format, and reviewed/approved by the Contracting Officer prior to fabrication.

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.

Graphics 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 pattern of the original specified art. Edges and corners shall be clean. Rounded corners, cut or ragged edges, edge buildup, bleeding or surfaces pinholes will not be accepted.

Raised text and braille shall be chemically etched and raised 0.8 mm from background.

2.3.2 Messages

See drawings and schedule 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 209M for sheet or plate, ASTM B 221M for extrusions and ASTM B 26/B 26M or ASTM B 108 for castings. Aluminum extrusions shall be provided at least 3 mm thick and aluminum plate or sheet at least 16 gauge thick. Welding for aluminum products shall conform to AWS C1.1.

2.7 ANODIC COATING

Anodized finish shall conform to AA DAF-45 as follows:

Clear (natural) designation AA-M10-C22-A31, Architectural Class II 0.010 mm or thicker.

2.8 OMITTED

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 0.08 mm 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 ACRYLIC SHEET

Acrylic sheet shall be in accordance with the flammability requirements of ASTM E 84 and shall conform to ANSI Z97.1.

2.15 POLYCARBONATE SHEET

Polycarbonate sheet shall conform to SAE AMS 3611.

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 on drawings. 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 and plaques 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 shall be adjusted for proper operation. Sign surfaces shall be cleaned in accordance with manufacturer's instructions. After signs are completed and inspected, the Contractor shall cover all project identification 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.

-- End of Section --

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DIVISION 10 - SPECIALTIES

SECTION 10440

INTERIOR SIGNAGE

06/98

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SECTION 10440

INTERIOR SIGNAGE
06/98

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.

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 NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z97.1	(1984; Rev 1994) Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 209M	(1995) Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B 221	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 221M	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)

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

Signage Schedule

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 for approval by the Contracting Officer.

SD-03 Product Data

Installation

Manufacturer's descriptive data, catalogs cuts, installation and cleaning instructions.

SD-04 Samples

Interior Signage

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/directory sign.

b. Door identification sign.

c. Room identification sign.

Two samples of manufacturer's standard color chips for each material requiring color selection.

SD-10 Operation and Maintenance Data

Approved Manufacturer's Instructions

Protection and Cleaning

Six copies of operating instructions outlining the step-by-step procedures required for system operation shall be provided. The instructions shall include simplified diagrams for the system as installed. Six copies of maintenance instructions listing routine procedures, repairs, and guides shall be provided. The instructions shall include the manufacturer's name, model number, service manual, parts list, and brief description of all equipment and their basic operating features. Each set shall be permanently bound and shall have a hard cover. The following identification shall be inscribed on the covers: the words "OPERATING AND MAINTENANCE INSTRUCTIONS", name and location of the facility, name of the Contractor, and contract number.

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.

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 75 mm .

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 0.8 mm upper case, sans serif or simple serif type and shall be accompanied with Grade 2 Braille. Raised characters shall be at least 16 mm in height, but no higher than 50 mm . Pictograms shall be accompanied by the equivalent verbal description placed directly below the pictogram. The border dimension of the pictogram shall be 152 mm 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.

1.6 EXTRA STOCK

The Contractor shall provide 5% extra frames and extra stock of the following: 5% blank plates of each color and size for each sign type. 5% pressure-sensitive letters in each color and size for each sign type. 5% changeable message strips for sign types requiring changeable message strips.

PART 2 PRODUCTS

2.1 ROOM IDENTIFICATION SIGNAGE SYSTEM

Signs shall be fabricated of acrylic plastic conforming to ANSI Z97.1 extruded aluminum conforming to ASTM B 221M .

2.1.1 Standard Room Signs

Signs shall consist of matte finish acrylic plastic and photopolymer chemically welded to 3 mm aluminum sheet. Frames shall be aluminum. Corners of signs shall be squared.

2.1.2 Changeable Message Strip Signs

Changeable message strip signs shall consist of matte finish acrylic plastic and photopolymer chemically welded to 3 mm aluminum sheet 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. If changeable message strips and evacuation map graphics are shown behind a clear surface cover, provide optical corrections to prevent distortion. Corners of signs shall be squared.

2.1.3 Door Tags

Signs shall be fabricated of type ES / MP laminated thermosetting plastic suitable for engraving. Sign size shall be as indicated on drawings. Locate one sign on each door frame throughout the facility. Sign number / message shall match the architectural floor plan number. Font height, font color and sign color shall be as indicated on drawings.

2.1.4 Type of Mounting For Signs

Extruded aluminum brackets 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 1.6 mm thick vinyl foam tape or concealed countersunk mounting holes in plaques and mounting screws. Sign inserts shall be provided with 1.6 mm thick foam tape.

2.1.5 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 0.08 mm film thickness. Film shall include a precoated pressure sensitive adhesive backing.

Graphics and 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, text and braille shall be raised 0.8 mm with background painted with low VOC paint.

2.1.5.1 Fire Evacuation Map Graphics

Graphics shall be generated from camera ready art and produced by the fabricator. Graphic image shall include "you are here" designation and shall indicated the path of travel to the nearest fire exit. Graphic shall include all information required by the local fire marshall.

2.2 BUILDING DIRECTIONALS (F SERIES)

Building directories shall be wall mounted directionals and shall be provided with changeable message strips. Dimensions, details, and materials of sign shall be as shown on the drawings. Where required, message content shall be as shown on drawings and schedule and as approved by the Contracting Officer.

2.2.1 Header Panel

Header panel shall be acrylic with pressure sensitive die-cut vinyl letters.

2.2.2 Omitted

2.2.3 Fabrication

Extruded aluminum frames and trim shall be assembled with corners reinforced and mitered to a hairline fit, with no exposed fasteners.

2.2.4 Omitted

2.2.5 Omitted

2.2.6 Changeable Letter/Message Strip Directional System

Directional shall consist of 3 mm thick aluminum and acrylic. Removable acrylic message strips and pressure sensitive die cut vinyl text. Unit shall be frame type with raised edges to capture insert strips, and side shall have formed opening for insertion and removal of strips. Design and color of unit shall be as shown on drawings.

2.2.6.1 Construction

The directional shall be constructed of an aluminum frame with satin clear anodized finish. Unit shall be surface mounted. Unit shall have a header with lettering as shown.

2.2.6.2 Message Strips

Message strips shall be updatable by user with coupon book reordering and with 5 to 7 day delivery. Message strips shall be acrylic sized as indicated on drawings. Text shall be die cut vinyl and shall be furnished in accordance with the schedule as approved by the Contracting Officer.

2.3 OVERHEAD DEPARTMENTAL IDENTIFICATION

2.3.1 Frame and Trim

Aluminum ASTM B 221, Alloy 6063-T5, finish and color as indicated. Provide panel framing consisting of aluminum extrusion and components designed to provide concealed fastners. Design bottom framing members to be removable to permit panel removal.

2.3.2 Face Plates

Provide aluminum panels in size as indicated. Design panels to be removable.

2.3.3 Plaque Message

Message content shall be submitted by fabricator in message schedule format, and reviewed/approved by the Contracting Officer prior to fabrication.

2.3.4 Applied Letters

Provide pressure sensitive die-cut vinyl letters with reflecting surface. Hand-cut letters are not acceptable. Ensure that edges and corners of finish letter forms and graphics are true and clean. Do not use letter forms and graphics with rounded positive or negative corners, nicked, cut or ragged edges.

2.3.5 Fabrication

Assemble frames and trim with corners welded and mitered to hairline fit, with no exposed fasteners.

2.3.6 Installation

Attach sign to supporting structures with concealed fasteners in accordance with manufacturer's instructions.

2.4 DIMENSIONAL BUILDING LETTERS

2.4.1 Fabrication

Letters shall be fabricated from cast aluminum. Letters shall be cleaned by chemical etching or cleaned ultrasonically in a special degreasing bath. Letters shall be packaged for protection until installation.

2.4.2 Typeface

Typeface shall be helvetica medium.

2.4.3 Size

Letter size shall be as indicated on drawings.

2.4.4 Finish

Anodized brushed aluminum finish shall be provided.

2.4.5 Mounting

Threaded studs of number and size recommended by manufacturer, shall be supplied for concealed anchorage. Letters which project from the mounting surface shall have stud spacer sleeves. Letters, studs, and sleeves shall be of the same material. Templates for mounting shall be supplied.

2.5 ALUMINUM ALLOY PRODUCTS

Aluminum extrusions shall be at least 3 mm thick, and aluminum plate or sheet shall be at least 1.3 mm thick. Extrusions shall conform to ASTM B 221M ; plate and sheet shall conform to ASTM B 209M . 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:

Clear (natural) designation AA-M10-C22-A31, Architectural Class II 0.010 mm or thicker.

2.7 OMITTED

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 as indicated on drawings. 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 75 mm 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 2 mm 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 0.13 mm 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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DIVISION 10 - SPECIALTIES

SECTION 10800

TOILET ACCESSORIES

04/01

-- End of Section Table of Contents --

SECTION 10800

TOILET ACCESSORIES
04/01

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

Accessory Items; G|RE

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

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.

1.2 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.

1.3 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period shall be provided.

PART 2 PRODUCTS

2.1 OMITTED

2.2 ACCESSORY ITEMS

2.2.1 Item A1066, Mirror

Wall mounted, Stainless Steel frame; 6.35 mm (1/4 inch) float glass with special waterproof back. Heavy duty tamper resistant mounting brackets. 457 mm wide by 914 mm high (18 inches wide by 36 inches high). Bobrick model B-290 1836 meets this specification.

2.2.2 Item A1080 Mirror, Posture, Wall Mounted

Wall mounted, Stainless Steel frame; 6.35 mm (1/4 inch) float glass with special waterproof back. Heavy duty tamper resistant mounting brackets. 508 mm wide by 1524 mm high (20 inches wide by 60 inches high). Bobrick model B-290 2060 meets this specification.

