SECTION 04220--CONCRETE MASONRY UNITS

PART 1--GENERAL

SUMMARY:

The Subcontractor shall provide all plant labor and materials to lay masonry walls, complete with accessories, reinforcing, mortar, grout fill, caulking, cell insulation, etc., as required by the drawings and these specifications. The Subcontractor shall be responsible to provide temporary bracing as required to support walls during construction against winds and other loading until permanent support provided by additional crosswalls, roofs, etc., is installed.

Work includes, but is not limited to:

Furnish and install concrete masonry unit walls as shown on drawings.

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent designated herein:

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 530	Building Code Requirements for Masonry Structures

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 82	Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
ASTM A 615	Standard Specification for Deformed and Plain Billet-Steel Bar for Concrete Reinforcement
ASTM C 90	Standard Specification for Load-Bearing Concrete Masonry Units (CMU)
ASTM C 140	Standard Test Methods for Sampling and Testing Concrete Masonry Units
ASTM C 144	Standard Specification for Aggregate for Masonry Mortar
ASTM C 150	Standard Specification for Portland Cement
ASTM C 207	Standard Specification for Hydrated Lime for Masonry Purposes
ASTM C 270	Standard Specification for Mortar for Unit Masonry
ASTM C 331	Standard Specification for Lightweight Aggregates for Concrete Masonry Units
ASTM C 404	Standard Specification for Masonry Grout
ASTM C 476	Standard Specification for Grout for Masonry
ASTM C 780	Standard Test Method for Prognostication and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
ASTM C 1019	Standard Test Method for Sampling and Testing Grout

INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)

UBC Uniform Building Code, 1997 Edition

SUBMITTALS:

Submittals include, but are not limited to the following:

Samples: Submit CMU samples for testing.

Product Data: Complete description of each type of masonry unit product and accessory, joint reinforcing, anchors, and other manufactured products specified.

Certificate of Materials: Prior to delivery of materials to jobsite, submit certification from manufacturer indicating curing, moisture content and linear shrinkage of all CMU for compliance with these specifications. Certify mortar and grout compliance. Certify that CMU delivered to the site are manufactured, cured and dried in the same manner as samples submitted and are equal in quality, strength and appearance.

See Section 01300, Submittals, and the Vendor Data Schedule for additional submittal requirements.

QUALITY CONTROL:

Qualifications of Workmen: Cutting and placing shall be done by skilled journeyman masons who are thoroughly experienced with materials and methods specified. Provide one skilled journeyman mason at all times too personally direct masonry work.

Regulatory Requirements (Codes and Standards): Comply with provisions of the following codes and standards, unless otherwise specified herein:

ACI 530.1 Specification for Masonry Structures
UBC Chapter 21, Masonry

Inspection: Inspection of structural CMU walls will be arranged for by the Contractor. The installation of concrete unit masonry will be inspected at no cost to the Subcontractor. However, this shall not relieve the Subcontractor from responsibility for the accuracy of the work in all details and compliance with specifications.

Contractor Supplied Testing: Provide 10 CMU samples representative of a production run for testing in accordance with ASTM C 140. Samples of mortar and grout may be taken by the testing agency, at no additional cost to the Subcontractor.

PRODUCT HANDLING:

Protect masonry material during storage and construction from rain, snow, ground water or materials likely to cause staining. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

Protect reinforcements and anchors from weather. Do not use metal reinforcing or anchors having rust or foreign coatings.

Do not use masonry units that contain ice or frost.

Do not use masonry units with chips, cracks, or voids that are not minor or incidental from manufacturing.

Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

PART 2--PRODUCTS

CONCRETE BLOCK:

General: Obtain masonry units from one manufacturer, of uniform texture and color for each kind required, for each continuous area, and visually related areas.

Concrete Masonry Units (CMU): Concrete masonry units shall be hollow, load bearing type. The units shall not contain any deleterious matter, which can stain adjacent construction work or corrode metal. The blocks shall conform to ASTM C 90 and as follows:

Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.

Weight Classification: Lightweight.

CMU Cells: Cells to be grouted shall meet the minimum dimension requirements in Table 21-C of the UBC.

MORTAR AND GROUT COMPONENTS:

Portland Cement: ASTM C 150, Type I-II, nonstaining, without air-entrainment, natural color.

Hydrated Lime: ASTM C 207, Type S.

Aggregates: Clean, sharp, well graded, and free from injurious amounts of dust, lumps, shales, alkali, surface coatings, and organic matter.

For Mortar: ASTM C 144.
For Grout: ASTM C 404.

Potable Water: Water shall be clean, fresh, and free from injurious amounts of oil, acid, salt, alkali, salt or organic matter.

MORTAR AND GROUT MIXES:

General: Proprietary, premeasured and prebagged mortar and grout may be substituted for field mixed mortar and grout when constituents and design performance can be certified by manufacturer, as being in compliance with this specification.

Mortar: Mortar shall conform to ASTM C 270, Type "S", 1800-psi minimum compressive strength in 28 days.

Grout: Grout shall conform to ASTM C 476, Type "Coarse Grout", having a minimum compressive strength of 2000 psi in 28 days.

Admixtures: Use of admixtures is prohibited, except when approved by the Contractor.

ACCESSORIES:

Reinforcing Bars: Reinforcing bars shall conform to ASTM A 615, Grade 60.

Horizontal Joint Reinforcement: Horizontal joint reinforcement shall conform to ASTM A 951, and shall consist of two deformed longitudinal rods welded at 16 in. intervals to a continuous diagonal cross rod forming a truss design. Out to out spacing of side rods shall be approximately 2 in. less than the nominal thickness of the wall or wythe. Provide minimum No. 9 gage stringers and crossbands, with a minimum total effective area of 0.048 sq. in. for nominal 8 in. wall, every second course. Factory prefabricated corners and tees shall be used at all corners and intersecting walls and shall be the same gauge, finish and design as the continuous joint reinforcement. Truss type joint reinforcement shall be as manufactured by Dur-O-Wall, Hohman & Barnard, Inc., Masonry Reinforcing Corporation of America.

Miscellaneous Anchors: All other inserts and anchors such as straps, bars, bolts and ties shall be hot-dipped galvanized.

Loose-Granular Fill Insulation: Perlite complying with ASTM C 549, Type II (surface treated for water repellency and limited moisture absorption) or IV (surface treated for water repellency and to limit dust generation).

PART 3--EXECUTION

GENERAL:

Masonry shall be constructed according to the provisions the UBC Section 2104, unless otherwise indicated herein or by the drawings.

INSPECTION:

Prior to start of work, carefully inspect work of other trades and notify the Contractor's Representative of any condition that would affect performance of unit masonry. Do not proceed until discrepancies have been fully resolved. Coordinate openings required by mechanical and other trades.

Verify that concrete masonry has been completed in strict accordance with all pertinent codes and regulations, and intent of design.

JOB CONDITIONS:

Environmental Requirements: Commence masonry work only when ambient temperature is 40^{O} F for 48 hours or above and rising, or when building is enclosed, covered and heated.

Protection: Protect exposed walls with insulated blankets or other methods approved by the Contractor during cold weather.

Mortar Protection: Store mortar materials in location above 40^{O} F. Should materials be exposed to colder temperatures, heat those materials until acclimatized to 70^{O} F $\pm$ 10^{O} F.

Protective Period: All new masonry work shall be protected against freezing for a period of not less than 72 hours subsequent to laying.

PROPORTIONING AND MIXING:

Proportioning of mixes, mortar and grout shall be in accordance with ASTM C 270 and C 476, respectively.

Use mechanical mixer of one sack minimum capacity.

Do not use calcium chloride in mortar or grout.

Mortar which has stiffened due to evaporation may be retempered, only by adding water within a basin formed with the mortar and the mortar reworked into the water. Do not heat mixing water above 150^{O} F.

Deliver mortar to mason's board within 45 minutes after mixing. Any mortar or grout that has begun to set or is not used within 2-1/2 hours after initial mixing shall be discarded and removed from the project.

BOND PATTERN AND JOINT TOOLING:

Spread mortar bed joints to a uniform thickness with fresh mortar. Throwing mortar scrapings or slushing mortar into joints is prohibited. Furrowing of bed joints will not be permitted. Where no bond pattern is indicated on drawings, masonry units shall be laid in running bond. Bond corners and intersections.

Cut joints flush in concealed areas and where surface will receive ceramic tile. Tool all exposed joints smooth, dense and slightly concave, so that not less than 5/8 in. coverage occurs at joint reinforcement. Tool after mortar has taken partial set but before fully set.

Joint thickness shall be 3/8 in. and shall meet control heights indicated on drawings throughout the building.

INSTALLATION:

Lay masonry units plumb, true to line, and with accurately spaced level courses. Vertical joints shall fall on centerline of unit below. Lay up CMU such that units are more than 1/2 blocks when exposed to view wherever possible.

Use a masonry saw for masonry units requiring cutting. Do not install any broken or cracked units. Cut, drill or block out chases for other trades or as indicated on drawings.

Lay masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on the concrete floor and where adjacent to cells to be filled with grout.

Adjust each unit to final position while mortar is still soft and plastic. Remove any unit disturbed after mortar has stiffened and relay with fresh mortar.

Comply with site tolerances in ACI 530.1 and the following:

For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than ¼ inch in 20 feet, nor ½ inch maximum.

For vertical alignment of exposed head joints, do not vary from plumb by more than ¼ inch in 10 feet, nor ½ inch maximum.

For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than ¼ inch in 20 feet, nor ½ inch maximum.

For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to ½ inch. Do not vary from bed joint thickness of adjacent courses by more than 1/8 inch.

For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

Lay only surface dry units, except that in hot weather, when units are warm to the touch, surfaces only may be wetted with a light fog spray.

As work progresses, build in all items shown on the drawings. Saw cut CMU to fit around frames, ducts, pipe chases and other construction with a clearance not greater than 1/2 in. Fill spaces between masonry and doorjambs or other built-in items solidly with mortar. Fill cells receiving anchors or anchor bolts solidly with grout.

Install bond beams where shown on the drawings using load-bearing bond beam units. Reinforce as shown on the drawings and fill with grout. Unless otherwise indicated, reinforce with at least two No. 4 bars.

Lap reinforcement 48 diameters or 12 inches whichever is greater, except as otherwise shown.

Provide horizontal reinforcement above and below wall openings as shown on drawings. Extend reinforcement at least 40 diameters or 24 inches, whichever is greater, past the opening, except as otherwise shown. Unless otherwise indicated, reinforce with one No. 5 bar.

Provide vertical reinforcement at wall corners, each side of openings, and at wall ends as shown on drawings. Unless otherwise indicated, reinforce with one No. 5 bar and extend the full height of the wall.

Place horizontal joint reinforcement in every other course in accordance with manufacturer's instructions. Provide prefabricated corners and intersections to maintain continuous unbroken reinforcement. Lap ends a minimum of 24 inches.

Maintain joint bed thickness of at least twice the diameter of wire stringers and equal mortar face coverage on each face.

Maintain at least 1/2 in. clearance between reinforcement and interior faces of units. Place vertical reinforcement centered in cores, unless otherwise shown on the drawings.

Maintain masonry unit temperatures above 40^{O} F when laid.

Bolts, anchors and other inserts that attach adjoining construction should be bedded in mortar joints and held in proper position until wall is grouted.

When starting and resuming work, clean exposed surfaces of set masonry of all loose mortar and grout prior to laying fresh masonry.

GROUTING:

Grouting shall conform to the requirements and limitations of UBC Section 2104.6.

Clean all mortar drippings out of cores before grouting.

Grout all cells full.

When grouting is stopped for one hour or longer, horizontal construction joints shall be formed by stopping the pour of grout not less than 2 in. below the top of the uppermost unit grouted.

Grout shall be consolidated by mechanical vibration during placement before loss of plasticity in a manner to fill the grout space. Grout pours shall be reconsolidated by mechanical vibration to minimize voids due to water loss.

REPAIR, POINTING AND CLEANING:

Remove and replace masonry units which are loose, chipped, broken, stained, or otherwise damaged, or if units do not match adjoining units as intended. Do not cover up damaged work. Repair immediately before continuing.

Install new units to match adjoining in fresh mortar and grout, pointed to eliminate evidence of replacement.

During tooling of joints, enlarge any holes and fill with mortar. Point up joints at corners to provide a neat, uniform appearance.

At the end of each day's work, and after final pointing, clean all exposed masonry by dry brushing. Remove all spots and droppings. Take care, while cleaning, to keep from roughening tooled mortar joints.

Provide temporary bracing as required. Shore up openings and projections until grout or concrete has reached required strength.

FIELD QUALITY CONTROL:

Samples: As CMU's are unloaded and made ready to use, compare units with job samples for appearance and quality. Reject and return broken, battered or damaged block.

Test Units: In addition to preconstruction tested units, additional units (up to 10 CMU) may be taken by testing agency from stock piled units at jobsite. Units will be selected at random by Contractor's Representative.

Straight Edge: Lay 10-ft straight edge on walls at random directions and locations. Measure indentation and/or projection of wall. Compare to specified maximum tolerances. Remove or repair discrepancies as specified above.

Grout: Samples for testing of grout mixtures for complying with ASTM C 1019 may be taken at any point during grouting operations by Contractor's Representative.

Mortar: Samples for testing of mortar mixtures for complying with ASTM C 780 may be taken at any point during masonry construction by Contractor's Representative.

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

END OF SECTION 04220

SECTION 05100--STRUCTURAL STEEL AND MISCELLANEOUS METALS

PART 1--GENERAL

SUMMARY:

The Subcontractor shall supply all labor, equipment, and materials required to construct items listed hereafter and as shown on the drawings.

Work includes, but is not limited to:

- Structural steel shapes
- Metal handrails and railings
- Miscellaneous steel such as guard posts, anchors, and embedments
- Trench grating
- Sump/Pit grating.

REFERENCES:

The following documents including others referenced therein, form part of this Section to the extent designated herein.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC	Code of Standard Practice for Steel Buildings and Bridges
AISC (ASD)	Specification for Structural Steel Buildings - Allowable Stress Design (ASD) and Plastic Design

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z49.1	Safety in Welding

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	Symbols for Welding, Brazing, and Nondestructive Examination
AWS B2.1	Specification for Welding Procedure and Performance Qualification
AWS D1.1	Structural Welding Code - Steel
AWS D1.3	Structural Welding Code - Sheet Steel

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP-7	Brush-off Blast Cleaning
SSPC Paint 25	Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (without Lead and Chromate Pigments)

The following specifications are referenced in regard to materials:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36	Structural Steel
ASTM A 53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A 307	Carbon Steel Bolts and Studs, 60000 psi Tensile Strength
ASTM A 325	High-Strength Bolts for Structural Steel Joints
ASTM A 490	Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength
ASTM A 500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 572	High-strength, Low-alloy Columbium-Vanadium Steels of Structural Quality
ASTM A 611	Steel, Sheet, Carbon, Cold-Rolled, Structural Quality
ASTM A 653	Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
ASTM A 924	Sheet Steel, Zinc Coated (Galvanized) by the Hot Dip Process
ASTM A 992	Steel for Structural Shapes for Use in Building Framing

SUBMITTALS:

Submittals include, but are not limited to the following:

Shop Drawings: Submit shop drawings including all shop and erection details, and members (with their connections) not shown on the Subcontractor drawings. All welds shall be indicated by standard welding symbols of AWS A2.4.