2.2.3 Item A4995, Diaper Changing Station

Diaper changing station shall be wall mounted and shall be fabricated of high impact plastic with no sharp edges, steel on steel hinges and 10 gauge steel mounting supports. Unit fold down platform shall be concave to the child's shape, equipped with nylon and velcro safety straps and engineered to withstand a minimum static load of 113 Kg (250 pounds). Unit shall have an integral dispenser for sanitary liners. Koala Bear Kare Horizontal Design Baby Changing Station meets this specification.

2.2.4 Item A5030, Built-In, Fold-Up, Shower Stall Bench

Bench shall be constructed of 5/16 inches thick, solidly fused plastic laminate with

matte-finish melamine surfaces, ivory-colored face sheets, and black phenolic-resin core that are integrally bonded. Seat shall be secured to the frame with stainless steel carriage bolts and acorn nuts. The frame shall be 18-8 S, Type 304, stainless steel with satin finish with 16 gauge 1 1/4 inches square tubing and 18 gauge 1 inch diameter tubing. The mounting flanges shall be 18-8 S, Type 304, .3/16 inches thick stainless steel with satin finish. The flanges shall be 3 inches diameter with 3 mounting screw holes. The base plate shall be 18-8 S, Type 304, heavy-gauge stainless steel. The spring shall be 17-7, Type 301, 24 gauge stainless steel spot welded to the base plate. The guide bracket shall be 18-8 S, Type 304, 16 gauge stainless steel with satin finish. Bobrick models B-5171 and B-5181 meet this specification.

2.2.5 Item A5080, Wall Mounted Paper Towel Dispenser

Surface mounted paper towel dispenser. Dispenses 400 C-fold towels. Recessed mounting slots. Fabricated of type 304 stainless steel. Satin finish. Door has tumbler lock and piano hinge. Approximate size: 311 mm wide by 124 mm high by 152 mm deep (12 1/4" inch wide by 7 ¼ inch high by 6 inches deep. Bobrick model B-263 meets this specification.

2.2.6 Item A5090, Sanitary Napkin Disposal Unit, Wall Mounted

Wall mounted corrosion resistance Type 304, stainless steel, all-welded, satin finish. Self-closing door with spring-loaded, full-length, piano-hinge. Approximate size: 254 mm high by 191 mm wide by 351 mm deep (10 inches high by 7 1/2 inch wide by 3 13/16 inch deep). Bobrick model B-270 meets this specification.

2.2.7 Item A5109, Grab Bars, at Water Closets

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 set screw mounting holes concealed on the lip of the flange. 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 ½ inches. Refer to drawings for exact length and configurations. Bobrick model series B5507 meets this specification.

2.2.8 Item A5110, Grap Bars, at Showers

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 set screw mounting holes concealed on the lip of the flange. Grab bar shall have satin finish. Provide peened non-slip surface. 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 ½ inches. Refer to drawings for exact length and configurations. Bobrick model series B5507 meets this specification.

2.2.9 Item A5135, Combination Mop/Broom Rack with Shelf

Unit shall consist of an 203 mm (8 inch) deep shelf with supporting brackets, drying rod, rag hooks and mop/broom holders. All metal components shall be fabricated of Type 304 stainless steel with satin finish. Shelf shall be minimum 18 gauge with 50 mm (2 inches) return edges; front edge hemmed. Mounting brackets: minimum 16 gauge, welded to shelf. Drying rod: stainless steel minimum 6.35 mm (1/4 inch) diameter. Item shall be provided with 3 spring-loaded rubber cam mop/broom holders and 2 minimum 16 gauge rag hooks. Dimensions: approximately 900 mm long by 150 mm (36 inches long by 6 inches high). Bobrick model B-224 x 36 meets this specification.

2.2.10 Item A5170, Metal Shower Rod

Unit shall consist of shower curtain rod and hanging hooks. Shower curtain rods shall be Type 304, stainless steel with satin finish and 1 inch outside diameter by 1.0 mm (20 gauge) one-piece die formed stainless steel with satin finish. Length of rod as indicated on contract documents. Provide stainless steel shower curtain hooks. Shower curtain is not part of this contract. Bobrick model B-6107 meets this shower rod specification.

2.2.11 Item A5175, Recessed Soap Dish with Grab Bar

Recessed heavy duty soap dish and bar shall be fabricated of Type 304, stainless steel with matt polished finish. Shell and flange shall be one piece seamless construction with one piece 1.0 mm (20 gauge) stainless steel retaining lip. Item shall be provided with plated steel mounting clamp. Bobrick model B-4390 meets this specification.

2.2.12 Item A5200, Toilet Tissue Dispenser

Double roll stainless steel toilet paper holder shall be constructed o f type 304 stainless

steel with satin finish. Unit shall accommodate two standard core toilet paper rolls up to 140 mm (5 ½ inch diameter. Flanges shall be equipped with concealed, 1.6 mm (16 gauge) stainless steel mounting brackets that are secured to concealed stainless steel wall plates with stainless steel locking set-screws. Spindles shall be equipped with a heavy duty internal spring.

2.2.13 Item A5205, Towel Bar

Surface mounted towel bar fabricated of Type 304 stainless steel with satin finish. Flanges and support arms shall be 22 gauge, equipped with concealed (16 gauge) mounting brackets, and concealed (16 gauge) wall plates with locking set screws. Bar shall be 19 mm (3/4 inch) diameter tubing by 600 mm (24 inches) long. Bobrick model B-6747 x 24 meets this specification.

2.2.14 Item L1200, Cabinet, Specimen Pass Thru

Unit for through-the-wall passing of specimen containers from one area to another while preventing viewing between rooms through the apparatus. Shall be constructed of type 304 stainless steel with all welded construction, one piece, seamless construction. Exposed surfaces shall have a satin finish. Spring-loaded doors shall be self closing and secured to cabinet with a full length stainless steel piano hinge. Doors shall be equipped with interlocking mechanism to prevent both from being open at the same time. Unit shall include a removable stainless steel spillage tray. Approximate size: 323 mm (12 3/4 inches) wide by 304 mm (12 inches) high.
Bobrick model B-505 meets this specification.

PART 3 EXECUTION

3.1 INSTALLATION

Surfaces of fastening devices and exposed after installation shall have the same finish as the attached accessory. Exposed screw heads shall be oval. Install accessories at the location and height indicated. Protect exposed surfaces of accessories with strippable plastic or by other means until the installation is accepted. After acceptance of accessories, remove and dispose of strippable plastic protection. Coordinate accessory manufacturer's mounting details with other trades as their work progresses. Brackets, and plates, anchoring devices and similar items used for mounting accessories in showers shall be bedded in a silicone or polysulphide sealant as specified in Section 10153, "Toilet Partitions." Provide theft-resistant fasteners and anchorage. After installation, thoroughly clean exposed surfaces and restore damaged work to its original condition or replace with new work.

3.1.1 Recessed Accessories

Fasten accessories with screws to studs, blocking or rough frame. Set anchors in mortar in masonry construction. Fasten to metal studs or framing with sheet metal screws in metal construction.

3.1.2 Surface Mounted Accessories

Mount on concealed backplates, unless specified otherwise. Accessories without backplates shall have concealed fasteners. Unless indicated or specified otherwise, install accessories with sheet metal screws in lead-lined braided jute, teflon or neoprene sleeves, or lead expansion shields, or with toggle bolts or other approved fasteners as required by the construction. Install backplates in the same manner, or provide with lugs or anchors set in mortar, as required by the construction. Fasten accessories mounted on gypsum board and plaster walls without solid backing into the metal studs or to metal backplates secured to metal studs.

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

MISCELLANEOUS SPECIALTIES

10/00

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SECTION 10900

MISCELLANEOUS SPECIALTIES
10/00

PART 1 GENERAL

1.1 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals Procedures."

SD-02, Shop Drawings

Telephone enclosures

SD-03, Product Data

Item A5145, Garment hook, double, surface mounted

Item F0102A, Mail distribution sorter cabinet and table

Item F2310, Rack, pamphlet, wall mounted

Item F3010, Board, Bulletin, 1219 mm H x 1219 mm W

Item F3025, Board, bulletin, 914 mm H x 610 mm W

Item F3050, Whiteboard, WCP, 914 mm H x 1219 mm W

Item F3055, Whiteboard with sliding panels

Item F3230, Wall mounted hat/coat rack

Item M0410, Screen projection, 1780 mm x 1780 mm, wall mounted

Item M1620, Patient chart holder

Telephone enclosures

Item A5215, Bracket, television, ceiling mounted

Item U0385, Ceiling mounted projector bracket

Include wiring diagrams for electrical items.

SD-07, Certificates

Item A5145, Garment hook, double, surface mounted

Item F0102A, Mail distribution sorter cabinet and table

Item F2310, Rack, pamphlet, wall mounted

Item F3010, Board, Bulletin, 1219 mm H x 1219 mm W

Item F3025, Board, bulletin, 914 mm H x 610 mm W

Item F3050, Whiteboard, WCP, 914 mm H x 1219 mm W

Item F3055, Whiteboard with sliding panels

Item F3230, Wall mounted hat/coat rack

Item M0410, Screen projection, 1780 mm x 1780 mm, wall mounted

Item M1620, Patient chart holder

Telephone enclosures

Item A5215, Bracket, television, ceiling mounted

Item U0385, Ceiling mounted projector bracket

SD-10, Operation and Maintenance Data

Item F3055, Whiteboard with sliding panels

Item M0410, Screen projection, 1780 mm x 1780 mm, wall mounted

Telephone enclosures

Submit operations and maintenance data.

1.2 DELIVERY, HANDLING, AND STORAGE

1.2.1 Handling and Storage

Material shall be protected from the weather, soil, and damage during delivery, storage, and construction.

1.2.2 Delivery

Materials shall be delivered in original packages or containers bearing the brand name and the name of the material.

1.3 FIELD MEASUREMENTS

Field measurements shall be taken prior to the preparation of drawings and fabrication to ensure proper fits.