Welders: Submit certified copies of welders qualification test records.

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

QUALITY CONTROL:

Qualification for Welding Work:

Off-Site: Qualify welding processes and operators for shop welding in accordance with AWS D1.1. Short arc gas process (GMAW-S) not allowed

On-Site: Qualify welding operators for on-site (field) welding in accordance with the INEEL Welding Manual. On-site welding will be performed to WPS C3.5 as applicable. Short arc gas process (GMAW-S) not allowed. All welders shall be qualified at the INEEL Welder Test Facility.

DELIVERY, STORAGE AND HANDLING:

Store material to permit easy access for inspection and identification. Protect members and materials from corrosion and deterioration.

Do not store materials in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials that do not meet these specifications.

PART 2--PRODUCTS

MATERIALS:

Structural Steel W Shapes: ASTM A 992, except where other type steel is indicated.

Structural Steel C, S, M, and HP Shapes: ASTM A 36, except where other type steel is indicated.

Miscellaneous Steel Plates, Angles and Bars: ASTM A 36, except where other type steel is indicated.

Cold-Formed Steel Tubing: ASTM A 500, Grade B.

Steel Pipe: ASTM A 53, Type E or S, Grade B or ASTM A 120, Grade B.

Shop Painting: Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint.

Apply one shop coat of steel prime paint to joists and accessories, by spraying, dipping, or other method to provide a continuous dry paint film thickness of not less than 0.50 mil.

Sump/Pit Grating:

Floor grating shall be welded, open steel bar type with bearing bars as indicated on the drawings. Acceptable manufacturers and types include the following:

Klemp Grating Type KW by Klemp Corporation

Ry-Weld Standard Grating by Ryerson, Inland Steel Company.

Grating shall be 1 1/2 in. deep, galvanized steel "Grip Strut" Grating as manufactured by GS Metals.

Grating shall be capable of supporting a uniform load of 100 psf over the clear spans shown on the drawings with a deflection no greater than L/360 as a minimum. All grating edges shall be banded.

Trench Grating: Trench grating shall be cast ductile iron for H-20 loading. Acceptable manufacturers include the following: Multidrain Corporation.

Anchor Bolts: ASTM A 307.

Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular hexagon type, low carbon steel.

Concrete Anchors: Concrete anchors shall be wedge anchors as manufactured by one of the following manufacturers:

"Red Head" by ITT Phillips Drill Company
"Hilti Kwik-Bolt II" by Hilti Inc.

Electrodes: Comply with AWS D1.1 for shop welding. Comply with INEEL Weld Procedures indicated for field welding.

Structural Steel Primer Paint: Primer shall conform to Painting Section 09900 SSPC Paint 25.

FABRICATION:

Shop Fabrication and Assembly: Fabricate items of structural steel in accordance with AISC ASD Specification.

Connections: Weld or bolt shop connections, as indicated. Bolt field connections, except where welded connections are indicated.

Weld Construction: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

Shop Painting:

General: Shop paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Do not paint surfaces to be welded or with "slip critical" bolted connections. Apply two (2) coats of paint to surfaces which are inaccessible after assembly or erection. See 09900--Painting for finish painting materials and requirements.

Surface Preparation: After inspection and before shipping, clean steel work to be painted. Remove loose rust, loose mill scale, and splatter, slag or flux deposits. Clean steel in accordance with SSPC SP-7 "Brush-off Blast Cleaning".

Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions.

PART 3--EXECUTION

ERECTION:

Surveys: Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to the Contractor. Do not proceed with erection until corrections have been made or until compensating adjustments have been agreed upon with the Contractor.

Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads.

Anchor Bolts: Furnish anchor bolts and other connectors required for securing steel to foundations and other in-place work. Furnish templates and other devices as necessary for presetting bolts and anchors to accurate locations.

Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base prior to packing with grout.

Setting Bases and Bearing Plates: Clean all surfaces of bond-reducing materials. Set loose and attached base plates and bearing plates on wedges or other adjusting devices. Pack grout solidly between bearing surfaces and bases or plates. Finish exposed surfaces, protect installed materials and allow to cure.

Field Assembly: Set structural steel accurately to lines and elevations indicated. Align and adjust various members before permanently fastening. Clean surfaces which will be in contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Level and plumb individual members of structure within specified AISC Code of Standard Practice tolerances.

Banding of Grating: Holes for pipe or other penetrations through grating, which are not prepared by the fabricator, shall be cut and banded in the field by the Subcontractor. Banding shall include providing A 36 material, fabrication and welding of the same in the field, and field touchup painting. Grating panels shall be split around the holes to permit easy removal. Where repaired to split grating panels, the area of exposed bearing bars shall also be banded. Banding for split grating shall be 1/4 in. material the same width as the grating thickness. Banding shall clear pipe, pipe and insulation, or other penetrating component by not less than 1 in. except where the arrangement of the hole must allow for the displacement of the pipes due to expansion or contraction without contact with the grating. When the clear opening between the banding and the pipe, and insulation or component is less than 2 in., the banding shall match the bearing bars and project 1 in. above the grating. If the clear opening is 2 in. and does not exceed 4 in., the banding shall be fabricated from material 1/4 in. thick by the grating thickness plus 4 in. so that the projection of the banding above grating will be 4 in.

Splice members only where indicated and accepted on shop drawings.

Comply with AISC, ASD Specification and Code of Standard Practice for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

Field Connections: Do not use gas cutting in field for correcting fabrication errors in structural framing:

Field Welding: Field welding shall be done in accordance with the AWS D1.1, the INEEL Welding Manual and INEEL Welding Procedure Specification C3.5.

FIELD QUALITY CONTROL:

Contractor Supplied Testing: The Contractor's Representative will inspect high-strength bolted connections and welded connections and perform tests and prepare test reports unless noted otherwise. The Contractor's Representative will perform visual inspection of all field welds in accordance with the requirements of Section 6 of AWS D1.1 as applicable. He may also perform a visual receipt inspection of shop welds.

Contractor Inspection: Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawing and specifications.

Subcontractor Supplied Testing:

Shop Welding: Certify welders, inspect and test during fabrication of structural steel per AWS D1.1 or AWS B2.1 and AISC ASD Specification. As a minimum visually inspect all welds per Section 6 of AWS D1.1 as applicable.

END OF SECTION 05100

SECTION 05400--COLD FORMED METAL FRAMING

PART 1--GENERAL:

SUMMARY:

Work includes, but is not limited to:

1. Exterior load-bearing wall framing
2. Interior load-bearing wall framing
3. Interior non-load-bearing wall framing

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent designated herein:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36	Standard Specification for Carbon Structural Steel
ASTM A 123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 568	Standard Specification for Steel, Sheet, Carbon and High Strength, low-Alloy, Hot Rolled and Cold Rolled
ASTM A 653	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process
ASTM A 780	Practice for Repair of Damaged Hot-Dip Galvanized Coatings
ASTM A 924	Specification for General Requirements for Steel Sheet, Metallic-Coated by Hot-Dip Process
ASTM C 645	Standard Specification for Nonstructural Steel Framing Members
ASTM C 954	Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plastic Bases to Steel Studs from 0.033 inch to 0.112 inch in Thickness
ASTM C 955	Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Track), and Bracing or Bridging for Screw Application of Gypsum Board and Metal Plaster Bases
ASTM C 1007	Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories
ASTM E 119	Standard Test Methods for Fire Tests of Building Construction and Materials

AMERICAN WELDING SOCIETY

AWS D1.3 Specification for Welding Sheet Steel in Structures

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI Specification for the Design of Cold-Formed Steel Structural Members

CONFERENCE ON COLD FORMED STEEL STRUCTURES (CCFSS)

Technical Bulletin, AISI Specifications Provisions for Screw Connections

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC Paint 25 Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer

SUBMITTALS:

Product Data: Submit product data for each type of cold-formed metal framing product and accessory provided. Product data shall include material certifications as indicated in the Quality Control section. Product data shall include material and section property information for each structural shape provided.

Installer Qualifications: An experienced installer who has completed cold-formed metal framing similar in material, design and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.

QUALITY CONTROL:

AISI Specifications: Comply with AISIs "Specification for the Design of Cold-Formed Steel Structural Members" and CCFSS Technical Bulletin: "AISI Specification Provisions for Screw Connections" for calculating structural characteristics of cold-formed metal framing.

DELIVERY, STORAGE AND HANDLING:

Protect cold-formed metal framing from corrosion, deformation and other damage during delivery, storage and handling. Store cold-formed metal framing off the ground, protect with a waterproof covering and ventilate to avoid condensation.

PART 2-PRODUCTS

MANUFACTURERS:

Subject to compliance with requirements, provide cold-formed metal framing by one of the following:

- Allied American Studco, Inc.
- Angeles Metal Systems
- Clark Steel Framing Industries
- Consolidated Fabricators Corp.
- Consolidated Systems, Inc.
- Dale Industries, Inc.
- Design Shape in Steel
- Dietrich Industries, Inc.
- Knorr Steel Framing Systems
- MarinoWare; Div. Of Ware Industries, Inc.
- Steel Construction Systems
- Steel Developers, LLC
- Steeler, Inc.
- Super Stud Building Products, Inc.
- Unimast, Inc.
- United Metal Products, Inc.
- Western Metal Lath.

MATERIALS:

GENERAL:

Galvanized Sections: All galvanized studs, joists and accessories, 16 gage or heavier shall be formed from steel that conforms to the requirements of ASTM A 653, with a minimum yield stress of 50,000 psi. All galvanized studs, joists and accessories, 18 gage and lighter shall be formed from steel that conforms to the requirements of ASTM A 653, with a minimum yield stress of 33,000 psi.

All galvanized studs, joists and accessories shall have a minimum G-60 coating.

Non-Galvanized Sections: Non-galvanized sections shall be formed from steel that conforms to the requirements of ASTM A 568, pretreated and primed with manufacturer's baked-on, lead- and chromate-free, rust-inhibitive primer complying with performance requirements in SSPC Paint 25. All Non-galvanized studs, joists and accessories, 18 gage or lighter shall be formed from steel with a minimum yield stress of 33,000 psi. Sections 16 gage and greater shall be formed from steel with a minimum yield stress of 50,000 psi.

WALL FRAMING:

Bearing Wall Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, complying with ASTM C 955 and as follows:

Minimum Upcoated-Steel Thickness: 0.0428 inch (18 ga.).

Minimum Flange Width: 1-5/8 inches.

Non-Bearing Walls (Partitions): Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, complying with ASTM C 645. The minimum uncoated steel thickness for non-bearing wall framing members shall be 0.0179 inch (25 gage).

Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, complying with ASTM C 955. Minimum Uncoated-Steel Thickness of track shall match corresponding steel studs.

Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads, and as follows:

Minimum Uncoated-Steel Thickness: 0.0428 inch (18 ga.).

Flange Width: A minimum of 2 inches to accommodate an upward or downward vertical deflection of ½ inch.

Double Deflection Tracks: Manufacturer's double, deep-leg. U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched with unstiffened flanges.

Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads and as follows:

Minimum Uncoated-Steel Thickness: 0.0428 inch (18 ga.).

Flange Width: A minimum of 2 inches to accommodate an upward or downward vertical deflection of ½ inch.

Inner Track: Shall be of web depth indicated and as follows:

Minimum Uncoated-Steel Thickness: 0.0428 inch (18 ga.).

Flange Width: Shall be a minimum flange width of 3-1/2 inches.

FRAMING ACCESSORIES:

Fabricate steel-framing accessories of the same material and finish used for framing members; with a minimum yield strength of 33,000 psi.

Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

- Supplementary framing
- Bracing, bridging and solid blocking
- Web stiffeners
- End clips
- Foundation clips
- Gusset plates
- Stud kickers, knee braces and girts
- Joist hangers and end closures
- Hole reinforcing plates
- Backer plates

ANCHORS, CLIPS AND FASTENERS:

Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123.

MISCELLANEOUS MATERIALS:

Galvanizing Repair Paint: ASTM A 780.

FABRICATION:

Fabricate cold-formed metal framing and accessories plumb, square and true to line and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.

Fabricate framing assemblies using jigs or templates. Cut framing members by sawing or shearing; do not torch cut. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work. Locate mechanical fasteners and install according to the manufacturer's instructions, with screw penetrating joined members by not less than three exposed screw threads.

Reinforce, stiffen and brace framing assemblies to withstand handling, delivery and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

PART 3-EXECUTION

EXAMINATION:

Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

INSTALLATION, GENERAL:

Cold-formed metal framing may be shop or field fabricated for installation or it may be field assembled. Install cold-formed metal framing according to ASTM C 1007, unless more stringent requirements are indicated. Install shop-or field-fabricated, cold-formed framing and securely anchor to supporting structure.

Bolt or weld wall panels at horizontal and vertical juncture to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

Install cold-formed metal framing and accessories plumb, square and true to line and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.

Cut framing members by sawing or shearing; do not torch cut.

Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds and methods used in correcting welding work. Locate mechanical fasteners and install with screw penetrating joined members by not less than three exposed screw threads.

Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.

Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintained braces and support in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

Install insulation in build-up exterior framing members, such as headers, sills, boxed joists and multiple studs at openings that are inaccessible on completion of framing work.

Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

Erection Tolerances: Install cold-formed metal framing level, plumb and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 ft. Space individual framing members no more than plus or minus 1/8 in. from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

WALL INSTALLATION:

Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends and shall match stud spacing as a minimum.

Squarely seat studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom racks. Space studs as indicated on the drawings.

Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

Align studs vertically where wall-framing continuity is interrupted by floor framing. Where studs cannot be aligned, continuously reinforce track to transfer loads.

Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.

Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners or gusset plates.

Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding and space jack studs same as full-height wall studs.

Install supplementary framing, blocking and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings and similar work requiring attachment to framing.

If type of supplementary support is not indicated, comply with stud manufacturers written recommendations and industry standards in each case, considering weight or load resulting from item supported.