PART 2 PRODUCTS

2.1 ITEMS

2.1.1 Item A5145, Garment Hook, Double, Surface Mounted

Provide two prong robe hooks as indicated. Unit to consist of hooks mounted on 102 mm high by 229 mm wide by 13 mm beveled edge wood backboard. Projection of hook shall be not less than 41 mm. Finish: as indicated on finish schedule.

Peter Pepper Products, Inc model "Type 1" with 2 model "2073AL" hooks meets this specification.

2.1.2 Item F0102A, Mail distribution sorter cabinet and table

Mail distribution sorter cabinet and table. 72 horizontal pockets. Sorter Cabinet size: 1828 mm wide by 1197 mm high by 400 mm. Table size: 1828 mm wide by 914 mm by adjustable height of 787 -1016 mm. Pockets shall be adjustable by 50 mm increments and accommodate legal size mail. Shall be constructed of heavy duty steel.

Charnstrom (800-328-2962) Model P793 with A577W meets this specification

2.1.3 Item F2310, Rack, Pamphlet, Wall Mounted

Wall mounted pamphlet rack. Steel back panel with retainer bar, 3 pockets high. 406 mm wide by 1295 mm high by 70 mm deep. Finish: as indicated on finish schedule.

Peter Pepper Products, Inc model 4034 meets this specification.

2.1.4 Item F3010, Board, Bulletin, 1219 mm x 1219 mm

Bulletin board with fabric tackable panel. Aluminum frame, 1219 mm wide by 1219 mm high. Radius frame profile. Equip with mounting hardware. Finish: as indicated on finish schedule.

Peter Pepper Products, Inc model FB4848 with aluminum radius frame meets this specification.

2.1.5 Item F3025, Board, Bulletin, 914 mm x 609 mm

Bulletin board with fabric tackable panel. Wood frame, 914 mm high by 609 mm wide. Bullnose frame profile. Equip with mounting hardware. Finish: as indicated on finish schedule.

Peter Pepper Products, Inc model FB2436 with wood bullnose frame meets this specification.

2.1.6 Item F3050, Whiteboard, WCP, 910 mm x 1219 mm

White porcelain enamel writing surface, 910 mm high by 1219 mm wide, 50 mm. Wood frame; bullnose frame profile; equipped with map rail and marker trough with mounting hardware. Surface: minimum 24 gauge steel sheet laminated to 9.5 mm particle board core with aluminum or steel backing sheet. Equip with map rail, marker trough, four dry erase markers and eraser; magnetic surface and mounting hardware.

Peter Pepper model TC3648 with wood bullnose frame meets this specification.

2.1.7 Item F3055, Whiteboard with sliding panels

Provide two panel sliding porcelain enamel writing surface. Fixed back panel with two sliding boards. Panels shall be top suspended to glide over extruded aluminum track on molded nylon rollers. Balanced, high-pressure-laminated, porcelain enamel of 3-ply construction consisting of face sheet, core material, and backing. Approximate size: 48 inches high by 9 feet long. Equip with pen rail trough and mounting hardware. Finish: as indicated on finish schedule.

Face Sheet: 0.024 inch enameling grade steel especially processed for temperatures used in coating porcelain on steel. Coat exposed face and edges with a 3-coat process consisting of primer, ground coat, and color cover coat. Coat concealed face with a 2-coat process consisting of primer and ground coat. Fuse cover and ground coats to steel at manufacturer's standard firing temperatures, but not less than 1200 deg F.

Core: 3/8-inch thick, particle board core material complying with requirements of ANSI A208.1, Grade 1-M-1.

Backing Sheet: 0.018-inch thick, galvanized steel sheet backing.

Laminating Adhesive: Manufacturer's standard, moisture-resistant, thermoplastic-type adhesive.

Peter Pepper Model 7700 with options above meets this specification.

2.1.8 Item F3230, Wall Mounted Hat/Coat Rack

Wall mounted hat and coat rack. Approximately 813 mm wide by 159 mm high by 279 mm deep with five (5) coat hooks. Bars and hooks shall be constructed of extruded aluminum, die-cast aluminum end caps and wall brackets.

Peter Pepper Products, Inc model 2155AL meets this specification.

2.1.9 Item M0410, Screen Projection, 70 x 70, wall mounted

Roll-up type, wall mounted, manual operation, 70 inches by 70 inches. Pull down system to lock at intervals. Viewing surface: flame and mildew resistant heavy-duty vinyl or fiberglass fabric with non-gloss matt white glass beaded face. Screen fabric: secured to a rigid tubular steel grooved roller by continuous spline and groove or by clips spaced no more than 4 inches apart. Roller shall be spring loaded for automatic retraction with nylon bearings. Case shall be 22 gauge or heavier steel. Case shall be suitable for wall mounting. Bottom of screen shall be securely fastened in tubular steel slat, with pull handle.

Claridge Model EN7070 meets this specification.

2.1.10 Item M1620, Patient Chart Holder

Wall mounted patient chart holder. Wood back panel with front wood slats as a retainer bar, 1 pocket. 400 mm wide by 317 mm high by 101 mm deep. Finish: as indicated on finish schedule.

Peter Pepper Products, Inc model 461 meets this specification.

2.1.11 Telephone Enclosures

Steel frame with 13 mm thick side perforated stainless steel acoustical panels, perforated noise absorbing acoustical interior back panel with finely perforated stainless steel shelf for telephone directory storage, and ADA compliant. Provide for flush mounting telephone company's standard telephones. Provide integral stainless steel header panels incorporating telephone signs. Size approximately 864 mm high by 483 mm wide by 330 mm deep.

2.1.12 Item A5215, Bracket, Television, Ceiling Mounted

Universal type video ceiling mounted bracket. Adjustable and capable of supporting TV equipment as approved by the Contracting officer. Brackets shall be heavy gauge formed steel

construction with arc-welded joints capable of supporting a minimum load of 91 kg. Mounting bracket platforms shall be expandable to accommodate TV/Monitors up to 660 mm diagonal screens, and shall be capable to tilt forward up to 0.209 rad. Include mounting hardware, lockable support for TV cabinets, wall and ceiling adapters and safety belts. Brackets shall be black enamel finish. Provide each ceiling bracket unit with adjustable extension column assemblies complete with ceiling plates and connectors required for drop mount installations from structural deck substrates above ceilings. Columns shall be adjustable for 25.4 mm increments, total length as required by job conditions. Coordinate ceiling mounting requirements with substrates indicated on drawings.

2.1.13 Item U0385, Ceiling Mounted Projector Bracket

Universal type base units suitable for LCD projectors weighing up to 22 kg., all steel construction, 2-piece interchangeable design with ceiling plate and adapter plate. Provide unit with adjustment capability for 0.349 rad pitch, 0.1745 rad roll, and 6.282 rad yaw. Brackets shall be black enamel finish. Provide each base unit with adjustable extension column assemblies complete with ceiling plates and connectors required for drop mount installations from structural deck substrates above ceilings. Columns shall be adjustable for 25.4. mm increments, total length as required by job conditions.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION

Install miscellaneous specialties true to line, level and plumb, as applicable and in accordance with each manufacturer's instructions. Fasten items securely in place and adjust.

3.1.1 Anchorage

Provide anchors and fasteners to secure items in place. Coordinate backing locations with other sections of this specification. Use inserts, expansion shields, power driven anchors, toggle bolts, machine bolts, or lag bolts, as required for a particular condition. Walls shall be reinforced as required to support wall mounted items.

3.2 DEMONSTRATION

Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sauna heaters and controls. Refer to Division 1 Section "Closeout Procedures."

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 10 - SPECIALTIES

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

Fire Extinguisher Cabinets

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 semirecessed cabinets where indicated. Cabinets shall be prime grade, cold rolled, reanealled, process-level furniture steel. Cabinet shall have minimum interior box dimensions of 580 mm high, 250 mm wide and 200 mm deep. The fire extinguishers shall be furnished by the Government.

2.1.1 Materials

The semirecessed cabinets shall be constructed of minimum 18-gauge steel with a white baked enamel surface. All trim and doors are to be constructed of extruded aluminum and all corners are to be mitered. Trim and doors are to have a clear satin anodized finish. 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.

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.

-- End of Section --

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DIVISION 11 - EQUIPMENT

SECTION 11475

RADIOGRAPHIC DARKROOM EQUIPMENT

09/99

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SECTION 11475

RADIOGRAPHIC DARKROOM EQUIPMENT
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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 167	(1996) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A 568/A 568M	(1998) Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled
ASTM B 221M	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)

1.2 RELATED REQUIREMENTS

Conform to Sections 11700, GENERAL REQUIREMENTS FOR MEDICAL EQUIPMENT, Section 15895, "AIR SUPPLY, DISTRIBUTION, VENTILATION AND EXHAUST SYSTEM and Section 16415, "ELECTRICAL WORK, INTERIOR." Provide final utility connections and utility service to equipment.

1.3 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-03 Product Data

Item X3150, Rack, Apron/Gloves, Wall Mounted

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Aluminum Alloy

ASTM B 221M, equivalent in ultimate tensile, yield, and shear strengths to Alloy 6063-T5 or 6063-T6.

2.1.2 Carbon Steel

ASTM A 568/A 568M, cold-rolled sheets, commercial bright finish. Stretcher level sheets 1.5 mm thick and lighter.

2.1.3 Stainless Steel

ASTM A 167, Class 301, 302, or 304.

2.2 ITEMS

2.2.1 Item X3150, Rack, Apron/Gloves, Wall Mounted

Wall mounted vertical , 360 mm (14?1/4 inch) high by 690 mm (27-1/4 inch) wide by 250 mm (9-3/4 inch) deep. Picker Model 265475 meets this specification.

PART 3 EXECUTION

3.1 INSTALLATION

Install at locations indicated. Conform to installation requirements of Section 11700, "General Requirements for Medical and Dental Equipment."

3.2 FIELD QUALITY CONTROL

3.2.1 Inspections

Examine each item for visual defects and conformance to specifications.