Partition Bracing: Provide diagonal bracing for the top of metal stud walls of more than 8 ft. unbraced length up to the closest roof purlin or joist. Use metal studs or heavy gage hat channel and a minimum of two screws into the top wall runner and roof purlin. Locate braces at not more than a 6-ft. spacing. The angle between the brace and a vertical line shall

not exceed 60 degrees. Coordinate with ductwork and other construction to avoid interferences.

Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle.

Install horizontal bridging in stud system, spaced 48 inches apart. Fasten at each stud intersection.

Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks.

Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors and fasteners, to provide a complete and stable wall-framing system.

Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support. Install solid blocking at every other stud. Install single deep-leg deflection tracks and anchor outer track to building structure.

Install double deep-leg deflection tracks and anchor outer track to building structure.

Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

REPAIRS AND PROTECTION:

General: Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure cold-formed metal framing is without damage or deterioration at time of substantial completion. Remove and replace work that does not comply with specified requirements.

Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

FIELD QUALITY CONTROL:

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

END OF SECTION 05400

SECTION 07190--VAPOR BARRIERS

PART 1--GENERAL

SUMMARY:

Work includes, but is not limited to:

Furnish and install vapor barriers on all perimeter walls and roof of the SSSTF Decontamination Building. The vapor barrier shall be located behind the gypsum board on the walls where gypsum board is installed, behind wall liner panels where shown and to the warm side of the insulation installed and exposed in the roofing system and where indicated on the drawings. The vapor barrier shall be continuous over all interior surfaces and all seams shall be sealed.

REFERENCES:

The following documents, including others referenced therein, form a part of this Section to the extent designated herein:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 774	Standard Test Method for Bursting Strength of Paper
ASTM D 828	Standard Test Method for Tensile Properties of Paper and Paperboard Using Content-Rate of Elongation Apparatus
ASTM D 2020	Standard Test Method for Mildew (Fungus) Resistance of Paper and Paperboard
ASTM E 96	Standard Test Method for Water Vapor Transmission of Material

SUBMITTALS:

No submittals required unless and "or equal' item is submitted.

QUALITY CONTROL:

Regulatory Requirements (Codes and Standards): Comply with provisions of the following cades and standards, unless otherwise specified herein:

UL Surface Burning Characteristics of Materials

PART 2--PRODUCTS

MATERIALS:

Vapor Barrier: The vapor barrier shall be a fiberglass scrim reinforced white polypropylene backed by flame retardant Kraft paper. The vapor barrier shall be a 2805 PSK aluminum

foil, as manufactured by Lamotite, a Division of Rexham Corporation. A matching pressure sensitive tape shall be provided from the same company for sealing edges. The properties of the vapor barrier shall be as follows:

CONSTRUCTION

Aluminum Foil	0.0015 in.
Kraft	15 lb./ream _ 10%, White, Flame retardant
Adhesive	Flame retardant
Tri-directional fiberglass	Machine Direction (MD) 4 in.
yarn reinforcing	Cross Direction (XD) 4 in.

TYPICAL PHYSICAL PROPERTIES

Permeance (MVTR) ASTM E 96, Desiccant Method	
Perms, grains/hr-ft^2 in. Hg,	0.02
Puncture Resistance ASTM D 4833	10 minimum
Tensile Strength ASTM D 828 lb./in. Width, Avg.	40
Mullen Burst Strength ASTM D 774 P.S.I., Avg.	65
Mold and Mildew Resistance ASTM D 2020	
Mold Growth Sustenance	No growth or organisms
Humidity Resistance 30 days at 95% RH/120° F	
Corrosion or Delamination 10 minimum	None

Dimensional Stability 15 min at 200 ° F Percent Length Change, Max 0.25

Low Temperature Resistance 4 hr at 30 ° F	Remains flexible with no delamination
High Temperature Resistance 24 hr at 150 ° F	Remains flexible with no delamination

Weight per MSF, lb. + or - 5% 21

Underwriters' Laboratories Surface Burning Characteristics Classification:

	Kraft Exposed	Facing Foil Exposed
Flame Spread	20	5
Smoke Developed	35	5

PART 3--EXECUTION

INSTALLATION:

Seal the vapor barrier at seams, perimeter, obstructions and penetrations, with tape recommended by manufacturer. Wall vapor barrier shall be installed as described in description of work.

The roof vapor barrier shall be installed over the top of the purlins and down under the batt insulation, continuously over the entire roof surface. Adequate slack shall be provided to allow the batt insulation to completely fill the void between the roof purlins. No penetrations for structural struts or other materials except when sealed with tape will be allowed.

FIELD QUALITY CONTROL:

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

END OF SECTION 07190

SECTION 07200--THERMAL INSULATION

PART 1--GENERAL

SUMMARY:

Extent of insulation work is shown on drawings, by note and/or symbol. All exterior walls and roofs shall be insulated whether specifically shown or not.

Work includes, but is not limited to:

Extent of insulation work is shown on drawings, by note and/or symbol. All exterior walls and roofs shall be insulated whether specifically shown or not.

Furnish and install rigid insulation to the outside of the perimeter foundation wall of the SSSTF Decontamination Building.

Furnish and install (20% recycled) blanket-type building insulation in all perimeter building walls, and for the full height of exterior walls.

Furnish and install batt insulation in the roof structure throughout entire building.

Include attachment or support system for roof insulation located within structural cavity.

Furnish and install batt insulation for sound attenuation in interior walls as shown on drawings.

Furnish and install sound attenuation blankets (3-1/2" thick) above the ceilings in the toilet, shower and locker room areas

REFERENCES:

The following documents, including others referenced therein, form a part of this Section to the extent designated herein:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 84	Standard Test method for Surface Burning Characteristics of Building Materials

SUBMITTALS:

No vendor data required for this section unless an "or-equal" item is proposed.

QUALITY CONTROL:

Regulatory Requirements (Codes and Standards): Comply with provisions of the following codes and standards, unless otherwise specified herein:

ASTM C 553, C 612, C665

Thermal Conductivity: Thickness' shown are for thermal conductivity specified for each material. Provide adjusted thickness as directed for equivalent use of material having a different thermal conductivity. Where insulation is identified by "R" value, provide appropriate thickness.

DELIVERY, STORAGE AND HANDLING:

General Protection: Do not allow insulation materials to become wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.

PART 2--PRODUCTS

MATERIALS:

Below Grade Insulation: Provide "Styrofoam SM" by Dow Chemical U.S.A., or "Foamular" by U.C. Industries.

Adhesive: Provide adhesive recommended by insulation manufacturer.

Mineral/Glass Fiber Blanket/Batt Insulation: Inorganic fibers formed into flexible resilient blankets or semi-rigid resilient sheets complying with ASTM C 665, [Type I][Type II, Class A]; density as indicated, but 1.0 lb. minimum; k-value of 0.27; manufacturer's standard lengths and widths as required to coordinate with spaces to be insulated; types as follows; Batts shall have rating shown on drawings or specified herein.

Mineral/Glass Fiber Blanket/Batt Insulation: Inorganic fibers formed into flexible resilient blankets or semi-rigid resilient sheets complying with ASTM C 553; density as indicated, but 1.0 lb. minimum; k-value of 0.27; manufacturer's standard lengths and widths as required to coordinate with spaces to be insulated; types as follows; Batts shall have rating shown on drawings or specified herein.

Thickness:

Walls	9 in. +	R-1 friction fit (in perimeter metal wall panels).
Roof	9 in.	R-26 vapor barrier faced 6-in. layer and (1) unfaced 3-in. layer.
Foundation wall	2 in.	R-10 extruded polystyrene rigid board insulation.

Roof Insulation Vapor Barrier: The roof insulation batts shall be provided with an attached (laminated) vapor barrier designed to be used in the roof of a pre-engineered metal building. The vapor barrier material shall be Lamotite 2805, by Rexam Corporation white metalized polypropylene/scrim/ kraft. It shall have been tested by Underwriter's Laboratories and shall possess ratings as follows:

	Flame Spread	Smoke Developed
Kraft side exposed	10	30
Polypropylene side exposed	5	25

In all cases the vapor barrier shall be attached to the batt insulation so that when it is installed, the polypropylene side is exposed to the interior. Width of the vapor barrier shall be such that it can be overlapped on the tops of the roof purlins to form a continuous roof vapor barrier.

Roof Insulation Support System: The Roof Insulation Support System shall be "Insul Basket" as manufactured by IB, Inc., P.O. Box 9807, Madison, WI 53715, Telephone 608-257-7288. Units shall be designed for use with "Z" shaped roof purlins. All Insul Basket members shall be painted white. The Insul Basket shall be 8 in. deep and allow 9 in. of insulation to be installed below the metal standing seam roof with slight compression of the batts.

Rigid Wall Insulation: The rigid wall insulation shall be Thermax as manufactured by Celotex in 4 X 8 ft sheets with foil facing on both sides. The insulation shall be 1.25 in. thick with an R-value of 9.00. Surface burning characteristics shall be as follows: Flame spread 25 or less and smoke developed 100 or less as tested according to ASTM E 84.

PART 3--EXECUTION

INSTALLATION:

General: Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with work.

Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.

Perimeter Foundation Insulation: On vertical surfaces, set units in adhesive applied in accordance with manufacturer's instructions. Apply with the long dimension vertical. Use adhesive type recommended by manufacturer of insulation.

FIELD QUALITY CONTROL:

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

END OF SECTION 07200

SECTION 07901--JOINT SEALANTS

PART 1--GENERAL

SUMMARY:

Work includes, but is not limited to:

Seal exterior joints in vertical surfaces; and non-traffic horizontal surfaces as indicated below:

- Perimeter joints between building materials and frames/thresholds of doors and windows.
- Control and expansion joints in ceiling and overhead surfaces.
- Other joints as indicated.

Seal exterior joints in horizontal traffic surfaces as indicated below:

- Control, expansion, and isolation joints in cast-in-place concrete slabs.
- Joints between different materials.
- Other joints as indicated.

Seal interior joints in vertical surfaces and horizontal nontraffic surfaces as indicated below:

- Control and expansion joints on exposed interior surfaces of exterior walls.
- All joints in interior metal wall liner panels and ceiling metal wall liner panels.
- Perimeter joints of exterior openings where indicated.
- Perimeter joints between interior wall surfaces and frames of interior doors.
- Wall/ceiling joints.
- Perimeter joints, junctures at vertical wall surfaces and horizontal floor and roof structure or surfaces
- Perimeter joints around units installed in wet areas
- Vertical joints between CMU's and gypsum board wall surfaces
- Other joints as indicated.

Seal interior joints in horizontal traffic surfaces as indicated below:

- Control and expansion joints in cast-in-place concrete slabs.
- Interior joint between perimeter concrete curb and concrete floor slab.
- Other joints as indicated.

Miscellaneous application:

- Gasketing of assemblies

Related Sections: The following Sections contain requirements that relate to this Section:

Section 09250, Gypsum Drywall for sealing concealed perimeter joints of gypsum board partitions to reduce sound transmission.

SYSTEM DESCRIPTION:

Joint Sealants: Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent designated herein:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 719	Standard Test Method for Adhesion and Cohesion of Elastormeric Joint Sealant Under Cyclic Movement (Hockman Cycle)
ASTM C 834	Standard Specification for Latex Sealants
ASTM C 920	Standard Specification for Elastomeric Joint Sealants
ASTM C 1193	Standard Guide for Use of Joint Sealants
ASTM D 1056	Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM E 90	Standard Test Method for Laboratory Measurements of Airborne Sound Transmission Loss of Building Partitions and Elements

SUBMITTALS:

No submittals required unless an "or equal" item is proposed

QUALITY CONTROL:

Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for the Project that have resulted in construction with a record of successful in-service performance.

Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

DELIVERY, STORAGE, AND HANDLING:

Deliver Materials: Deliver materials to the Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

Store and Handle Materials: Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

SITE CONDITIONS:

Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40° F (4.4° C).

When joint substrates are wet.

Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.

Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

PART 2--PRODUCTS

MATERIALS, GENERAL:

Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

Colors: Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

ELASTOMERIC JOINT SEALANTS:

Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealants that comply with ASTM C 920 and other requirements indicated on each Elastomeric Joint Sealant Data Sheet at end of this Section, including those requirements referencing ASTM C 920 classifications for Type, Grade, Class, and Uses.

Additional Movement Capability: Where additional movement capability is specified in Elastomeric Joint Sealant Data Sheet, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements of ASTM C 920 for Uses indicated.

Available Products: Subject to compliance with requirements, elastomeric sealants that may be incorporated in the Work include, but are not limited to, the products specified in each Elastomeric Sealant Data Sheet.

ACOUSTICAL JOINT SEALANTS:

Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:

Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E 90.

Product has flame spread and smoke developed ratings of less than 25 per ASTM E 84.

Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

Available Products: Subject to compliance with requirements, acoustical joint sealants that may be incorporated in the Work include, but are not limited to, the following:

Acoustical Sealant:
USG, Sheetrock Acoustical Sealant
Pecora Corp., AC-20 FTR Acoustical and Insulation Sealant

Acoustical Sealant for Concealed Joints:
Pecora Corp., BA-98
Tremco, Inc., Tremco Acoustical Sealant

TAPE SEALANTS:

Tape Sealant: Manufacturer's standard, solvent-free, butyl-based tape sealant with a solids content of 100% formulated to be nonstaining, paintable, and nonmigrating in contact with nonporous surfaces with or without reinforcement thread to prevent stretch and packaged on rolls with a release paper on one side.

Available Products: Subject to compliance with requirements, tape sealants that may be incorporated in the Work include, but are not limited to, the following:

Pecora Corp., Extru-Seal Tape
Pecora Corp., Shim-Seal Tape
Protective Treatments, Inc., PTI 606
Tremco, Inc., Tremco 440 Tape
Tremco, Inc., MBT-35

JOINT SEALANT BACKING:

General: Provide sealant backings of material and type that are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

Plastic Foam Joint Filler: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

> Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.

Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, capable of remaining resilient at temperatures down to -26° F (-32° F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

MISCELLANEOUS MATERIALS:

Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.

Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.

Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3--EXECUTION

EXAMINATION:

Examining joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions

affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

PREPARATION:

Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:

Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

Remove laitance and form release agents from concrete.

Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

INSTALLATION OF JOINT SEALANTS:

General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

Do not leave gaps between ends of joint fillers. Do not stretch, twist, puncture, or tear joint fillers. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.

Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.

Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

FIELD QUALITY CONTROL:

PROTECTION:

Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that

they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that installations with repaired areas are indistinguishable from original work.

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

CLEANING:

Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

ELASTOMERIC JOINT SEALANT DATA SHEET NO. 1

Elastomeric Joint Sealant Designation: ES-1.
Base Polymer: Oligomeric Polyurethane.
Type: Multicomponent.
Grade: Non sag.
Class: 25.
Additional Movement Capability: 50% in either extension or compression.
Use Related to Exposure: Non traffic.
Uses Related to Joint Substrates: Excellent adhesion too most common building substrates. Primer required on some Architectural finishes.
Colors Available: 50 standard colors.
Available Products: DYMERIC 511 as manufactured by TREMCO.

ELASTOMERIC JOINT SEALANT DATA Sheet NO. 2

Elastomeric Joint Sealant Designation: ES-2.
Base Polymer: Silicone.
Type: One part.
Grade: Non sag.
Class: 25.
Additional Movement Capability: 100% extension, 50% compression.
Use Related to Exposure: Non traffic.
Uses Related to Joint Substrates: Aluminum, glass, and concrete. Some materials with special surface characteristics, finishes, or coatings may require priming.
Colors Available: 6 colors, precast white, off white, limestone, bronze, aluminum/stone, black.
Available Products: Spectrum 1 as manufactured by TREMCO.

END OF SECTION 07901

SECTION 08110--STEEL DOORS AND FRAMES

PART 1--GENERAL

SUMMARY:

Work includes, but is not limited to:

Furnish and install steel personnel door assemblies in accordance with these specifications and as shown on the drawings. Assemblies include doors, frames and hardware.

Related Sections: The following sections contain requirements that relate to the work of this section:

Section 08700, Door Hardware for door hardware and weather stripping.
Section 09900, Painting for field painting primed doors and frames.

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent designated herein:

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A115	Hardware Standards Series
ANSI A224.1	Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames
ANSI A250.4	Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcement

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 153	Zinc Coating on Iron and Steel Hardware
ASTM A 366	Steel, Carbon, Cold-Rolled, Commercial Quality
ASTM A 569	Steel, Carbon, hot-Rolled Sheet and Strip Commercial Quality
ASTM A 620	Steel Sheet, Carbon, Drawing Quality, Special Killed, Hot-Rolled
ASTM A 653	Steel Sheet, Zinc-Coated or Zinc-Iron Alloy-coated by the hot-Dip Process
ASTM A 780	Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM C 236	Steady State Thermal performance of Building Assemblies by means of a Guarded Hot Box
ASTM C 976	Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box
ASTM E 152	Fire Test of Door Assemblies

DOOR AND HARDWARE INSTITUTE

Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	Fire Doors and Fire Windows

STEEL DOOR INSTITUTE (SDI)

SDI 100	Recommended Specifications for Standard Steel Doors and Frames
SDI 105	Recommended Erection instructions for Steel Frames
SDI 107	Hardware on Steel Doors
SDI 112	Galvanized Standard Steel Doors and Frames
SDI 117	Manufacturing Tolerances Standard Steel Doors and Frames

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC-PA 1	Paint Application Specification No. 1
SSPC-Paint 20	Zinc-Rich Primers
SSPC-SP 1	Solvent Cleaning
SSPC-SP 5	White Metal Blast Cleaning
SSPC-SP 8	Pickling

UNDERWRITER'S LABORATORIES (UL)

FACTORY MUTUAL (FM)

SUBMITTALS:

No vendor data required for this section unless an "or-equal" item is proposed.

QUALITY CONTROL:

Regulatory Requirements (Codes and Standards): Comply with the provisions of the following codes and standards, unless otherwise specified:

ANSI/SDI 100

DELIVERY, STORAGE AND HANDLING:

Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection for factory finished doors.

Inspect doors and frames upon delivery for damage. Minor damages may be repaired provided finished items are equal in all respects to new work and acceptable to the Contractor; otherwise, remove and replace damaged items as directed.

Store doors and frames under cover, placed on minimum 4-inch high wood blocking. Avoid creating non-vented humidity shelters. If cardboard wrappers become wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors.

PART 2--PRODUCTS

MANUFACTURERS:

Available manufacturers of steel doors include the following:

- AMWELD Building Products Div.
- Ceco Corp.
- Curries
- Fenestra
- Republic Builders Products Corp.
- Steelcraft Mfg. Co.

Available manufacturers of steel fire doors include the following:

- AMWELD Building Products Div.
- Ceco Corp.
- Curries
- Fenestra
- Republic Builders Products Corp.
- Steelcraft Mfg. Co.

MATERIALS:

Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569.

Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 366, or ASTM A 620, drawing quality, special killed.

Galvanized Steel Sheets: Zinc-coated carbon steel sheets complying with ASTM A 653 commercial quality, with A60 or G60 coating designation, mill phosphatized.

Supports and Anchors: Fabricate of not less than 18 gage galvanized sheet steel.

Inserts, Bolts and Fasteners: Manufacturer's standard units, except hot-dip galvanized items to be built into exterior walls complying with ASTM A 153, Class C or D as applicable.

DOORS:

Steel Doors: 1-3/4" doors, conforming to ANSI/SDI 100, with manufacturer's standard core, except provide cores in exterior doors with rigid polyutherane cores. Provide exterior doors with top and bottom edges finished flush. Provide doors of materials and ANSI/SDI 100 grades and models specified below, or as indicated on drawings and schedules.

Interior Doors: Unless otherwise indicated, Grade II, heavy duty, Model 2 (seamless design), 18 gauge cold-rolled steel sheet faces.

Exterior Doors: Unless otherwise indicated, Grade III, extra heavy duty, Model 2 (seamless design), minimum 16 gauge galvanized steel sheet faces.

Glazing: Shall be tempered glass, heat treated to strengthen glass in bending to not less than 4.5 times annealed strength and meet requirements and test standards of ANSI 97, and ANSI 2-99 safety and test requirements.

Sealant: 1-Part polysulfide elastomeric glazing sealant complying with FS TT-S---23-, Class A, Type II; for exterior exposed glazing.

Glazing Gasket: Molded or extruded neoprene for watertight construction complying with ASTM D 2000 designated 2 BC 415 to 3BC 620, black.

Hardware: See Section 08700, Door Hardware of these specifications.

FRAMES:

Provide metal frames for doors and other openings according to ANSI/SDI 100 and of types and styles as shown on drawings and schedules. Conceal fastenings unless otherwise indicated. Frames shall be No. 16 USS gage or heavier cold-rolled steel sheet. Form exterior frames of hot dip galvanized steel. Fabricate frames with mitered and welded corners.

Door Silencers: Except on weather-stripped and fire rated frames, drill stops to receive three silencers on strike jambs of single-swing frames and two silencers on heads of double-swing frames.

FIRE DOORS:

General: All fire doors and frames shall be UL or FM approved and labeled accordingly and shall be for Class B openings.

Fire-Rated Assemblies: Units complying with NFPA 80 identical to assemblies tested for fire-test-response characteristics per ASTM E152, and labeled or listed by UL or FM. For oversized fire-rated assemblies, provide certification from UL or FM that doors conform to standard requirements of tested and labeled assemblies except for size.

FABRICATION:

Comply with ANSI/SDI 100 requirements. Fabricate with clearances not more than 1/8 inch at head and jambs, 1/4 inch at non-fire-rated, pair door meeting stiles, and not more than 3/4 inch at bottom. Comply with NFPA 80 per fire door clearances. Fabricate exterior steel doors and frames according to SDI 112.

Tolerances: Comply with SDI 117 requirements.

Thermal-Rated (Insulating) Assemblies: At all exterior locations, provide doors which have been fabricated as thermal insulating door and frame assemblies and tested in accordance with ASTM C 236 or ASTM C 976. Unless otherwise indicated, provide assemblies with maximum apparent U factor for thermal-rated assemblies is 0.24 BTU/hr (ft^2) ° F.

Fire-Rated Assemblies: Fabricate fire-rated assemblies to comply with NFPA 80. Identify each fire door and frame with UL or FM testing laboratory labels indicating fire-rating.

Finish Hardware Preparation: Prepare doors and frames to receive mortised and concealed finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of SDI 107 and ANSI A115 series specifications for door and frame preparation for hardware.

Locate finish hardware as shown on final shop drawings or, if not shown, in accordance with DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

GALVANIZED STEEL SHEET FINISHES:

Surface Preparation: After fabrication, clean surfaces with nonpetroleum solvent so that surfaces are free of oil, or other contaminants. After cleaning, apply a conversion coating of type suited to the organic coating applied over it. Clean welds, mechanical connections and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less 94 percent zinc dust by weight, and complying with SSPC-Paint 20.

Factory Priming for Field Painting: Where field painting after installation is indicated apply air-dried shop primer that is compatible with finish paint system indicated. Apply primer immediately after cleaning and pretreatment.

STEEL SHEET FINISHES:

Surface Preparation: After fabrication, solvent-clean surfaces in compliance with SSPC-SP 1 to remove dirt, oil, grease and other contaminants that could impair paint bond. Remove mill

scale and rust, if present, to comply with SSPC-SP 5 (white metal blasting cleaning), or SSPC-SP 8 (pickling).

Pretreatment: Immediately after surface preparation, apply a conversion coating of a type suited to the organic coating applied over it.

Factory Priming for Field Painting: Apply shop primer that complies with ANSI A224.1 acceptance criteria, is compatible with finish paint system indicated, and has capability to provide a sound foundation for field-applied topcoats. Apply primer immediately after surface preparation and pretreatment.

PART 3--EXECUTION

EXAMINATION:

Installer must examine substrate and conditions under which steel doors and frames are to be installed and must notify Subcontractor of any conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer. Subcontractor shall be responsible for field verification of dimensions.

INSTALLATION:

General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.

In Masonry Construction: Install at least 3 completed opening anchors per jamb adjacent to hinge location on high jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.

In Metal-Stud Partitions: Install at least 3 wall anchors per jamb at hinge and strike levels. In steel-stud partitions, attach wall anchors to studs with screws.

In-Place Gypsum Board Partitions: Install knock-down, slip-on, drywall frames.

Fire-Rated Frames: Install according to NFPA 80.

Door Installation: Fit hollow metal doors accurately in frames, within clearance specified in SDI-100.

Fire-Rated Doors: Install with clearances specified in NFPA 80.

FIELD QUALITY CONTROL:

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

ADJUSTING AND TOUCH UP:

Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.

Protection Removal: Immediately prior to final inspection, remove protective plastic wrappings from prefinished doors.

Final Adjustments: Check and readjust operating finish hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

CLEANING:

Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION 08110

SECTION 08362--INSULATED SECTIONAL OVERHEAD DOOR

PART 1--GENERAL

SUMMARY:

Work includes, but is not limited to:

Furnish and install insulated sectional overhead door(s) as shown on the drawings. Included operator manual override track, and weatherstripping.

Coordinate work closely with metal building manufacturer to assure compatibility and that all backing and framing have been provided. Furnish all necessary inserts and anchoring. Door color to match metal building panels.

Related Sections:

Division 16 sections for electrical requirements.

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent designated herein:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 236	Standard Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box
ASTM E 283	Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

SUBMITTALS:

Submittals include, but are not limited to the following:

Product Data: Submit product data indicating compliance with the requirements of this Section and including installation instructions.

Operation and Maintenance Manual: Submit Operation and Maintenance Manual.

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

QUALITY CONTROL:

Codes and Standards:

American Society for Testing Materials (ASTM)

Single Source Responsibility: Provide the sectional overhead door(s) as complete units produced by one manufacturer, including sections, brackets, guides, tracks, glazing, counterbalance mechanisms, hardware, operator and installation accessories, to suit openings and head room allowable.

PART 2--PRODUCTS

OVERHEAD DOOR(S):

The door(s) shall be motor operated and insulated to provide a minimum "R" value of 14 ("U" 0.070) for the individual panels and a minimum "R" value of 7 ("U" 0.143) for the door(s) in place when tested in accordance with ASTM C 236. The sections shall be sandwich construction steel/foam/steel with the insulation foamed in place. The section shall be galvanized sheet steel, 0.016-in. thick minimum, with ribbed or fluted face finished as specified hereinafter.

The door(s) shall be designed to withstand and operate under a 30-psf wind load and 100,000 operating cycles.

MANUFACTURERS:

Acceptable products are:

Overhead Door Company "Thermacore 591"
Ceco/Windsor "2001"
Kinnear "Climaseal"
Wayne-Dalton "Thermospan"
Raynor TC-20.

MATERIALS:

Track: Tracks shall be 3 in. for doors over 144 s.f. and/or 16 ft in height. Tracks shall be of galvanized steel and shall be supplied with mounting brackets, fasteners, etc., for a complete installation. Where possible, the track shall provide for high lift operation such that the door in the raised position encroaches on the interior space no more than 6 ft.

Glazing: Windows shall be the door manufacturers standard in the numbers indicated on the drawings, door type elevations and shall be double glazed.

Weatherstrip: The door shall be provided with head, jamb, threshold, and joint weatherstripping which will allow a maximum of 0.19 CFM/ft^3 of door space at a pressure difference of 0.112 in. water (15 MPH wind) when tested in accordance with ASTM E 283.

Door Bottom: Provide adjustable black Santoprene Rubber door bottom seal, either "loop" type or bottom bar with full featheredge.

Rollers: Provide heavy-duty rollers, with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide roller tires to suit size of track. Use casehardened steel tires for normal installations and neoprene or bronze for hazardous atmospheres.

Finishes: All sections shall be prefinished on the inside face and outside face. The outside face shall have a baked-on enamel finish. The color shall be white.

ELECTRIC DOOR OPERATOR:

General: Furnish electric door operator assembly of size and capacity recommended and provided by door manufacturer; complete with electric motor and factory-prewired motor controls including control transformer, gear reduction unit, solenoid operated brake, clutch, remote control stations and control devices and local disconnect switch.

Provide centermount gear hoist type, with worm and gear reduction drive, direct-couple chain to counterbalance shaft, and with auxiliary chain hoist and disconnect clutch.

Design operator so that motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator. The operator shall be designed so that the door will stop downward travel if the "down" control button is released.

Centermount type, with V-belt and roller chain drive connected to counterbalance shaft, and with auxiliary chain-hoist and disconnect switch.

Electric Motors: Provide high-starting torque, 208V-1-phase reversible, constant duty, Class A insulated electric motors with overload protection, sized to move door in either direction, from any position, at not less than 2/3 ft or more than 1 ft per second. Coordinate wiring requirements and current characteristics of motors with building electrical system. Provide open-drip-proof type motor, and controller with NEMA Type 1 enclosure.

Counter Balancing Mechanism: Operation by torsion-spring counterbalance mechanism, consisting of adjustable-tension, tempered-steel torsion springs mounted on a cross header tube or steel shaft. Connect to door with galvanized aircraft-type lift cables. Provide springs calibrated for 50,000 cycles minimum. Spring shall have safety cable or other device to restrain springs in case of breakage.