3.2.2 Adjustments

Adjust each item to ensure that equipment is operational and conforms to specification requirements.

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DIVISION 11 - EQUIPMENT

SECTION 11601

LABORATORY EQUIPMENT AND FUMEHOODS

09/99

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SECTION 11601

LABORATORY EQUIPMENT AND FUMEHOODS
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.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH 2080 (1992) Industrial Ventilation

1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS

Conform to provisions of Section 11700, GENERAL REQUIREMENTS FOR MEDICAL EQUIPMENT and Section 12350, CASEWORK FOR MEDICAL FACILITIES. Provide final utility connections and utility service to equipment including waste, under Sections 15895, AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM, 15405, PLUMBING, HOSPITAL; and 16415, ELECTRICAL WORK, INTERIOR.

1.3 SUBMITTALS

Submit the following in accordance with Section 01330, Submittal Procedures."

SD-02 Shop Drawings

Item M2020, Safety Storage Cabinets

SD-03 Product Data

Item M2020, Safety Storage Cabinets

Include descriptive literature, technical data sheets, and diagrams.

SD-04 Samples

Item M2020, Safety Storage Cabinets

Exterior cabinet paint

SD-06 Test Reports

Item M2020, Safety Storage Cabinets

SD-08 Manufacturer's Instructions

Item M2020, Safety Storage Cabinets

SD-10 Operation and Maintenance Data

Item M2020, Safety Storage Cabinets, Data Package 2

Submit operation and maintenance data

1.4 SUBMITTAL REQUIREMENTS

1.4.1 Cabinet Paint

Submit color chips of exterior cabinet paint. Submit colors which are standard with the manufacturer.

1.4.2 Drawing Requirements

Show pertinent installation layout. Indicate details of construction and rough-in requirements.

1.4.3 Schedule

Include each type of equipment and hood and submit in accordance with Section 11700, GENERAL REQUIREMENTS FOR MEDICAL EQUIPMENT.

1.4.4 Tests

Submit cabinet test reports required by ACGIH 2080.

PART 2 PRODUCTS

2.1 ITEM M2020, SAFETY STORAGE CABINETS

Cabinet shall conform to NFPA standards and OSHA regulations. Cabinet shall have two self-closing doors and double-wall steel construction with 1-1/2 inch air space. Provide four leveler feet; three-point lock as approved by the Contracting Officer and a 2 inch leak proof sill. Cabinet finish shall be yellow enamel. Provide (2) 2 inch diameter pipe taps, both on rear of cabinet, for venting to the exterior. Coordinate venting requirements with Section 15405, PLUMBING, HOSPITAL. Hamilton Model 950S7550 meets this specification.

PART 3 EXECUTION

3.1 INSTALLATION

Install units at locations indicated. Conform to installation provisions of Section 11700, GENERAL REQUIREMENTS FOR MEDICAL EQUIPMENT; Section 15405, "Plumbing, Hospital"; and the ACGIH 2080 including provision for an adequate supply of tempered make-up air to meet the air flow requirements of fume hood(s). Provide interlocks for controls and alarms to maintain the required air balance between hood interiors and the room.

3.2 POSTED OPERATING INSTRUCTIONS

Provide in accordance with the requirements in Section 15895, AIR SUPPLY, DISTRIBUTION, VENTILATION AND EXHAUST SYSTEM.

3.3 FIELD QUALITY CONTROL

3.3.1 Inspection

Examine each unit for visual defects, operation and conformance to specifications.

3.3.2 Tests

Test each unit to ensure that the equipment is operational and conforms to specification requirements. Field tests for fume hood operation and performance shall meet the requirements of ACGIH 2080.

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DIVISION 11 - EQUIPMENT

SECTION 11700

GENERAL REQUIREMENTS FOR MEDICAL EQUIPMENT

09/00

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SECTION 11700

GENERAL REQUIREMENTS FOR MEDICAL EQUIPMENT
09/00

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 the basic designation only.

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C510	(1997) Double Check Valve Backflow-Prevention Assembly
AWWA C511	(1997) Reduced-Pressure Principle Backflow Prevention Assembly

CODE OF FEDERAL REGULATIONS (CFR)

21 CFR 701	Cosmetic Labeling Regulation for the Enforcement of the Federal Food, Drug and Cosmetics Act and for Packaging and Labeling Act

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)

FCCCHR-USC	List of Approved Backflow Prevention Assemblies

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA MG 1	(1993; Rev. 1-4) Motors and Generators

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101	(1997) Life Safety Code

SHEET METAL & AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION, INC. (SMACNA)

SMACNA SRM	(1998) Seismic Restraint Manual Guidelines for Mechanical Systems

UNDERWRITERS LABORATORIES INC. (UL)

UL 544	(1998) Medical and Dental Equipment

1.2 LOGISTICAL CLASSIFICATION

Methods of procurement are defined as follows:

a. Category A: Contractor furnished and Contractor installed.

b. Category B: Government furnished from using service operating funds other than construction and installed by contractor from construction funds (Construction Appropriations/Medical Construction Appropriations).

c. Category C: Government furnished and installed from existing assets or from funds other than construction.

d. Category D: Other (leased or rented equipment or that obtained under special conditions. Funds will be determined by the using service.)

e. Category E: Government furnished and contractor installed from Construction Appropriated/Medial Construction Appropriation funds. (Procurement may be delayed until the latest date feasible that will not interfere with project completion. This will provide the latest model of equipment at the time it is needed).

f. Category F: Government furnished and installed from Construction Appropriation/Medical Construction Appropriations funds. (Procurement may be delayed until the latest date feasible that will not interfere with project completion. This will provide the latest model of equipment at the tine it is needed).

g. Category G: Government furnished and installed equipment requiring special funding (not MCON or project specific OM or OP dollars) and may require other judication and approvals.

Equipment designated Logistical Category "B" "C" "D" "E" "F" and "G" will be Government provided. For equipment installed by the Government, the Contractor shall make preparations for installation, as indicated.

1.3 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

INSTALLATION Drawings

Submit for equipment items that interface with other pieces of equipment or construction. Indicate:

Installation layout

Coordination of equipment services

Details of construction and rough-in requirements

Schedule of Contractor-furnished equipment

SD-03 Product Data

Contractor-furnished medical and dental materials and equipment

Submit within 60 days after award of contract, but before ordering equipment. Submit names and addresses of manufacturers, item's catalog numbers, trade names, literature, data sheets, diagrams, drawings, and other pertinent data for each referenced item to evaluate performance, dimensions, and appearance of the equipment and materials. Submit in triplicate copies of manufacturer's printed specifications and installation requirements.

SD-04 Samples

Manufacturer's standard color charts for medical and dental equipment; G|RE

SD-06 Test Reports

Factory inspection

Submit three copies of the test reports required or specified and performed by an approved laboratory.

SD-07 Certificates

Medical and dental equipment deviations

Medical and dental equipment substitutions

Backflow preventers Certificate of Full Approval

SD-10 Operation and Maintenance Data

Medical and dental equipment, Data Package 3

Submit operation and maintenance data. Submit manual data for each unit of equipment furnished for the project.

1.4 QUALITY ASSURANCE

1.4.1 Materials and Equipment

Materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacture of products which are of a similar material, design, and workmanship and are offered for sale on the commercial market through advertisements, manufacturer's catalogs, or sales brochures. The products shall have been in commercial or industrial use under similar circumstances and of similar size for 2 years prior to the bid opening.

1.4.2 Alternative Service Record

Products having less than a 2-year field service record will be acceptable if a certified record of the manufacturer's factory or laboratory tests demonstrating performance compliance is provided to the Contracting Officer.

1.4.3 Service Support

Equipment items shall be supported by service organizations located near the equipment installation, and able to service the equipment on a regular basis and respond immediately on emergency calls throughout the warranty period.

1.4.4 Manufacturer's Nameplate

Each piece of equipment shall have the manufacturer's name, address, model number, and serial number utility ranges or capacities, including voltage and amperage rating if electrically powered on the nameplate, securely affixed in a conspicuous place. The name of only the distributing agent on the plate is not acceptable.

1.4.5 Factory Inspection

Arrange and perform all factory inspections required by the technical sections of the specification, unless otherwise specified. Report these inspections in the daily report to the Government inspector.

1.4.6 Product Qualifications

The products specified by the technical sections of the specification establish standards for each item.

1.4.7 Design Parameters

Equipment furnished shall meet each of the following parameters specified in the technical sections.

a. Size of equipment

b. Function of equipment

c. Standard and listed accessories

d. Equipment controls and performance of equipment

e. Construction of equipment.

1.5 STANDARDS COMPLIANCE

Submit one of the following as evidence of proof of conformance for materials or equipment specified to conform to the standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), American Society of Mechanical Engineers (ASME), American Gas Association (AGA), Air-Conditioning and Refrigeration Institute (ARI), and Underwriters Laboratories Inc. (UL).

a. If an organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections.

b. In lieu of the label or listing, submit a certificate from an independent testing organization which is competent to perform acceptable testing and is approved by the Contracting Officer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item conforms to the specified organization's standard.

c. For materials and equipment whose compliance with organizational standards or specifications is not regulated by an organization using its own listing or label as proof of compliance, submit a certificate of compliance from the manufacturer for approval, identifying the manufacturer, product, and referenced standard and certification stating that the product conforms to the requirements of the project specification and the referenced standards listed.

1.6 STANDARDS DEVIATIONS

Submit for approval a record of deviations from the following standards established for the specified product, before ordering equipment.

a. Size of equipment

b. Function of equipment

c. Standard and listed accessories

d. Equipment controls and performance of equipment

e. Construction of equipment.

1.7 SUBSTITUTIONS

Submit before ordering equipment.

a. Size: Layouts shall be based on the unit specified. If the size of a substituted unit differs from the item specified and is accepted, submit to the Contracting Officer for approval a revised layout, design calculations, drawings, and specifications for changes in the building to accommodate the substituted equipment.

b. Function: Additional functions and accessories of substituted equipment will not be considered as an improvement over the unit specified. If such functions are standard equipment of a substituted item but the function is not desired by the Government, then it shall be at the discretion of the Government to either have the Contractor completely remove that function from the unit, if the unit is otherwise acceptable, or allow the Contractor to retain that function on the unit under the following conditions:

(1) The function is fully operational and its performance complies with the terms and conditions of this specification, including product quality and warranty;

(2) The function shall in no way eliminate or modify those functions required by the Government on the specified unit. Refinement in control or accessibility of the substituted unit will be considered an improvement over the specified unit.

c: Appearance: Only the following aesthetic qualities of design will be considered an improvement:

(1) Uniformity of finish

(2) Variety of finish selections

(3) Compatibility with substituted item.

1.8 CERTIFICATE OF FULL APPROVAL

Submit a Certificate of Full Approval from the Foundation of Cross-Connection Control and Hydraulic Research (FCCCHR), University of Southern California, attesting that the design, size and make of each backflow preventer has satisfactorily passed the complete sequence of performance testing and evaluation for the respective level of approval. Certificate of Provisional Approval will not be acceptable.

1.9 PACKAGING, STORAGE AND PROTECTION

1.9.1 Packaging

Package each piece of equipment to ensure protection from damage during shipment and delivery. Legibly indicate on the exterior of each container or crate, the shipping address and a brief description of its contents. Outside of the container, fasten a waterproof envelope containing a packing list and complete instructions for uncrating and setting the equipment in place.

1.9.2 Storage and Protection

During storage and until completion and acceptance by the Contracting Officer, protect materials and equipment from damage. Before acceptance by the Contracting Officer, remove all protective coverings, thoroughly clean the inner and outer surfaces, and ensure that the equipment is free from defects.

PART 2 PRODUCTS

2.1 MATERIALS

Materials not specified otherwise shall be of the same quality used for the intended purpose in commercial practice. Equipment, materials, and articles incorporated in the work shall be new. Any deviations or substitutions shall be reported before ordering equipment.

2.2 EQUIPMENT

2.2.1 Safety

Medical and dental equipment shall meet the requirements of OSHA 21 CFR 701, NFPA 101, and UL 544. In lieu of UL approval, consideration will be given to certified test reports from an approved laboratory meeting UL 544 requirements.

2.2.2 Omitted

2.2.3 Electrical Motors

Unless otherwise shown, equipment with motors of 375 watts or less shall be suitable for operation from a 120-volt, single-phase, 60 Hz supply. Motors shall be of sufficient size for the duty to be performed and shall not exceed the nameplate rating when driven equipment is operating at specified capacity under the most severe conditions. Fractional horsepower motors shall conform to NEMA MG 1.

2.2.4 Backflow Preventers

Reduced pressure principle type conforming to the applicable requirements of AWWA C510, AWWA C511 and FCCCHR-USC.

2.3 COMPONENTS

2.3.1 Mechanical

Components, such as piping, valves, and controls, shall conform to the requirements specified in Section 15405, "Plumbing, Hospital."

2.3.2 Electrical

Provide components of equipment and systems, such as motors, starters, and controls as specified for complete operable systems. Extended voltage-range motors are prohibited. Provide interconnecting wiring for components of packaged equipment as an integral part of the equipment. Provide interconnecting power wiring and conduit for field-erected equipment and control wiring and conduit shall be as specified in Section 16415, "Electrical Work, Interior." Motor control equipment forming part of the motor control centers or switchgear assemblies and the necessary conduit and wiring connecting such assemblies, centers, or other power sources to the equipment shall be as specified in Section 16415, "Electrical Work, Interior."

PART 3 EXECUTION

3.1 EXAMINATION

Before laying out the equipment, inspect the site of work. Report to the Contracting Officer damage to the building, including piping and wiring systems related to and affecting the installation of the equipment.

3.2 PROTECTION

Make provisions to prevent electrolysis where dissimilar metal parts are welded or otherwise fastened together.

3.3 INSTALLATION

Set and connect the equipment plumb and true to level in accordance with the manufacturer's instructions and recommendations. Attach items and accessories. Make connections between equipment and other work in a neat manner, and install the equipment so as not to damage other work.

3.3.1 Mounting

Mount the equipment according to SMACNA SRM seismic restraints guidelines.

3.3.2 Operation

Provide all items necessary to make equipment operational.

3.4 FIELD INSPECTION

Notify the Contracting Officer 5 days before the scheduled inspection. Perform acceptance inspection of the finished work with the Contracting Officer to examine each item to ensure that the equipment is operational.

3.5 CLEANING AND ADJUSTING

Clean and adjust equipment. Lubricate moving parts, and test the equipment in accordance with the manufacturer's instructions. Clean the medical equipment, both inside and outside. Ensure that equipment is free from defects.

3.6 OPERATING AND MAINTENANCE DATA

Attach a copy of the operation and maintenance data for each piece of equipment to its respective equipment.

3.7 EQUIPMENT AND CASEWORK SCHEDULE

The following schedule contains a listing of the equipment items that are identified by a Joint Schedule Number (JSN). The listing contains the JSN, Nomenclature, Logistical Classification, specification and required backing.

JSN	NOMECLATURE	CATEGORY	SPEC SECTION	WALL BACKING REQUIRED
A1030	Locker, 2 Person, Over/Under, 72x18x21	C		No
A1066	Mirror, Float Glass, With SS Frame, 36	A	10800	Yes
A1080	Mirror, Posture, Wall Mounted	A	10800	Yes
A1095A	Digital Message Board Display	C		Yes
A1095B	Digital Message Board System Prompt	C		No
A1095C	Digital Message Board Controlling Computer	C		No
A1132	Rail, Accessory Mounting, Length As Required	C		Yes
A1150	Shelving, File, Open, Patient Records	C		No
A4995	Table, Diaper Changing, Wall Mounted	A	10800	Yes
A5020A	Dressing Room Bench, Built-in	A	06200	No
A5025	Bench, Locker Room, Portable	C		No
A5030	Bench, Stall, Shower, Built In	A	10800	Yes
A5075	Dispenser, Soap, Disposable	C		No
A5080	Dispenser, Paper Towel, SS, Surface Mo	A	10800	Yes
A5090	Disposal, Sanitary Napkin, SS, Surface	A	10800	Yes
A5106	Waste Disposal Unit, Sharps w/Glove Di	C		No
A5109	Grab Bar, 1-1/4" Dia., SS, 2 Wall, W/C	A	10800	Yes
A5110	Grab Bar, 1-1/4" Dia., SS, 2 Wall, Sho	A	10800	Yes
A5135	Shelf, Utility W/ Mop/Broom Holders, S	A	10800	Yes
A5145	Hook, Garment, Double, SS, Surface Mou	A	10900	Yes
A5170	Rod, Shower Curtain, 1"Diameter, W/Cur	A	10800	No
A5175	Soap Dish, With Bar, SS, Recessed	A	10800	Yes
A5180A	Surface Mounted Cubicle Track	A	10191	No
A5180B	Cubicle Curtain	C		No
A5200	Dispenser, Toilet Tissue, SS, 2-Roll,	A	10800	Yes
A5205	Bar, Towel, 1" Diameter, SS, Surface M	A	10800	Yes
A5215	Bracket, Television, Ceiling Mounted	A	10900	No
A6030	Machine, Vending	D		No
A6046	Artwork, Decorative, With Frame	C		No
A6105	Counter, Control, Inpatient, Built-In	A	06200	No
C02B0	Cabinet, U/C/B, 2 Shelves, 1 Door, 36x	A	12350	Yes
C02C0	Cabinet, U/C/B, 1 Shelf, 1 Drawer, 1 D	A	12350	Yes
C02D0	Cabinet, U/C/B, 4 Drawer, 36x24x22	A	12350	Yes
C02Q0	Cabinet, Sink, U/C/B, 1 Door, 36x24x22	A	12350	Yes
C03E0	Cabinet, U/C/B, 1 Shelf, 1 Drawer, 2 D	A	12350	Yes
C03F0	Cabinet, U/C/B, 1 Shelf, 2 Half DR, 2	A	12350	Yes
C03H0	Cabinet, U/C/B, 2 Half Drawers, 3 DR,	A	12350	Yes
C03J0	Cabinet, U/C/B, 8 Half Drawers, 36x30x	A	12350	Yes
C03P0	Cabinet, Sink, U/C/B, 2 Door, 36x30x22	A	12350	Yes