Pushbutton Stations: Each overhead sectional door shall be equipped with two 3-position pushbutton stations. Buttons shall be for open, close, and stop. Buttons shall be located as shown on the drawings. Exterior buttons shall be housed in a NEMA 3R enclosure. All other buttons shall be housed in a NEMA-4X enclosure.

Automatic Reversing Control: Furnish each door with automatic safety (electric or pneumatic) switch, extending full width of door bottom, and located within neoprene or rubber astragal mounted to bottom door rail. Contact with switch will immediately reverse downward door travel. Furnish manufacturer's standard take-up reel or self-coiling cable.

ACCESSORIES:

Provide hand-operated disconnect or mechanism for automatically engaging sprocket chain operator and releasing brake for emergency manual operation. Include interlock device to automatically prevent motor from operating when emergency sprocket is engaged.

PART 3--EXECUTION

INSTALLATION:

Install door, track, and operating equipment complete with necessary hardware, jamb and head mold stops, anchors, inserts, hanger and equipment supports in accordance with final shop drawings, manufacturer's instructions, and as specified herein. Adjust tension on the springs for the doors, such that they can be moved manually with a force of 10 lbs.

Fasten vertical track assembly to framing at not less than 24-in. o.c. Hang horizontal track from structural overhead framing with angle or channel hangars, welded and bolt-fastened in place. Provide sway bracing, diagonal bracing, and reinforcing as required for rigid installation of track and door operating equipment.

Upon completion of installation, including work by other trades, lubricate, test and adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

FIELD QUALITY CONTROL:

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

END OF SECTION 08362

SECTION 08700--DOOR HARDWARE

PART 1--GENERAL

SUMMARY:

This Section includes items known commercially as finish or door hardware that are required for swing doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.

Work includes, but is not limited to:

Furnishing and installing:

- Hinges
- Lock and latch sets
- Bolts
- Exit devices
- Push/pull units
- Closers
- Miscellaneous door control devices
- Protection plates
- Weatherstripping for exterior doors
- Sound and smoke stripping for interior doors
- Automatic drop seals (door bottoms)
- Astragals or meeting seals on pairs of doors
- Thresholds

Related Sections: The following Sections contain requirements that relate to this Section:

Section 08110, Steel Doors and Frames for silencers integral with hollow metal frames and for door and frame reinforcements for surface-mounted hardware.

Products furnished and installed by the Contractor, and are not part of the work of this Section, include:

Cylinders for locks on entrance doors.
Final interchangeable cores and keys.

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent designated herein:

AMERICAN NATIONAL STANDARDS INSTITUTE/BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (ANSI/BHMA)

ANSI/BHMA A156.1	Butts and Hinges
ANSI/BHMA A156.2	Bored and Preassembled Locks and Latches
ANSI/BHMA A156.3	Exit Devices
ANSI/BHMA A156.4	Door Controls - Closer
ANSI/BHMA A156.5	Auxiliary Locks and Associated Products
ANSI/BHMA A156.7	Template Hinge Dimensions
ANSI/BHMA A156.8	Door controls - Overhead Holders
ANSI/BHMA A156.12	Interconnected Locks and Latches
ANSI/BHMA A156.13	Mortise Locks and Latches
ANSI/BHMA A156.15	Closer Holder Release Devices
ANSI/BHMA A156.16	Auxiliary Hardware
ANSI/BHMA A156.18	Materials and Finishes

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1056	Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.

DOOR AND HARDWARE INSTITUTE (DHI)

DHI	Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	Fire Doors and Windows.

NATIONAL WOOD WINDOW AND DOOR ASSOCIATION (NWWDA)

NWWDAI.S.7	Hardware locations for Wood Flush Doors.

UNDERWRITERS' LABORATORIES (UL)

SUBMITTALS:

Submittals include, but are not limited to the following:

Hardware Schedule: Submit a proposed hardware schedule with the following submittal requirements:

Final Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information.

- Type, style, function, size, and finish of each hardware item.
- Name and manufacturer of each item.
- Fastenings and other pertinent information.
- Location of each hardware set cross referenced to indications on Drawings both on floor plans and in door and frame schedule.
- Explanation of all abbreviations, symbols, and codes contained in schedule.
- Mounting locations for hardware.
- Door and frame sizes and materials.

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

PRODUCT HANDLING:

Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.

Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.

Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).

QUALITY CONTROL:

Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closer, etc.) from a single manufacturer.

Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service

performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware consultant (AHC) who is available to the Contractor and the Subcontractor, at reasonable times during the course of the Work, for consultation. Require supplier to meet with the Contractor to finalize keying requirements and to obtain final instructions in writing.

Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by UL, Warnock Hersey or FM, for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels.

PART 2--PRODUCTS

MANUFACTURERS: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to the following:

Butts and Hinges	McKinney Products Co. Stanley Hardware, Div. Stanley Works
Cylinders and Locks	Best Lock Corp. Schlage Lock, Div. Ingersoll-Rand Door Hardware Group
Bolts	Glynn-Johnson Corp. H. B. Ives, A Harrow Company Stanley Hardware, Div. Stanley Works
Exit/Panic Devices	Adams Rite Manufacturing Co. Dor-O-Matic Sargent Manufacturing Company
Push/Pull Units:	Baldwin Hardware Corp Hiawatha, Inc. H. B. Ives, A Harrow Company
Overhead Closer:	LCN, Div. Ingersoll-Rand Door Hardware Group Rixson-Firemark, Div. Yale Security Inc.
Smoke-Activated Closer:	LCN, Div. Ingersoll-Rand Door Hardware Group Rixson-Firemark, Div. Yale Security Inc
Door Control Devices:	Glynn-Johnson Corp. H. B. Ives, A Harrow Company

Electromagnetic Door Holders:	LCN, Div. Ingersoll-Rand Door Hardware Group Rixson-Firemark, Div. Yale Security Inc.
Kick, Mop, and Armor Plates:	Baldwin Hardware Corp. H. B. Ives, A Harrow Company
Door Stripping, Seals, Thresholds, Drop Seals, Sound Stripping and Astragals:	Pemko Manufacturing Co., Inc. Zero International, Inc.

SCHEDULED HARDWARE:

General: Requirements for design, grade, function, finish, size and other distinctive qualities of each type of door hardware is indicated in the Hardware Schedule at the end of this section. Products are identified by using hardware designation numbers as shown in the following: (Products other than those specified will be considered and approved if equal in all respects.)

Manufacturer's Product Designations: Provide either the designated product of the manufacturer indicated for each type of hardware listed or the comparable product of one of the other manufacturers that complies with requirements and is accepted by the Contractor as "or equal" to the designated product. Provide products for each type of hardware complying with referenced quality standards as specified under the Article "Quality Control" in Part 1 and requirements specified elsewhere in this Section.

Panic Hardware: Panic hardware shall have forged internal working parts and be opened under a maximum pressure of 15 pounds.

Quality Standards:

Butts and Hinges: ANSI A156.1
Locks and Lock Trim: ANSI A156.2
Exit Devices: ANSI A156.3
Door Controls--Closer: ANSI A156.4
Architectural Door Trim: ANSI A156.6
Template Hinge Dimensions: ANSI A156.7
Door Controls - Overhead Holders: ANSI A156.8
Thresholds, Kick Plates: ANSI A156.6
Material and Finishes: BHMA 1301.

MATERIALS AND FABRICATION:

Hand of Door: The drawings show the direction of swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of the door movement as shown.

Base Metals: Produce hardware units of the basic metal and forming method indicated, using the manufacturer's standard metal alloy, composition, temper and hardness. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified. Comply with basic metal and forming method requirements of NFPA 80 and UL or Warnock Hersey or FM for hardware units on fire-rated door assemblies.

Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.

Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely. Where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.

HINGES, BUTTS, AND PIVOTS:

Number of Hinges: Provide number of hinges indicated but not less than 3 hinges per door leaf for doors 90 inches or less in height and one additional hinge for each 30 inches of additional height.

LOCKS, LATCHES, AND BOLTS:

Lock Throw: Provide 5/8-inch minimum throw of latch on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings. Provide 3/4-inch minimum throw of latch for mortise locks. Provide 1-inch minimum throw for all dead bolts.

Interchangeable Core: Provide lock sets and cylinders compatible with Government-furnished and installed Best Universal Lock Co. Inc. 7-pin interchangeable cores and No. 1EC4 cams.

CLOSER AND DOOR CONTROL DEVICES:

Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit depending on size of door, exposure to weather, and anticipated frequency of use. Where parallel arms are indicated for closer, provide closer unit one size larger than recommended for use with standard arms. Provide parallel arms for all exterior overhead closers and track arms for all interior overhead closers, except as otherwise indicated. Provide extended spindle on closer as may be necessary to accommodate thickness of frame-mounted hardware.

Electromagnetic Door Holders: Provide units designed to hold door in open position under normal usage and to release and close door automatically under fire conditions. Incorporate a separate electromagnetic holder mechanism designed for use with UL listed smoke/fire detectors, provided with normally closed switching contacts.

WEATHERSTRIPPING AND SEALS:

General: Provide continuous weatherstripping on exterior doors and smoke, light, or sound seals on interior doors where indicated or scheduled. Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.

HARDWARE FINISHES:

Provide matching finish for hardware units at each door or opening. Reduce differences in color and textures as much as commercially possible where the base metal or metal forming process is different for individual units of hardware exposed at the same door or opening. In general, match items to the manufacturer's standard finish for the latch and lock set (or push-pull units if no latch or lock sets) for color and texture.

Provide quality of finish, including thickness of plating or coating (if any), composition, hardness and other qualities complying with manufacturer's standards, but in no case less than specified for the applicable units of hardware by referenced standards.

The designations used in schedules and elsewhere to indicate hardware finishes are the industry-recognized standard commercial finishes, except as otherwise noted.

The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.

PART 3--EXECUTION

INSTALLATION:

Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by the Contractor.

Steel Doors and Frames: "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.

Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way care shall be taken to prevent scuffing. Coordinate removal, storage and reinstallation or application of surface

protections with finishing work specified in the Division 9 sections. Do not install surface-mounted items until finishes have been completed on the substrate.

Set until level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards. Do not use thru-bolting for installing surface-mounted hardware units, except as otherwise scheduled or specified elsewhere in this Section.

Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant.

Install electromagnetic holders according to manufacturer's written instructions and in coordination with Division 16 Sections for electrical requirements.

FIELD QUALITY CONTROL:

Surveillance will be performed by Contractor's Representative to verify compliance of the work to the drawings and specifications.

ADJUST AND CLEAN:

Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace those that cannot be adjusted to operate freely and smoothly as intended for the application made. Clean adjacent surfaces soiled by hardware installation.

Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

HARDWARE SCHEDULE:

Hardware Set 1

3	ea	Hinge	T4A3386 4.5 X 4.5	630	McKinney Mfg. Co.
1	ea	Rim Exit	70-8813 ETL	630	Sargent
1	ea	Closer	4041-SPRING CUSH	ALM	LCN
1	ea	Kickplate	12 X 2" LDW	630	Rockwood
1	ea	Threshold	254X4AFG	AL	Pemko
1	set	Weatherstrip	319CN X S88	AL/D	Pemko
1	ea	Door Bottom	430CRL	AL	Pemko

Hardware Set 2

3	ea	Hinge	T4A3386 4.5 X 4.5	630	McKinney Mfg. Co.
1	ea	Storeroom	93K7D 15D	630	Best Locks
1	ea	Closer	4041-SPRING CUSH	ALM	LCN
1	ea	Threshold	254X4AFG	AL	Pemko
1	set	Weatherstrip	319CN X S88	AL/D	Pemko
1	ea	Door Bottom	430CRL	AL	Pemko

Hardware Set 3

3	ea	Hinge	T4A3786 4.5 X 4.5	630	McKinney Mfg. Co.
1	ea	Push Plate	70C 4 X 16	630	Rockwood
1	ea	Pull Plate	106 X 70C 4 X 16	630	Rockwood
1	ea	Closer	4041	ALM	LCN
1	ea	Kickplate	12 X 2" LDW	630	Rockwood
1	ea	Wall Stop	406	630	Rockwood

Hardware Set 4

3	ea	Hinge	TA2714 4.5 x 4.5	26D	McKinney Mfg. Co.
1	ea	Lockset	93K7AB 15D	630	Best Locks
1	ea	Wall Stop	409	630	Rockwood

Hardware Set 5

3	ea	Hinge	T4A3386 4.5 X 4.5	630	McKinney Mfg. Co.
1	ea	Classroom	93K7R 15D	630	Best Locks
1	ea	Closer	P4041	ALM	LCN
1	ea	Kickplate	12 X 2" LDW	630	Rockwood
1	ea	Wall Stop	406	630	Rockwood

END OF SECTION 08700

SECTION 09250--GYPSUM DRYWALL

PART 1--GENERAL

SUMMARY:

Subcontractor shall provide all material, labor, and equipment to install gypsum wallboard including all metal corners, accessories, and taping, complete and ready for painting.

Work includes, but is not limited to:

Metal stud and gypsum wallboard backing at interior high bay walls as shown on drawings.

Metal stud and gypsum wallboard as shown on drawings.

Metal stud and water board at walls in wet areas as shown on drawings.

Suspended metal channel and gypsum ceiling located in wet areas and where shown on drawings.

REFERENCES:

The following documents, including others referenced therein, from part of this Section to the extent designated herein:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 36	Specification for Gypsum Wallboard
ASTM C 475	Specification for Joint Treatment Materials for Gypsum Wallboard Construction
ASTM C 630	Specification for Water-Resistant Gypsum Backing Board
ASTM C 840	Specification for Application and Finishing of Gypsum Board
ASTM C 1002	Specification for Steel Drill Screws for Application of Gypsum Board.

SUBMITTALS:

No submittals required unless an "or equal" item is proposed.

QUALITY CONTROL:

Single Source Responsibility: Obtain gypsum board products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum boards.

DELIVERY, STORAGE AND HANDLING:

Deliver gypsum drywall materials in sealed containers or bundles identified with manufacturer, name, brand, type and grade. Store in a dry, well-ventilated space protected from weather, undercover and off the ground or floor.

Environmental Conditions:

Temperature shall be 55° F minimum day and night during entire joint operation and until building is occupied

Provide ventilation to eliminate excessive moisture

Avoid hot air drafts which will cause too rapid drying.

PART 2--PRODUCTS

MATERIALS:

Wallboard: Partitions shall be constructed with new tapered edge gypsum wallboard. Wallboard shall conform to ASTM C36. Fire rated wallboard shall comply with the requirements of ASTM C36, Type X.