JSN	NOMECLATURE	CATEGORY	SECTION	REQUIRED
C04E0	Cabinet, U/C/B, 1 Shelf, 1 Drawer, 2 D	A	12350	Yes
C04J0	Cabinet, U/C/B, 8 Half Drawer, 36x36x2	A	12350	Yes
C04L0	Cabinet, U/C/B, 1 DR, 3 Half DR, 1 Doo	A	12350	Yes
C04P0	Cabinet, Sink, U/C/B, 2 Door, 36x36x22	A	12350	Yes
C05E0	Cabinet, U/C/B, 1 Shelf, 1 Drawer, 2 D	A	12350	Yes
C05P0	Cabinet, Sink, U/C/B, 2 Door, 36x48x22	A	12350	Yes
C06M0	Cabinet, U/C/B, 1 PBD, 2 DR, 1 File DR	A	12350	Yes
C09F0	Cabinet, U/C/B, 2 Half Drawer, 2 Door,	A	12350	Yes
CB020	Cabinet, W/H, 2 Shelf, 1 DO, Sloping T	A	12350	Yes
CE030	Cabinet, W/H, 2 SH, 2 GDO, Sloping Top	A	12350	Yes
CE040	Cabinet, W/H, 2 SH, 2 GDO, Sloping Top	A	12350	Yes
CS010	Sink, SS, Single Compartment, 7.5x12x1	A	15405	No
CS090A	Sink, SS, Single Compartment, 7.5x16x1	A	15405	No
CS140A	Sink, SS, Single Compartment, 10x16x13	A	15405	No
CS150	Sink, SS, Single Compartment, 10x19x16	A	15405	No
CS200	Sink, SS, Single Compartment, 12x28x16	A	15405	No
CT030	Countertop, High Pressure Laminate	A	06200	No
CT060A	Countertop, Solid surface	A	06200	No
E0048A	Workcenter, Free standing	C		No
E0078	Workstation, L-Shaped w/Peninsula, Freestanding	C		No
E0096	Workstation, L-Transaction 72, Free Standing	C		No
E0117	Workstation, Straight, Free Standing	C		No
E0123	Workstation, Straight, Free Standing	C		No
E0210	Worksurface, w/Overhead Cab, Wall Mtd,	C		No
E0218	Worksurface, w/Overhead Cab, Wall Mtd,	C		No
E0222	Worksurface, Computer, O/H Cab, Wall	C		No
E0224	Worksurface, Computer, O/H Cab, Wall M	C		No
E0903	Locker, Supply, w/Shelves, Wall Mtd, 2	C		No
E0906	Locker, Supply, General, Wall Mtd, 23"	C		No
E0912	Locker, Supply, Med Surg, Wall Mtd, 23	C		No
E0915	Locker, Supply, Medication, Wall Mtd,	C		No
E0921	Transporter, Locker, Supply, 27"W x 25	C		No
E0948	Cart, General Storage, Mobile, 42"H x	C		No
E0954	Cart, Emergency, Mobile, 66"H x 52"W x	C		No
E1500	Rail, MOD, W/MNTD, HX144XD	C		No
F0102A	Mail distribution sorter cabinet and table	A	10900	No
F0110	Bookcase, 3 Shelf	C		No
F0120	Bookcase, Executive, 3 Shelf, Wood	C		No
F0205	Chair, Side With Arms	C		No
F0210	Chair, Side, Without Arms	C		No
F0220	Chair, Conference	C		No
F0225	Chair, Dining Room	C		No
F0230	Chair, Drafting, Rotary	C		No
F0235	Chair, Executive, Side	C		No
F0245	Chair, Executive, Rotary, Highback	C		No
F0280	Chair, Swivel, Low Back	C		No
F0285	Chair, Secretarial, Tilt Back, Adjusta	C		No
F0295	Chair, Stacking, 34 X 21 X 24	C		No
F0305	Chair, Waiting Room, Single	C		No
F0340	Stool, Self Adjusting	C		No
F0355	Footstool, Straight	C		No
F0405	Cabinet, Filing, Full Height, 4-5 Draw	C		No
F0410	Cabinet, Filing, Half Height, 2 Drawer	C		No
F0415	Cabinet, Filing, Lateral, Full Height	C		No
F0420	Cabinet, Filing, Lateral, Half Height	C		No
F0465	Cabinet, Storage, 2 Door, 5 Shelf	C		No
F0470	Cabinet, Television / Video Recorder	C		No
F0500	Cart, Janitor's	C		No
F0510	Cart, Linen, Soiled	C		No
F0515	Cart, Supply, Linen	C		No
F0530	Cart, Trash	C		No
F0545	Cart, Library, Mobile	C		No
F0650	Desk, Executive, Wood, 30 x 72 x 36	C		No
F0695	Workstation, Computer, Open	C		No
F0710	Table, Computer, With Print Shelf	C		No
F0715	Carrel, Study Table	C		No
F0740	Table, Occasional, Lamp, 20 x 27 x 27	C		No
F0750	Table, Office, (size as required)	C		No
F0755	Table, Conference, Wood, 30 x Var x Va	C		No

JSN	NOMECLATURE	CATEGORY	SECTION	REQUIRED
F0775	Table, Work, 2 Drawer, 32 x 72 x 30	C		No
F0795	Table, Dining	C		No
F0855	Table, Typing, Mobile	C		No
F0855A	Table, Printer	C		No
F2000	Basket, Wastepaper, Round, Metal, 18 H	C		No
F2005	Basket, Wastepaper, Executive, Wood, 1	C		No
F2010	Basket, Wastepaper, Step-On	C		No
F2020	Can, Trash, 44 Gallon	C		No
F2026	Container, Recycling, Large	C		No
F2300	Rack, Magazine, Wall Mounted	C		No
F2305	Rack, Magazine, F/S	C		No
F2310	Rack, Pamphlet, Wall Mounted	A	10900	Yes
F2490	Cleaner, Carpet / Floor, Vacuum, Porta	C		No
F2520	Imprinter, Clock, Day / Date / Time	C		No
F2540	Shredder, Paper, Security	C		No
F3010	Board, Bulletin, 48 x 48	A	10900	Yes
F3025	Board, Bulletin, Wood Framed, 36 x 24	A	10900	Yes
F3050	Whiteboard, Dry Erase, 36 x 48	A	10900	Yes
F3055	Whiteboard, With Sliding Panels	A	10900	Yes
F3200	Clock, Battery, 12" Diameter	C		No
F3230	Rack, Hat / Coat, Wall Mounted	A	10900	Yes
K1552	Brewer, Coffee, Auto, Elect, 3 Burner	C		No
K4665	Oven, Microwave, Consumer	C		No
L0100	Microscope, Binocular	C		No
L0210	E.I.A. Analysis System, Basic	C		No
L0990	Analyzer, Urine, Basic	C		No
L1180	Dilutor, 1:25,000 Dilution	C		No
L1182	Refractometer	C		No
L1200	Cabinet, Specimen, Pass Thru, CRS	A	10800	No
L1300	Centrifuge, Small, Blood Typing, 2 Spe	C		No
L1350	Centrifuge, Table, Small, 3200 RPM, 6	C		No
L1400	Centrifuge, Microhematocrit, 24 Tube	C		No
L1502	Centrifuge, Tabletop	C		No
L1680	Centrifuge, Refrigerated, Benchtop	C		No
L2290	Hood, Laminar Flow, Horizontal, Bench	C		No
M0030	Audiometer, Diagnostic	C		No
M0041A	Booth, Audio, Double Wall, Suite, Cust	A	13334	No
M0385	Projector, Multimedia/Data	C		No
M0410	Screen, Projection, 70x70	A	10900	Yes
M0415	Projector, Slide, Carousel	C		No
M0430	Recorder / Player, Cassette, Video	C		No
M0500	Television, Color, 20" Diagonal	C		No
M0507	Video Teleconferencing System	C		No
M0510	TV/VCR Combination	C		No
M1410	Chair, Laboratory, Blood Drawing, w/St	C		No
M1620	Holder, Chart, Patient, Wall or Door M	A	10900	No
M1800	Computer, Microprocessing	C		No
M1802	Wall Mounted, Fold Down Computer	C		No
M1805	Copier, Bench Top	C		No
M1810	Copier, Floor Standing, w/Collator	C		No
M1820	Imprinter, Data Record, Electric	C		No
M1825	Printer, Computer	C		No
M1830	Printer, Label, Pharmacy	C		No
M1850	Typewriter, Electric	C		No
M1855	Facsimile Machine	C		No
M2015	Cabinet, Storage, Flammable, Freestand	C		No
M2020	Cabinet, Storage, Safety, Built-In, Ve	A	11601	No
M2025	Rack, Storage, Cylinder, Gas	A	05500	Yes
M2055	Shelving, Storage, Wire, CRS, w/Adjust	C		No
M2070	Shelving, Storage, 77hx36wx18d	C		No
M2080A	Shelving, Storage, Solid, CRS,w/Adjust	C		No
M3070	Hamper, Linen, Mobile, w/Lid	C		No
M3072	Frame, Infectious Waste Bag w/Lid	C		No
M4040	Scale, Weighing, 300 Pound Capacity	C		No
M4100	Sphygmomanometer, Aneroid, Wall Mounte	C		No
M4116	Monitor, Vital Signs	C		No
M4200	Otoscope/Ophthalmoscope, Wall Mounted	C		No
M4255	Stand, IV, Adjustable	C		No
M4266	Pump, Volumetric, Infusion, Multiple L	C		No
M4655	Stretcher, Mobile, CRS, 9 Position	C		No
M4665	Stretcher, Recovery, Surgical	C		No
M4705	Wheelchair, Patient Transport, Folding	C		No

JSN	NOMECLATURE	CATEGORY	SECTION	REQUIRED
M5010	Desk, Fitting/Dispensing, Optical	C		No
M5016	Desk, Refraction w/console, w/o Sink	A	11702	Yes
M5025	Table, Instrument, Ophthalmic, Adjusta	C		No
M5027	Table, Multiple Instrument, Ophthalmol	C		No
M5030	Stool, Ophthalmology, Revolving	C		No
M5500	Autorefractor, Ophthalmic	C		No
M5510	Camera, Fundus, Digital	C		No
M5520	Lensometer	C		No
M5530	Lamp, Slit, w/Applanation Tonometer	C		No
M5535	Ophthalmoscope, Binocular, Indirect	C		No
M5545	Ophthalmometer/Keratometer	C		No
M5555	Perimeter, Automated	C		No
M5560	Projector, Acuity w/Stand, Wall Mounted	C		No
M5570	Armed Forces Vision Tester	C		No
M5575	Tonometer, Noncontact	C		No
M5600	Unit, Exam, Eye, w/Motor Chair, Phorop	C		No
M5700	Frame Set, Lens, Trial	C		No
M5705	Gauge, Distance, Pupillary	C		No
M5735	Warmer, Spectacle, Plastic	C		No
M6045	Corneal Topography Unit	C		No
M7405	Light, Exam, Ceiling Mounted	A	16553	No
M7665	Defibrillator/Monitor/Recorder Automat	C		No
M7710	Electrocardiograph, 12 Lead, Portable	C		No
M7905	Oximeter, Pulse	C		No
M7910	Thermometer, Electronic	C		No
M8810	Stand, Mayo	C		No
M8830	Table, Instrument/Dressing, Mobile, 34	C		No
M8945	Stool, Surgeon, Revolving	C		No
M9020	Table, Exam, Pediatric, With Scale	C		No
M9025	Table, Examination/Treatment, With Cab	C		No
P1965	Eyewash Station, Eye/Face, Sink Mounted	A	15405	No
P3070	Lavatory, Vitreous China, Under or Cou	A	15405	No
P3100	Lavatory, Vitreous China, Slab Type	A	15405	No
P4700	Sink, Mop, Molded Stone, 10x36x24	A	15405	No P5040 Shower, Single, Hand-Held
P6350	Sink, Flushing Rim, China, 18x26x22	A	15405	No
P8150	Urinal, Wall Hung	A	15405	No
P9050	Toilet, Wall Hung, Siphon Jet	A	15405	No
R2201	Fountain, Water, CRS, Wall Mounted, 2	A	15405	No
R2202	Fountain, Water, CRS, Wall Mounted, Ha	A	15405	No
R4780	Ice Maker, 500 Pound	A	11702	No
R6110	Refrigerator, 2 Swing Door, Shelves, 4	C		No
R6200	Refrigerator, U/C or F/S, 5 Cu Ft, 35x	C		No
R7000	Refrigerator, 14 Cubic Feet, 64x28x29	C		No
T0801	Workbench, Electric, Locker Base, 34	C		No
U0010	Analyzer, Chemistry, Point Of Use	C		No
U0385	Ceiling mounted projector bracket	A	10900	No
U1000	Distilled Water Center	A	11702	No
U2000A	Pharmacy disp syst, P2000 Server	C		No
U2000B	Pharmacy disp syst, P2000 HUB	C		No
U2000C	Pharmacy disp syst, P2000 HUB	C		No
U2000D	Pharmacy disp syst, Baker RxPorts Cabinets	C		No
U2000E	Pharmacy disp syst, Imaging Station	C		No
U2000F	Pharmacy disp syst, Filling/ Checking Station	C		No
U2000G	Pharmacy disp syst, Imaging Station	C		No
U2000H	Pharmacy disp syst, Filling/ Checking Station	C		No
X1170	Cabinet, Filing, Film, 5 Shelves, 88x3	C		No
X1400	Holder, Cassette, Vertical, With Bucky	F		No
X1426	Imager, Dry, Chemisry, 14" x 17"	C		No
X3150	Rack, Apron/Gloves, Wall Mounted	A	11475	Yes
X3830	Illuminator, Film, Single, Wall Mounte	C		No
X3930	Illuminator, Film, Double, Wall Mounte	C		No
X3990	Illuminator, Film, 4 Panels, Wall Moun	C		No
X4100	Console, PACS, Diagnostic, Reporting	F		No
X4130	Juke Box, Optical Disk, PACS	F		No
X4150	Processor, Computed Radiography Plate	F		No
X5700	Radiographic Unit, 65 kW, Non-Tilt Tab	F		No

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 11 - EQUIPMENT

SECTION 11702

MEDICAL EQUIPMENT, MISCELLANEOUS

09/99

-- End of Section Table of Contents --

SECTION 11702

MEDICAL EQUIPMENT, MISCELLANEOUS
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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 167	(1996) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A 366/A 366M	(1997) Commercial Quality (CS) Steel, Carbon, (0.15 Maximum Percent) Cold-Rolled
ASTM B 221M	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA LD 3	(1995) High-Pressure Decorative Laminates

1.2 RELATED REQUIREMENTS

Section 11700, "General Requirements for Medical and Dental Equipment" applies to this section with the additions and modifications specified herein.

1.3 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Item M5016, Desk, refraction w/console, w/o sink

Item R4780, Ice maker, 500 pound

Item U1000, Distilled water center

SD-03 Product Data

Item M5016, Desk, refraction w/console, w/o sink

Item R4780, Ice maker, 500 pound

Item U1000, Distilled water center

Submit equipment lists and manufacturer's literature for each specified item. Include manufacturer's standard colors and patterns for laminated plastic items.

SD-10 Operation and Maintenance Data

Item M5016, Desk, refraction w/console, w/o sink

Item R4780, Ice maker, 500 pound

Item U1000, Distilled water center

Submit data package in accordance with Section 01780, "Operation and Maintenance Data."

PART 2 PRODUCTS

2.1 MATERIALS

Items not specified otherwise shall conform to the following requirements:

a. Aluminum alloy: Equivalent in ultimate tensile, yield, and shear strengths to Alloy 6063-T5 or 6063-T6; conforming to ASTM B 221M.

b. Carbon steel: ASTM A 366/A 366M.

c. Laminated plastic: NEMA LD 3; colors and patterns as selected by the Contracting Officer from the manufacturer's standard colors and patterns.

d. Stainless steel: ASTM A 167, Type 301, 302, or 304. Exposed surfaces shall have a satin finish or a minimum No. 3 polished finish.

2.2 ITEMS

2.2.1 Item M5016, Desk, Refraction w/console, w/o sink

Delivery/Desk Cabinet with storage cabinet. Approximate size: 736 mm wide by 1473 mm long by 774 mm high . Unit shall include counterbalanced slit lamp, full auto switch, indirect ophthalmoscope control with hanger and overhead lamp. Power: 120 Volts, 15 amp, 60 HZ.

Topcon (800-523-0265) model Omni-II meets this specification.

2.2.2 Item R4780, Ice Maker, 500 Pound

Ice dispenser shall be freestanding. UL listed; conform to UL 250; self-contained, air-cooled condenser, minimum 267 Kg of flaked ice per 24 hours at 70 degree air temperature and 50 degree water temperature. Bin capacity shall be 136 Kg . Exterior cabinet shall be baked enamel. Provide solid-state automatic temperature controls, built-in self-analyzing integrated circuit, removable front access panels, and bin of polyurethane construction. Approximate size: 1020 mm high by 1220 mm wide by 720 mm deep. Power: 120 volt, single phase, 20 Amp, 60 HZ.

IMI Cornelius Inc. (800-238-3600) model AF725-P-SCR meets this specification.

2.2.3 Item U1000, Distilled Water Center

Programmable water dispensing unit. Capable of dispensing precisely measured amounts of purified water. Shall have a menu driven control panel and Bar Scan Technology. Battery powered.

Innovative Medical Services (619-596-8600) model Fillmaster 1000e meets this specification.

PART 3 EXECUTION

3.1 INSTALLATION

Install items at locations indicated. Conform to installation provisions of Section 11700, "General Requirements for Medical and Dental Equipment." Provide final utility connections and utility service to equipment, including waste, under Sections 15405, "Plumbing, Hospital".

3.2 FIELD QUALITY CONTROL

3.2.1 Tests

Test each item to ensure equipment is operational and conforms to specification requirements.

3.2.2 Inspection

Examine each item for visual defects and conformance to specifications.

-- End of Section --

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DIVISION 12 - FURNISHINGS

SECTION 12350

CASEWORK FOR MEDICAL FACILITIES

04/99

-- End of Section Table of Contents --

SECTION 12350

CASEWORK FOR MEDICAL FACILITIES
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 920 (1998) Elastomeric Joint Sealants

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 each type of cabinet and related item. The drawings shall clearly indicate the complete plan and elevations of the cabinets and accessories and pertinent details of construction, fabrication, and attachments.

SD-03 Product Data

Casework

Manufacturer's printed data, catalog cuts, and instructions for installation and cleaning.

SD-04 Samples

Casework; G|RE

In lieu of individual samples, complete minimum size casework 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. Melamine plastic color samples approximately 50 x 75 mm size.

d. Stain/color samples shall be approximately 50 x 75 mm size.

SD-07 Certificates

Casework

Certificates attesting that the casework meets the requirements specified.

1.3 DELIVERY AND STORAGE

Casework shall be delivered to the jobsite wrapped in a protective covering. Casework shall be stored in an adequately ventilated, dry location that is free of dust, water, or other contaminates and in a manner to permit access for inspection and handling. Casework 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 MATERIALS AND FINISH

2.1.1 Metal Casework

Carbon steel with baked enamel finish, unless otherwise indicated or specified. Color of finish shall be in accordance with color schedule as indicated on the Finish Identification Drawings. Locations as indicated on the Finish Identification Drawings. Fisher Hamilton Steel casework meets this specification. All medical casework shall be steel unless noted otherwise.

2.1.2 Laminate Casework

Plywood core or particleboard core, at the manufacturer's option, covered with laminated plastic sheets. Pattern, color and finish of decorative laminated plastic for exteriors of casework shall be in accordance with color schedule as indicated o the Finish Identification Drawings. Locations as indicated on the Finish Identification drawings. Fisher Hamilton plastic laminate casework meets this specification.

2.2 CASEWORK

Casework items are identified on drawings with numbers preceded by the letter "C". These numbers are Joint Schedule Numbers, with are the same in MIL-C-20709 and MIL-STD-1691. Casework shall be as indicated in the schedules and drawings. Equipment listed below is Contractor furnished and Contractor installed.