Water Resistant Backing Board: ASTM C630, with tapered edges and of type and thickness indicated. Furnish maximum lengths available to minimize end-to-end butt joints. This wallboard shall be used throughout men's shower/locker and toilet room, women's shower/locker and toilet room, and janitor room (wet walls), on all walls and ceilings.

Thickness: 5/8 in.

Screws: Screws for attachment of gypsum board shall be Type S for light gage steel framing (22 gage or lighter), Type S-12 for heavy gage steel framing (20 to 12 gage).

Tape and Cement: Tape and cement for finishing the joints shall be of material specifically manufactured for that purpose and shall be United States Gypsum Co., "Perf-A-Tape."

Metal Corners, Etc.: Steel edge trim and corner reinforcement shall be United States Gypsum Co., "200-B" and "Dur-A-Bead," respectively.

PART 3--EXECUTION

INSTALLATION:

Framing: The Subcontractor shall check the alignment of framing members and make necessary adjustments before proceeding with installation of the wallboard. Wall and ceiling framing shall be spaced 16 in. on center unless shown otherwise. Framing members shall be

straight and in alignment, and headers shall be installed for solid support of fixture attachments, wherever necessary. Blocking shall be installed behind all wallboard edges and joints.

Wallboard: Cut and fit gypsum accurately, in the longest lengths possible, with long edges parallel or perpendicular to main framing. Joints on opposite sides of partitions shall not fall on the same stud. All field cut and rough edges shall be sanded smooth and straight. All joints shall be firmly butted together without damaging the edges of the wallboard. Screw wallboard securely to supports, spacing the fasteners not less than 3/8 in. nor more than 5/8 in. from edges and ends of the boards, 10in. to 12 in. o.c. Adjust power screwdriver to set heads in 1/32-in. dimple. Do not break face paper. If face is accidentally broken, apply second screw 2 in. away. Screws on adjacent ends or edges should be opposite each other. The boards shall be fastened at all intermediate studs, joists and blocking using the same spacing as that around edges. Steel corner-reinforcement shall be installed on all outside corners.

Water Resistant Gypsum Board Base: Treat joints and fasteners to comply with directions of water-resistant joint compound manufacturer.

Treat fastener heads and embed tape as indicated above using water resistant joint compound but finish with 2 coats of joint compound used for regular gypsum board work.

Texturing: All gypsum board walls shall be provided with a light-textured surface using commercially available ready-to-use texturing products or by mixing joint compound with water to a thick paint consistency. Texture shall be applied with a roller, or other approved method.

FIELD QUALITY CONTROL:

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

PROTECTION OF WORK:

Subcontractor shall protect gypsum drywall work from damage and deterioration during the entire construction period.

No taping or texturing shall be done when temperature is below the manufacturer's recommended application temperature and in no case shall the temperature be below 40_ for 24 hr following application.

END OF SECTION 09250

SECTION 09510--ACOUSTICAL CEILINGS

PART 1--GENERAL

SUMMARY:

The Subcontractor shall furnish all materials, labor, equipment and services required to provide acoustical ceilings, including complete suspension system and auxiliary framing, as shown on drawings.

Work includes, but is not limited to:

Furnish and install suspension system and acoustical ceiling where indicated on the drawings and room finish schedule.

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent designated herein:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 636	Standard Practice for Installation of Metal Suspension Systems for Acoustical Tile and Lay-in Panels
ASTM E 1264	Standard Classification for Acoustical Ceiling Products

INTERNATIONAL CONFERENCE OF BUILDING OFFICALS (ICBO)

1997 UBC UNIFORM BUILDING CODE

UBC Std 25-2	Metal Suspension Systems for Acoustical Tile and for Lay-In Panel Ceilings

UNDERWRITERS' LABORATORIES (UL)

SYSTEM DESCRIPTION:

Design Requirements:

Deflection: Suspension system components (auxiliary framing and exposed components, grid and acoustical panels) shall be limited to maximum deflection of 1/360 of span.

Level Tolerance: Finish grid components shall be level to within 1/8 in. in 12 ft.

Connection Devices: Devices for anchoring and attachment of hanger wire shall conform to UBC Std 25-2 Section 25.212.

SUBMITTALS:

No submittals required unless an "or equal" item is proposed.

QUALITY CONTROL:

Regulatory Requirements (Codes and Standards): Comply with the following, codes and standards, unless otherwise specified herein.

UBC Uniform Building Code

UL Fire Hazard Classification: Ceiling tiles shall have a flame spread of 25 or less and smoke developed of 50 or less, and shall be UL labeled.

DELIVERY, STORAGE AND HANDLING:

Store materials in a heated building at temperatures above 55° F. Allow 72 hours for ceiling panels to reach temperature and humidity stability.

Protect from damage by weather, dust or the work of other trades. Damaged units shall not be used.

PART 2--PRODUCTS

SUSPENDED CEILING SYSTEM:

Tile: The acoustical tile shall be Armstrong Minaboard Cortega design with regular edge. The tile shall conform to ASTM E 1264, Type IV, Class 25 (noncombustible) and shall carry an Underwriters' Laboratories, Inc., label. The tiles shall be white, 24 x 48 x 5/8 in.

Performance: Ceiling Tile shall have a NRC Range 0.50-0.70; STC Range 35-39; and a Light Reflectance of LR-0.80 minimum.

Standard Ceiling Suspension System: The ceiling suspension system shall be an exposed tee grid for lay-in tiles, consisting of steel main and cross tees, prepainted white. System shall be Armstrong Prelude, DONN Type DX from USG Interiors.

Structural Classification: The ceiling suspension system shall be "Intermediate-duty in accordance with UBC Std. 25-2 (Table 25-A).

MISCELLANEOUS:

Auxiliary Suspension Support Framing: Auxiliary Suspension Support Framing shall be Galvanized steel sections of size and configuration to maintain specified ceiling performance requirements.

Hanger Wire: Hanger wire shall be galvanized, 12 gage, soft annealed wire.

Sound Attenuation Blankets: Provide USG or OCF Sound Attenuation Blanket Insulation, 2 in. to 2 1/2-in. thick.

Acoustical Sealant: Provide USG or Tremco Acoustical Sealant.

Hold Down Clips: Use approved manufacturer's standard No. 24MSG spring steel clip, tested with assembly.

Spare Tiles: Subcontractor shall provide a minimum of 16 spare tiles of each color and design for future use by the owner.

PART 3--EXECUTION

COORDINATION WITH OTHER TRADES:

Prior to beginning work, review construction sequence of installation with other trades to designate potential interferences, and report to Contractor any discrepancy that would delay or deviate from job requirements.

JOB CONDITIONS:

Space Enclosure: Do not install interior acoustical ceilings until space is enclosed and weatherproof, and until wet-work in space is completed and nominally dry, and until work above ceilings is completed, and until ambient conditions of temperature and humidity are continuously maintained at values indicated for final occupancy.

Measure Each Ceiling Area: Measure and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Comply with reflected ceiling plans wherever possible, changes shall be approved by the Contractor.

INSTALLATION:

General: Install materials in accordance with manufacturer's printed instructions, and industry standards applicable to work.

Suspension System: Install ceiling grid in accordance with ASTM C 636 and the UBC Standard 25-2. Lateral force bracing is required as described by this standard. Light fixtures shall be supported according to ASTM C 636.

Edge Moldings: Install edge moldings at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.

Screw-attach moldings to substrate at intervals not over 16 in. o.c. and not more than 3 in. from ends, leveling with ceiling suspension system to tolerance of 1/8 in. in 12 ft-0 in. Miter corners accurately and connect securely.

Acoustical Panels: Install acoustical panels in coordination with suspension system. Scribe and cut panels to fit accurately at borders and at penetrations.

FIELD QUALITY CONTROL:

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

ADJUST AND CLEAN:

Clean exposed surfaces of acoustical ceilings, including trim and edge moldings. Comply with manufacturer's instructions for cleaning and touchup of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09510

SECTION 09900--PAINTING

PART 1--GENERAL

SUMMARY:

Work includes, but is not limited to:

Texturing of all new gypsum wallboard and water board walls.

Painting of all concrete block walls.

Painting all new doors and frames including personnel and overhead.

Painting of all exterior structures including guard post and pipe bollards, vehicle and equipment head bolt heater structures, etc.

Painting piping and electrical identification as required.

Painting exterior exposed steel.

Painting and seal all concrete floors not specifically addressed in other sections.

Sealing exterior concrete slabs.

Painting new parking lot stripes and traffic centerline and shoulder striping and directional guides as shown on drawings.

Pre-finished Items: Unless otherwise indicated, do not include field painting when factory-finishing is specified for such items as (but not limited to) pre-finished partition systems, acoustic materials and casework, finished mechanical and electrical equipment including light fixtures, switchgear and distribution cabinets, equipment and cast iron gratings.

Metal surfaces of anodized aluminum, chromium plate, copper, bronze, stainless steel and similar finished materials will not require finish painting, unless otherwise indicated.

Metal Fire Rating Labels: Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

SUBMITTALS:

Submittals include, but are not limited to the following:

Product Data: Submit manufacturers technical information, including paint label analysis and application instructions for each material proposed for use.

Material Safety Data Sheets (MSDS): Submit MSDSs on all products used.

Samples: Submit manufacturers standard color chips for selection by the Contractor. If a non-standard color is required to match an existing color, submit three paint samples on 12-in. square hardboard for approval by the Contractor.

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

QUALITY CONTROL:

Applicator Qualifications: Engage an experienced applicator who is regularly engaged in the application and installation of, and has successfully completed, coating system applications similar in material and extent to those in this project.

Single Source Responsibility: Provide primers and undercoat material produced by the same manufacturer as the finish coats and as recommended for the particular substrate and finish coat.

Application: Strictly follow manufacturer's application instructions.

DELIVERY, STORAGE, AND HANDLING:

General: Deliver materials to the job site in the manufacturers original, new, unopened packages and containers bearing the manufacturers name and label, and the following information:

- Name or title of material
- Product description (generic classification or binder type)
- Manufacturers name, stock number and date of manufacture
- Contents by volume, for major pigment and vehicle constituents
- Thinning instructions
- Application instructions
- Color name and number
- Handling instructions and precautions.

Storage: Store materials not used in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45^{O} F (7^{O} C). Maintain containers used in storage in a clean condition, free of foreign materials and residue. Volatile liquids and used wiping and

cleaning rags shall be kept in tightly closed metal containers. After each days work, empty paint cans and other waste shall be removed from the premises and disposed of as directed by the Contractor. Only one day's supply of paint may be brought into the work area. Any extra must be removed from the work area at the end of each day unless otherwise approved by the Contractor. The Subcontractor shall store and handle all paint in a well-ventilated area or room.

PART 2--PRODUCTS

MANUFACTURERS:

Subject to compliance with requirements, provide products of one of the following:

- Benjamin-Moore
- Columbia Paint Company
- Devoe and Raynolds Company (ICI)
- Fuller-O'Brien (ICI)
- The Glidden Company (ICI)
- ICI Dulux (ICI)
- Ponderosa Paint Company
- Pratt and Lambert
- Sherwin-Williams Company
- Sika Corporation.

Unique or special paint requirements are addressed in the following sections.

MATERIALS:

Paint shall be well ground, shall not settle excessively, cake or thicken in the container; shall be readily broken up with paddle to a smooth consistency and shall show easy brushing properties. Products containing lead or known carcinogens shall not be used. All products used shall comply with VOC requirements.

Solids by volume for latex-based coatings shall be not less than 30%. Solids by volume for alkyd based coatings shall not be less than 40%. Solids by volume for wood stains and transparent finishes shall be not less than 20%.

PAINT SCHEDULE (EXTERIOR):

Pavement Marking Paint:

Paint shall comply with the current Idaho Transportation Department Contract Specification for no-heat, fast dry, yellow traffic line paint.

Suppliers of this traffic striping paint are:

Morton Traffic Markings, 1675 Commercial ST. N.E., Salem, OR 97303
Columbia Paint Coating, N 112 Haven, Spokane, WA 99202

Glass Beads: Glass beads for traffic line paint shall conform to Federal Specification TT-B-1325, Type I, Gradation A, or AASHTO 247, Type 1.

Specification for No-Heat, Fast-Dry Traffic Paint, Yellow: Paint shall be free from foreign materials such as dirt, sand fibers from bags or other material which can clog screens, valves, pumps or equipment used in striping. Paint shall show no evidence of excessive caking, setting, separation, livering, skinning, or corroding of the container upon storage in the bulk tanks or in the sealed container as received. If striping equipment (airless system) is used, paint shall give a smooth uniform strip without the following problems:

Paint skinning and splattering, excessive pressure and excessive dusting or fogging.

Concrete Slabs and Curbs (Contaminated Equipment Holding Pad and Empty Container Pad):

Two Coat System (12-16 mils per coat):
Primer and Topcoat: Sika Top 144 – Polymer Modified Cementious Coating.

Known Supplier:

Sika Corporation
1682 Marion Williamsport Road
Marion, Ohio
(740) 387-9224 (Tom May)
or
John Anderson - Intermountain Concrete Specialties
Idaho Falls, Idaho
(208) 522-4949

Concrete Masonry Units:

Semi-Gloss, Acrylic-Enamel Finish:
Block Filler: High performance, latex block filler.
First and Second Coats: Semigloss, exterior, acrylic-latex enamel.

Ferrous Metal:

Semi-Gloss, Acrylic-Enamel Finish:
Primer: Rust inhibitive metal primer.
First and Second Coats: Semigloss, exterior, acrylic-latex enamel.

Galvanized Metal:

Semi-Gloss, Acrylic-Enamel Finish:
Primer: Galvanized metal primer.
First and Second Coats: Semigloss, exterior, acrylic-latex enamel.

PAINT SCHEDULE (INTERIOR):

Concrete (Interior Treatment Area, Decontamination Bay Floor, Radcon Room and PPE Change Room)

15 mil, Two Coat System:
Penetrating Primer: general Polymer 3578 Universal Penetrating Primer.
Second Coat: General Polymer 3644P Chemical Resistant Epoxy-Cote.

Concrete Masonry Units:

Semi-Gloss, Odorless Alkyd-Enamel Finish:
Block Filler: High performance, latex block filler.
Undercoat: Interior alkyd- or latex-based enamel undercoater.
Finish Coat: Semigloss, alkyd, interior enamel.

Ferrous Metal:

Semi-Gloss, Odorless Alkyd-Enamel Finish: One finish coat over an enamel undercoat and a primer.
Primer: Quick-drying, rust inhibitive, alkyd-based or epoxy-metal primer.
Undercoat: Interior, alkyd-enamel undercoat or semigloss, interior alkyd-enamel finish coat.
Finish Coat: Semigloss, alkyd, interior enamel.