JSN Number	Description
C02B0	Cabinet, Undercounter Base Unit with two shelves and one door. 91 cm (36 inches) high by 61 cm (24 inches) wide by 56 cm (22 inches) deep.
C02C0	Cabinet, Undercounter Base Unit with one adjustable shelf, one door and one full width drawer. Provide left or right hand door as indicated on the drawings. 91 cm (36 inches) high by 61 cm (24 inches) wide by 56 cm (22 inches) deep. Provide key lock as indicated and scheduled on drawings.
C02D0	Cabinet, Undercounter Base Unit, with four equal height drawers, 91 cm (36 inches) high by 61 cm (24 inches) wide by 56 cm (22 inches) deep.
C02Q0	Cabinet, Undercounter Sink base Unit with hinged door. Provide left or right hand door as indicated on the drawings. 91 cm (36 inches) high by 61 cm (24 inches) wide by 56 cm (22 inches) deep.
C03E0	Cabinet, Undercounter Base Unit with two hinged doors, one drawer and one shelf. 91 cm (36 inches) high by 76 cm (30 inches) wide by 56 cm (22 inches) deep. Provide key lock as indicated and scheduled on drawings.
C03F0	Cabinet, Undercounter Base Unit with one shelf, two half drawers and two doors. 91 cm (36 inches) high by 76 cm (30 inches) wide by 56 cm (22 inches) deep. Provide key lock as indicated and scheduled on drawings.
C03H0	Cabinet, Undercounter Base Unit with two half width drawers side-by-side above three full width drawers. 91 cm (36 inches) high by 76 cm (30 inches) wide by 56 cm (22 inches) deep.
C03J0	Cabinet, Undercounter Base Unit, with eight half width drawers, 91 cm (36 inches) high by 76 cm (30 inches) wide by 56 cm (22 inches) deep. Provide key lock as indicated and scheduled on drawings.
C03P0	Cabinet, Undercounter Sink Base Unit with two hinged doors. 91 cm (36 inches) high by 76 cm (30 inches) wide by 56 cm (22 inches) deep.
C04E0	Cabinet, Undercounter Base Unit with two hinged doors, drawer and shelf. One full width drawer and one adjustable shelf.

JSN Number	Description
	91 cm (36 inches) high by 91 cm (36 inches) by and 56 cm (22 inches) deep.
C04J0	Cabinet, Undercounter Base Unit, with eight half width drawers, 91 cm (36 inches) high by 91 cm (36 inches) wide by 56 cm (22 inches) deep. Provide key lock as indicated and scheduled on drawings.
C04L0	Cabinet, Undercounter Base Unit, with a full width drawer above three half width drawers alongside a solid right or left door/cupboard, 91 cm (36 inches) high by 91 cm (36 inches) wide by 56 cm (22 inches) deep. Provide key lock as indicated and scheduled on drawings.
C04P0	Cabinet, Undercounter Sink Base Unit with two hinged doors. 91 cm (36 inches) high by 91 cm (36 inches) wide by 56 cm (22 inches) deep.
C05E0	Cabinet, Undercounter Base Unit with an adjustable shelf, a full width drawer and two hinged solid doors. 91 cm (36 inches) high by 122 cm (48 inches) wide by 56 cm (22 inches) deep.
C05P0	Cabinet, Undercounter Sink Base Unit with two hinged doors. 91 cm (36 inches) high by 122 cm (48 inches) wide by 56 cm (22 inches) deep.
C06M0	Cabinet, Undercounter Base Unit with a pullboard above two drawers and file drawer. 76 cm (30 inches) high by 46 cm (18 inches) deep.
C09F0	Cabinet, Undercounter Base Unit with two half width drawers above solid hinged doors. 76 cm (30 inches) high by 91 cm (36 inches) wide by 56 cm (22 inches) deep. 30x36x22
CB020	Cabinet, Wall Hung with two adjustable shelves and one hinged door. 76 cm (30 inches) high by 61 cm (24 inches) wide by 33 cm (13 inches) deep. Provide left or right hand drawer as indicated on drawings.
CE030	Cabinet, Wall Hung with two hinged glazed doors, two adjustable shelves and a single pane in each door. 76 cm (30 inches) high by 76 cm (30 inches) wide by 33 cm (13 inches) deep. Provide key lock as indicated and scheduled on drawings.
CE040	Cabinet, Wall Hung with two hinged glazed doors, two adjustable shelves and a single pane in each door. 76 cm (30 inches) high by 91 cm (36 inches) wide by 33 cm (13 inches) deep. Provide key lock as indicated and scheduled on drawings.
CT030	Countertop, Plastic Laminate, Size As Indicated On Drawings. Plastic laminate countertop. Countertop shall be a minimum of 6 mm (1/4 inch) thick working surface and 10 cm (4 inch) high splash backformed of one piece of plastic laminate with a minimum of 6 mm (1/4 inch) cove at intersection of top and splash back. Countertop front and sides, and splash back top and sides shall be covered with plastic laminate and be self-edged. Intersections of all plastic laminate covered surfaces with the exception of post-formed intersections shall be a 90 degree nominal angle broken with an edge bevel to elimate sharp line angles. Countertops 3.6 m (12 feet) or less in length shall be in one piece. Colors of plastic laminate shall be as specified on drawings. Refer to Section 06200, FINISH CARPENTRY.

PART 3 EXECUTION

3.1 INSTALLATION

Casework shall be located as indicated. The installation of the casework shall not damage the

work of other trades. The casework shall be secured in place in true alignment, level, and plumb. Units shall be secured with screws through backs to cleats that have been anchored to building structure with toggle or expansion bolts. Wall-hung cabinets shall be installed to support the weight of the cabinets plus the normally expected weight of the contents of the cabinets. Fasteners shall be spaced 300 mm on center using at least three bolts in each 900 mm or 1200 mm unit width. Adjoining cabinets in an assembly shall be joined together at top and bottom with inconspicuous bolts or clips. Cabinets shall be bolted to bases at cabinet corners. Metal bases shall be faced with resilient material similar to the base provided for the space adjacent to the cabinets. Where base cabinets and counters are removable, wall anchors shall be readily accessible. Joints between the casework and wall surfaces which are not larger than the joints between casework sections shall be sealed flush with sealant conforming to ASTM C 920, Type M, Grade NS, Class 25, Use NT. Larger joints shall be closed with filler strips of the same material and finish as adjacent casework. Filler strips shall be cut to the contour of the wall surface and secured to the casework with concealed nails or screws. Width of filler strips shall not exceed 150 mm in width. Metal cabinets in rooms having terrazzo or ceramic-tile floors shall be set on concrete or masonry bases with exposed faces finished the same as other bases in the room. Height of counter tops shall be as indicated on the drawings. Where required, toe space at front of cabinets shall be provided by installing front face of cabinets 75 mm in front of face of base. Where toe space is not required, face of base and cabinets shall be flush. Bases shall have a height of approximately 100 mm. All items shall be installed as required for proper operation in accordance with the manufacturer's directions.

3.2 CLEANING

Cabinets and countertops shall be cleaned in accordance with manufacturer's instructions.

-- End of Section --

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DIVISION 12 - FURNISHINGS

SECTION 12680

WALK-OFF MAT

09/93

-- End of Section Table of Contents --

SECTION 12680

WALK-OFF MAT
09/93

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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 2047	(1993) Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine
ASTM E 648	(1997) Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source

1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures"

SD-02 Shop Drawings

Walk-off mat

4 samples of drawings showing layout of mat/grid and frame including installation and accessory detail.

SD-03 Product Data

Walk-off mat

4 sets of product data to include manufacturer's specifications, installation instructions and maintenance recommendations.

SD-04 Samples

Walk-off mat

4 samples a minimum of 300 x 300 mm of mat, including tread strips in carpet and finish to be provided. Submit a corner section of mat frame showing mitered joint and method of anchorage.

1.3 QUALITY ASSURANCE

Flammability in accordance with ASTM E 648, Class I, Critical Radiant Flux, minimum 0.45 watts/cm. Slip Resistance in accordance with ASTM D 2047, Coefficient of Friction, minimum 0.60 wet for all accessible routes. Obtain floor mat/grid system from one source of a single manufacturer. Use 6061-T6 and 6105-T5 or T304 structural aluminum/stainless alloys for rail components.

1.4 DELIVERY, STORAGE AND HANDLING

Deliver materials to the project site ready for use and fabricated in as large sections and assemblies as practical, in unopened original factory packaging clearly labeled to identify manufacturer.

1.5 COORDINATION, SCHEDULING AND PROJECT CONDITIONS

Verify field measurements prior to fabrication. Check actual openings for mats/grids by accurate field measurements before fabrication of product. Coordinate fabrication schedule with construction progress to avoid delay of work. Do not position splices in wider units (above 2 meters) in the center of a door opening. For recess application coordinate frame installation with concrete construction to ensure recess and frame anchorage are accurate and that the base is level and flat. Defer frame installation until building enclosure is complete and related interior finish work is in progress.

PART 2 PRODUCTS

2.1 RECESSED WALK-OFF MAT WM-1

Provide extruded 6105-T5 aluminum alloy multiple low profile tread planks, joined by a dual durometer PVC combination hinge to comprise overall grid length (traffic direction). Materials to have perforations between each tread rail for drainage. Mat is to have rollback capability for cleaning. Finishes to be as indicated on drawings.

2.1.1 Tread Rails

Extruded 6105-T5 aluminum alloy multiple low profile tread planks.

a. Tread Rail Spacing: 38.1 mm on center.

b. Aluminum Finish: As indicated on drawngs.

c. Rolling load capacity: 1000 Lbs. per wheel.

d. Class: Class 1.

e. Mat depth: 17.5 mm.

f. Slip resistance coefficient of friction: 0.63.

g. Tread inserts: heavy-duty carpet tread inserts shall be colorfast, 100 percent solution dyed type 6,6 nylon, with 12 mil monofilament. Each carpet fiber and monofilament shall be fusion bonded to a rigid two-ply backing to prevent fraying and be supplied in continuous splice-free lengths. Anti-static carpet fiber shall contain anti microbial additive and be treated with Scotchgard to reduce soiling. Carpet weight shall be a minimum of 33 ounces per square yard. Color to be as indicated on drawings.

2.1.2 Fabrication

Shop fabricate and shop cut tread rails to custom size as indicated on drawings. Verify field measurements prior to fabrication of product. Defer installation of product until building enclosure is complete and related interior work is in final stages.

PART 3 EXECUTION

3.1 INSTALLATION

Install recessed frame and walk-off mat to comply with manufacturer's instructions at locations indicated and with top of frame and mat in relationship to one another and to adjoining finished flooring as recommended by manufacturer. Set top of mat at height for most effective cleaning action and coordinate top of mat surface with doors that swing across mat to provide clearance under door.

3.2 PROTECTION

After completing frame installations, provide temporary filler or plywood or fiberboard in mat recess and cover frame with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near time of Substantial Completion.

-- End of Section --