Galvanized Metal:

Semi-Gloss, Acrylic-Enamel Finish:
Primer: Galvanized metal primer.
First and Second Coats: Semigloss, interior, acrylic-latex enamel.

Gypsum Board:

Semi-Gloss, Acrylic-Enamel Finish:
Primer: Latex-based, interior primer.
First and Second Coats: Semigloss, acrylic-latex, interior enamel.

Water Board:

Semi-Gloss, Acrylic-Enamel Finish:
Primer: Latex-based, interior primer.
First and Second Coats: Semigloss, acrylic-latex, interior enamel.

Colors: Colors, except as specified hereinafter for Piping Identification and Safety Painting, shall be as selected by the Contractor from current color charts or chips submitted by the Subcontractor. The color charts or chips shall be made by the manufacturer of the paint or labels to be used on the work covered herein. If the same colors required are not available in ready mixed paint, the Subcontractor shall prepare special mixes and submit samples of such mixes to the Contractor for approval.

Identification Labels: Identification labels for piping identification shall be Brady "Quik-Labels" as manufactured by the W. H. Brady Company. (Stenciling is acceptable.)

PART 3--EXECUTION

APPLICATION AND WORKMANSHIP/INTERIOR PAINTING:

General: No paint shall be thinned or otherwise altered in any manner other than recommended by the paint manufacturer. All paint shall be applied in strict accordance with the manufacturers instructions, unless specified otherwise herein.

Number of Coats:

New Work: One coat of primer and two coats of finish paint except as noted otherwise on the drawings or in these specifications.

Paint Film Thickness: Dry film thickness of paint films above substrate or existing paint surface shall be as recommended by the paint manufacturer for each coat. However, the accumulated dry film thickness above substrate or existing paint surface shall not be less than 2.5 mils. Dry film thickness on non-magnetic surfaces shall be determined by a wet film gauge. Dry film thickness is the wet film thickness multiplied by the percent of solids by volume of the paint.

Surface Preparation: All surfaces to be painted shall be clean, smooth, dry and free of corrosion. The Subcontractor shall follow the paint manufacturer's recommendations for surface preparation strictly for the particular substrate being painted and shall submit copies of the surface preparation instructions as called for on the Vendor Data Schedule. All

hardware, fixtures, fixture plate and similar factory finished items shall be removed or covered in an approved manner before painting is begun. All items shall be replaced and/or uncovered when the painting work is complete. Masonry and concrete surfaces shall be free of mortar splatters, caulking or other foreign matter. Welds that are not prime coated shall be cleaned by wire brushing.

Damaged Prime Coat or Factory Finish: Damaged shop prime or factory finish coats of paint of any material, fabricated steel or equipment to be installed shall be repaired by the Subcontractor. Chipped or scratched areas shall be sanded or wire brushed to bare metal, feathered and spot primed before finish paint is applied. All prime coats on structural steel and miscellaneous metals that have been damaged, or affected by welding during erection, shall be brushed, cleaned and painted with a prime coat after erection, except that painted concealed surfaces shall be painted before erection. The paint for repair of finish painting shall be the same color as the factory finish coat.

Protection: During painting operations, all equipment and materials, flange faces and other machined or finished surfaces, floors, furniture, plumbing and electrical fixtures and construction work, including window and door glass, that is not to be painted, or is factory finished, shall be protected from paint splatter with drop cloths, paper, masking tape or other approved means. Painted surfaces on existing work, not to be painted under this Subcontract, that are damaged as a result of the Subcontractor's operations shall be repaired by the Subcontractor by priming the touch-up as required to match the undamaged surfaces. Remove all oily rags and waste from the building each night. Take every precaution to avoid danger of fire.

Application: Paint shall be applied in such manner as to preclude runs, sagging, brush marks, holidays or other defects in the finished surface. (No spray painting will be allowed within buildings.) Each coat of paint shall have a slightly different shade of color so that each coat will be distinguishable from the preceding coat. No painting shall be done when the ambient temperature is less than 50°F or when the temperature during the drying period is apt to drop below 50^{O}F. In areas of fresh painted surfaces where the temperature has dropped below 45^{O}F during the drying period, the area shall be brought back to or above 45^{O}F and the drying period extended to 48 hours. All paint shall, otherwise, be applied in strict accordance with the paint manufacturer's directions, including use of respirators where required by the manufacturer's instructions.

Cleanup: Upon the completion of the work, the Subcontractor shall remove all surplus materials and rubbish and remove all paint spots from hardware, equipment, floors, glass and walls, etc. He shall remove all excess materials and equipment from the premises and leave the area in a clean and orderly condition.

EXTERIOR CONCRETE SLABS:

Surface Preparation: All surfaces to be coated must be clean, sound and saturated surface dry with no standing water at the time of application. Remove all dust, laitance, grease, oils,

curing compounds, waxes, impregnations and other contaminants. Preparation work must be done by mechanical equipment, i.e., blastcleaning, waterblasting or a combination of the two.

Mixing: All mixing must be done mechanically using a low-speed drill (400-600 rpm). Place approximately ½ Component "A" into a clean mixing container. While mixing, slowly add all of Component "B" and continue to mix until you achieve a uniform paste with no lumps. Be sure to scrape down sides of the mixing container at this time. Add remainder of Component "A" and continue to mix until uniformly blended.

Application: SikaTop 144 should only be applied over properly prepared surfaces with high-quality brushes, rollers or "hopper-type" spray equipment. Surface should be saturated surface dry prior to application. Two coats are recommended for maximum performance.

Apply thoroughly mixed coating generously with loaded brush or roller. Always finish off with light strokes blending back into coated area for uniform appearance. For application in direct sun or on a hot substrate, pre-wet surface and allow surface water to dissipate before coating.

Curing: Protect newly applied SikaTop 144 from direct sunlight, wind, rain and freezing.

Limitations: Maximum thickness of applications is 16 mils/coat. Thicker application can result in cracking.

Do not apply when rain is expected.

Minimum ambient and substrate temperature is 45°F and rising at the time of application.

For spray application, coating must be screened prior to loading of the spray hopper.

Coating may chalk and show water marks during weathering.

For applications where coating will be subjected to immersion, a 3-day cure is recommended.

Coating will slightly yellow with age and exposure to UV light.

Clean Up: In case of spillage, scoop or vacuum into appropriate container and dispose of in accordance with current, applicable, local, state and federal regulations. Keep container tightly closed and in an upright position to prevent spillage and leakage.

Mixed Components: Uncured material can be removed with water. Cured material can only be removed mechanically.

PAINTING PAVEMENT MARKINGS:

The paint shall be applied by a spray-type marking machine with automatic controls. The equipment shall provide a uniform film thickness and markings of uniform cross-sections

with clear-cut edges. Equipment for glass bead application shall distribute the glass beads uniformly regardless of variation in speed of travel of the distributing equipment. Marking equipment shall be approved by the Contractor's Representative before it is brought on the project. The application of the paint by hand will be permitted only where necessary for proper forming.

Paint shall be applied only when surfaces are clean and thoroughly dry and when the air temperature is above 40°F. Paint stripes shall be placed with equipment that is capable of producing a straight line. The stripes shall be uniform and free of erratic waves. If the stripes are not satisfactorily applied, work shall be stopped until corrective action is taken. Striping shall not be eradicated by overpainting with black paint.

IDENTIFICATION OF PIPING SYSTEMS:

Definitions: The following piping identification requirements are based on the American Standards Scheme for the Identification of Piping Systems A13.1 with additions as stipulated herein.

Piping systems are defined as conduits for the transport of gases, liquids, and semi-liquids. This excludes systems which are concealed or in covered pipe trenches, but would include piping systems in service tunnels and pits.

Contents of piping systems shall be identified according to color classification, by a solid color band completely encircling pipe, at least 8 in. in length (longer when necessary to accommodate full identification labels and provide 2-in. end border), painted on pipe or pipe covering in every location where identification labels are required. Stencils may be used in lieu of labels. All exposed firewater piping shall be painted as opposed to using intermittent color bands.

Color Classification: Where a question arises as to proper color classification, the Contractor should be consulted. The following list of pipe identifications are those which will be used on this Subcontract:

	Background/Lettering
Water, Fire Protection	Red/White
(Sprinkler heads shall not be painted)	
Water, Potable (cold)	Green/White
Water, Potable (hot)	Green/White
Water, Raw	Green/White
Radioactive	Magenta/Black
Electrical Conduit	Orange/Black

Identification Labels: Identification shall be accomplished by use of labels or stenciling. Straight lines of pipe shall be identified at intervals of 20 ft and at least once in each room. Piping shall also be identified at approximately 2 ft from all turns, valves and upstream side of distributional fittings or branches (exception: Piping in service racks). Horizontal piping

which runs only in a service rack shall be identified at intervals of 20 ft or at the point it leaves the room. Branch takeoffs from the horizontal runs in service racks to outlet cocks or valves, less than 10 ft in length, shall not be identified if in the same room.

The lettered label, besides identifying the materials in full English text (no abbreviations or codes), shall indicate unusual qualities of the pipe contents, i.e., hot, cold, pressure, in lb./sq. in.

On service piping, either liquids or gas, apply black arrows of same height and with same background color as adjacent identification labels, to indicate direction of flow.

Application: Labels or stencils shall be applied to the pipe so that the lettering is in the most legible position. Lettering size shall be in accordance with standards specified in ASA-A13; however, nearest "Brady Labels" shall be acceptable (see excerpt from American Standard).

Pipes to be marked shall first be wiped clean of dirt, dust, grease and moisture. Apply label over color band, using pressure, so that it lies smooth and flat. Apply a brush coat of clear lacquer after label has been applied to pipe, making sure edges of label are well covered. Stencils may be used in lieu of labels without use of lacquer cover.

Administration Areas Exceptions: Identification stripping and labeling will not be required in administrative areas unless so directed by the Construction Engineer.

Size of Labels

Outside Diameter of Pipe of Covering (in.)	Width of Color Band A (in.)	Size of Legend Letters B (in.)
*1/4 to 3/4	8	-
3/4 to 1-1/4	8	-
1-1/4 to 2	8	3/4
2 to 6	12	1-1/4
8 to 10	24	2
Over 10	32	3

(All dimensions are given in inches.)

* See paragraph on small piping for tag requirements.

Small Piping: Where pipe diameters are too small to accept labels, apply background colors and labels (or stenciling) to rigid phenolic "signboards", sized to accommodate Brady labels, and hung with stainless steel bead chain from the piping.

Apply flow arrows to all sizes.

Valves, Etc.: Identify in a manner similar to "small piping".

FIELD QUALITY CONTROL:

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

END OF SECTION 09900

SECTION 10160--TOILET PARTITIONS

PART 1--GENERAL

SUMMARY:

Extent of toilet partitions is indicated on drawings.

Section Includes, but is not limited to:

Furnish and install floor-supported toilet partitions and shower dressing stall enclosures as shown on the drawings. Toilet and shower partitions shall include overhead bracing.

Related Sections:

Section 10800, Toilet Accessories, for toilet paper dispensers, grab bars, shelves, etc.

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent referenced herein:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 666	Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar

INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)

UBC	Uniform Building Code

SUBMITTALS:

Submittals include, but are not limited to the following:

Product Data: Submit manufacturer's detailed technical data for materials, fabrication, and installation, including catalog cuts of anchors, hardware, fastenings, and accessories.

Certification: Certify that toilet and shower partitions contain at least 20% recycled material.

Samples: Submit manufacturer's standard color chips for selection by the Subcontractor.

Shop Drawings: Submit shop drawings for fabrication and erection of toilet partition assemblies not fully described on product drawings, templates, and instructions for installation of anchorage devices built into other work.

Warranty: Submit warranty of toilet partitions.

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

QUALITY CONTROL:

Regulatory Requirements (Codes and Standards): Comply with provisions of the following codes and standards, unless otherwise specified herein:

UBC

WARRANTY:

Toilet partitions and dressing stalls shall be guaranteed against breakage, deformation, discoloration, and stains for 10 years from the date of beneficial occupancy. Products found to be defective within that period shall be replaced without charge.

PART 2--PRODUCTS

MANUFACTURERS:

Subject to compliance with requirements, provide products of one of the following:

Santana Products Company
Comtec Industries

MATERIALS:

Toilet Compartments/Dressing Stall Partitions: Toilet partitions shall be floor-mounted with noncorrosive doors, panels and pilasters. Panels, doors, and pilasters shall be fabricated from high density polyethylene (HDPE) containing a minimum of 10% recycled material manufactured under high pressure forming a single component section which is waterproof and nonabsorbent. Provide materials that have been selected for surface flatness and smoothness.

FINISH:

Panels shall have a self-lubricating surface that resists marking with pens, pencils, lipsticks, and other writing or marking implements.

Color: Submit samples for selection by the Contractor.

Hardware: Furnish hardware conforming to the following material requirements:

Hinges, door latches, door strikes, coat hooks, and all brackets shall be bright-dip anodized aluminum.

Fasteners, pilaster shoes and curtain hooks shall be stainless steel.

Headrail and shower curtain extrusion shall be heavy duty (6060-T6) anti-grip bright-dip anodized aluminum.

Door pulls, door stops and bumper/hooks shall be heavy duty operating hardware and accessories of chromium-plated nonferrous cast alloy ("Zamac").

Furnish hardware for each compartment in partition system, as follows:

Hinges: Manufacturer's standard bright-dip anodized aluminum unit or integral hinge system.

Latch and Keeper: Manufacturer's standard surface-mounted latch unit, designed for emergency access, with combination rubber-faced door strike and keeper.

Coat Hook: Manufacturer's standard unit, combination hook and rubber-tipped bumper.

Door Pull: Manufacturer's standard unit.

Pilaster Shoes shall be 3-in. high and made of one-piece molded HDPE or Type 304, 20 gage stainless steel, secured to the pilaster with a stainless steel, one-way sex bolt.

Pilaster Sleeves shall be 3-in. high and made of one-piece molded HDPE or Type 304, 20 gage stainless steel, secured to the top of the pilaster with a stainless steel, one-way sex bolt.

Wall Brackets shall be 54-in. long and made of extruded PVC plastic with a wall thickness of 3/16-inch. Wall brackets shall be fastened to the pilaster with stainless steel, tamper resistant torx screws and fastened to the panels with stainless steel, one-way sex bolts OR shall be 1-1/2 in. stirrup type made of heavy-duty aluminum with a bright dip anodized finish. Stirrup brackets shall be fastened to pilasters and panels with stainless steel, one-way sex bolts.

MANUFACTURED UNITS:

Partitions shall have all edges machined to a radius of 0.25 in. and all sharp corners removed. All dividing panels and doors shall be 55-in. high and mounted 14 in. above the finished floor.

All pilasters shall be 82-in. high and fastened to stainless steel shoes by means of theft-proof stainless steel sex bolts.

FABRICATION:

General: Furnish standard doors, panels, screens, and pilasters fabricated for partition system, unless otherwise indicated. Furnish units with cutouts, drilled holes, and internal reinforcement to receive partition-mounted hardware, accessories, and grab bars, as indicated.

Toilet Partitions and Dressing Stall Enclosures:

Floor-Supported Partitions: Furnish galvanized steel anchorage devices, complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters, to permit structural connection at floor. Furnish shoe at each pilaster to conceal anchorage.

Floor Supported Screens: Furnish pilasters not less than 1 inch in thickness, panels and pilasters of the same construction and finish as toilet partitions. Furnish galvanized steel anchorage devices, complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters, to permit structural connection at floor. Furnish shoe at each pilaster to conceal anchorage.

PART 3--EXECUTION

INSTALLATION:

General: Comply with manufacturer's recommended procedures and installation sequence. Install partitions rigid, straight, plumb, and level. Provide clearances of not more than 1/2 in. between pilasters and panels, and not more than 1 in. between panels and walls.

Floor-Supported Partitions: Set pilaster units with anchorages having not less than 2 in. penetration into structural floor, unless otherwise recommended by partition manufacturer. Level, plumb, and tighten installation with devices furnished. Hang doors and adjust so that tops of doors are level with tops of pilasters when doors are in closed position.

Doors: Adequately brace handicap doors attached to narrow screens so that screens do not warp, doors sag, and doors return to the fully closed position.

Screens: Attach with concealed anchoring devices, as recommended by manufacturer to suit supporting structure. Set pilaster to provide support and to resist lateral impact.

Accessories: Mount accessories to partition units in accordance with manufacturer's instructions.

FIELD QUALITY CONTROL:

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

ADJUST AND CLEAN:

Hardware Adjustment: Adjust and lubricate hardware for proper operation. Set hinges on swinging doors to hold open approximately 30° from closed position when unlatched. Set hinges on outswinging doors (and entrance swing doors) to return too fully closed position.

Cleaning: Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

END OF SECTION 10160

SECTION 10260--CORNER GUARDS

PART 1--GENERAL

SUMMARY:

Work includes, but is not limited to:

Providing and installing corner guards to protect all exposed and finished wallboard corners.

SYSTEM DESCRIPTION:

Clear "Lexan" corner guards provide high impact resistance in material which permits the color if the wall to show through. Wings area ¾", 1-1/8", 2-1/2" respectively. Installed with screws or brads (included). The CR-3 or 4 is available as a companion wainscoting strip. Colors available in styles CG-17 and 18. 45 and 135 angles available in style CG-18 only.

SUBMITTALS:

No vendor data required for this section unless an "or-equal" item is proposed.

PART 2--PRODUCTS

ACCEPTABLE MANUFACTURERS:

Pro-Tek Impact Protection Systems by Pawling Corporation

LG-200 Lexan Corner Guards by Decrovin

Saturn (CG-2163) Universal Guard Systems by American Floor Products Co., Inc.

MATERIALS:

Lexan:

Impact Resistance – 16-ft. lbs./sq. in. (ASTM D256)

Flammability – 94V-2 (UL Bulletin 94)

Approx. Weight/ft. – CG-16-1 oz., CG-17-2 oz., CG-18-4 oz.

Smoke Developed – Under 450 (NB Smoke Chamber)

Lengths – 4ft., 8ft.

Installation CG-17 and CG-18 with chrome plated counter sunk screws supplied.

CG-16 with brads supplied.

Colors: (132) Clear

PART 3--EXECUTION

INSTALLATION/APPLICATION/ERECTION:

Install as per factory instructions.

FIELD QUALITY CONTROL:

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

END OF SECTION 10260

SECTION 10440--LETTERS

PART 1--GENERAL

SUMMARY:

Work includes, but is not limited to:

Furnish and install building designation letters as shown on drawings.

Provide and install the letters shown on the drawings and as specified in these specifications.

SUBMITTALS:

Submittals include, but are not limited to the following:

Product Data: Submit product data including installation instructions.

Warranty: Submit warranty as called for in "Warranty".

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

SEQUENCING/SCHEDULING:

Install letters before insulating wall behind them. This will allow fastening of studs through metal panels and nuts behind.

WARRANTY:

Guarantee baked enamel finish for 5 years, against cracking, peeling and discoloration.

PART 2--PRODUCTS

MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following:

Andco Industries Corp., 4615 Sellars Ave., Greensboro, NC 27407
Metal Arts, 410 6th Street SE, PO Box 639, Mandan ND, 58554
The Southwell Co., Box 299, San Antonio, TX, 78291-0299

MATERIALS:

Letter Style: Microgramma Bold.

Material: 1/2 in. plate aluminum.

Letter Size: 24-in. high, 1/2-in. depth.

Copy and Design: As shown on the drawings.

Finish: Baked enamel. Color shall be black.

PART 3--EXECUTION

INSTALLATION/APPLICATION/ERECTION:

Install as per manufacturer's instructions using a concealed fastener method. Letters shall project a 1 ½-in. from wall panels.

FIELD QUALITY CONTROL:

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

END OF SECTION 10440

SECTION 10500--METAL LOCKERS

PART 1--GENERAL

SUMMARY:

Extent of metal lockers and dressing benches is shown on drawings.

Work includes, but is not limited to:

Furnish and install single-tier metal lockers in the Men's Shower/Locker Room and Women's Shower/Locker Room as shown on the drawings.

Furnish and install dressing benches as shown on drawings.

SUBMITTALS:

Submittals include, but are not limited to the following:

Product Data: Submit product data including manufacturer's installation instructions.

Samples: Submit manufacturer's standard color chips for selection by the Contractor.

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

QUALITY CONTROL:

Single Source Responsibility: Provide each type of metal locker as produced by a single manufacturer, including necessary mounting accessories, fittings, and fastenings.

PART 2--PRODUCTS

MANUFACTURER:

Subject to compliance with requirements, provide products by one of the following

Lyon Metal Products, Inc.
Penco Products, Inc.
Republic Steel Corp.

MATERIALS:

Sheet Steel: Mild cold-rolled and leveled steel, free from buckle, scale, and surface imperfections.

Fasteners: Cadmium, zinc, or nickel plated steel; exposed bolt heads, slotless type; self-locking nuts or locker washers for nuts on moving parts.

Accessories: Hooks and hand rods of cadmium-plated steel or cast aluminum.

FABRICATION:

Fabricate lockers square, rigid, and without warp, with metal faces flat and free of dents or distortion.

LOCKERS:

Lockers shall be 18 in. wide x 21 in. deep x 72 in. high with a metal base.

Frame: Fabricate of 16-gage channels or 12-gage angles, minimum, with continuous stop/strike formed on vertical members.

Body: Fabricate back and sides of 24-gage minimum steel, with double-flanged connections extending full height. Form top and bottom of not less than 24-gage steel, with flanged edges.

Provide 24-gage steel sheet hat shelf in single-tier units.

Form exposed ends of non-recessed lockers of 16-gage minimum steel.

Door: One-piece, 16-gage minimum sheet steel, flanged at all edges, constructed to prevent springing when opening or closing. Fabricate to swing 180° unless otherwise indicated.

Reinforcing: Provide extra bracing or reinforcing on inside of doors over 15 in. wide.

Ventilation: Provide stamped, louvered vents in door face, as follows:

Single-Tier Lockers: Not less than 6 louver openings top and bottom.

Hinges: Heavy-duty, not less than 0.050-in. thick steel, full-loop, 5-knuckle, tight pin, 2 in. high. Weld to inside of frame and secure to door with not less than 2 factory-installed fasteners which are completely concealed and tamperproof when door is closed.

Provide at least 3 hinges for each door 42 in. high and over, at least 3 hinges for each door less than 42 in. high.

Latching: Positive automatic, prelocking, dry-resistant latch and pull with rubber silencers; chromium-plated, heavy-duty, vandal-proof lift-up handle, containing strike and eye for padlock; and with not less than 3-point latching for single tier lockers.

Locking: Fabricate lockers to receive padlocks provided by the Contractor.

Finish: Apply baked-on enamel finish to all surfaces, exposed and concealed, except plates and non-ferrous metal.

Color: Provide locker units in color as selected by Contractor from manufacturer's standards. Unless otherwise indicated, concealed parts may be manufacturer's standard neutral color.

ACCESSORIES:

Furnish each locker with the following items, unless otherwise shown:

Hat Shelf: One double-prong ceiling hook and not less than 2 single-prong wall hooks.

Number Plates: Manufacturer's standard etched, embossed, or stamped, non-ferrous metal number plates with numerals not less than 3/8 in. high. Number lockers in sequence. Attach plates to each locker door, near top, centered, with at least 2 fasteners of same finish as number plate.

Metal Base: Minimum 20-gage cold-rolled steel, fabricated in lengths as long as practicable to enclose base of lockers without additional fastening devices. Flange bottoms inward 3/4 in. for stiffening. Factory-finish metal base to match lockers.

Separators: Provide manufacturer's standard vertical dividers of sheet steel.

Sloped Tops: Provide manufacturer's standard sloped tops of 18 ga. sheet steel in finish and color to match lockers.

End and Back Panels: Provide manufacturer's standard end and back panels in 16 ga. sheet steel, match color and finish of lockers. These panels shall be provided where ends or backs of lockers are exposed.

PART 3--EXECUTION

INSTALLATION:

Erect stalls straight, plumb and level, securely anchored and rigid. Lay out work and cut or drill into other finishes accurately. Errors or poor workmanship which causes damage to adjacent materials or finishes shall be corrected as directed by the Construction Engineer.

Wall Attachment: Space fasteners about 48 in. o.c., unless otherwise recommended by manufacturer, and apply through backup reinforcing plates where necessary to avoid metal distortion; conceal fasteners insofar as possible.

Base: Install metal locker base using concealed fasteners to provide flush, hairline joints against adjacent surfaces.

Benches: Install benches to comply with manufacturer's instructions.

FIELD QUALITY CONTROL:

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

ADJUST AND CLEAN:

Adjust: Adjust doors and latches to operate easily without binding. Verify that integral locking devices are operating properly.

Touch-Up Marred Finishes: Touch-up marred finishes, but replace units which cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 10500

SECTION 10800--TOILET ACCESSORIES

PART 1--GENERAL

SUMMARY:

Toilet accessories required are shown on drawings and schedules.

Work includes, but is not limited to furnishing and installing:

- Paper towel dispensers
- Waste receptacles
- Sanitary napkin dispensers
- Sanitary napkin disposal units
- Toilet tissue dispensers
- Soap dispensers
- Seat cover dispensers
- Shower curtains
- Curtain rods
- Mirror with shelf unit.

SUBMITTALS:

No submittals required unless an "or equal" item is proposed.

QUALITY CONTROL:

Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry. Coordinate delivery with other work to avoid delay.

Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.

PART 2--PRODUCTS

MANUFACTURER:

Subject to compliance with requirements, provide products from one of the following:

- American Specialties, Inc.
- Basco
- Bobrick Washroom Equipment, Inc.
- Bradley Corp.
- Gamco
- Scott

ACCESSORIES:

Furnish each item complete with screws, bolts, clips, and other accessory parts as required for proper installation, operation and appearance.

All accessories shall be as specified on drawings.

PART 3--EXECUTION

INSTALLATION:

Securely attach each accessory level and plumb. Flanges of recessed items shall be in neat uniform contact with wall surfaces along full length. Assure that finish is carried evenly to each installation. Assure that there are no open joints between finish and fixture. Filling of open spaces is prohibited. Repair or conceal open spaces as directed by the Construction Engineer. In general, attach to drywall with toggle bolts except where blocking has been provided. Attach into stud blocking with sheet metal steel screws.

FIELD QUALITY CONTROL:

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

END OF SECTION 10800

SECTION 12390--CABINETS AND PLASTIC LAMINATE

PART 1--GENERAL

SUMMARY:

The work includes plastic laminate covered counter tops with backsplash and storage cabinet in radcon room, and shelves and hooks in men's and women's toilet rooms.

Sink units in countertops are specified in a Division 15 section.

SUBMITTALS:

Shop Drawings: Submit shop drawings showing location and size of each type of cabinet, countertops, accessories, materials, finishes, hardware types and locations, fillers, etc. Include fully dimensioned plans and elevations and indicate details of anchorage to countertop and to walls.

Samples: Submit samples of plastic laminate.

PRODUCT DELIVERY, STORAGE AND HANDLING:

Protect cabinets and countertops during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

VENDOR DATA: See the Vendor Data Schedule.

PART 2--PRODUCTS

DEFINITIONS:

Exposed portions of cabinets include all surfaces including edges visible when doors are closed.

Semi-exposed portions of cabinets include surface behind doors including shelves, dividers, interior faces of cabinet ends, backs, tops and bottoms and back face of doors.

Concealed portions of cabinets include sleepers, web frames, dust panels and other surfaces not normally visible at installation.

MATERIALS:

PLASTIC LAMINATE CABINETS:

Exposed Surfacing Material of Doors, Fixed Panels, Toeboards.

Ends: High-pressure plastic laminate, 0.028 in. thick, General Purpose Type (GP-28). Color shown in color schedule of these specifications.

Counter Top: High-pressure plastic laminate 1/16-in. thick. Color to match front and sides.

Semi-Exposed Surfacing Material and Doors: High-pressure laminate, 0.020 in. thick, Cabinet Liner Type (CL-20), in white color.

Remaining Semi-Exposed Materials: Decorative boards, General Purpose Type, conforming to NEMA LQ-1 with decorative faces patterns or colors and finish indicated, or, if not indicated, selected by Architect from manufacturer's standard choices. Submit samples to the Construction Engineer.

Concealed Materials: Any sound, dry solid lumber, plywood or particleboard or combination thereof; without defects affecting strength, utility or stability. On concealed surfaces or portions constructed of decorative boards, provide decorative or cabinet liner back (Light Duty Type).

Core Material for Plastic Laminates: Particleboard.

Treatment of Exposed and Semi-Exposed Edges: Edge doors and drawer fronts with plastic laminate of same material as exposed faces. Edge top of drawer body with high impact plastic tee edging. Edge remaining portions of cabinets with high pressure plastic laminate not less than 0.028 in. thick matching adjoining plastic laminate in colors or patterns and finish, unless otherwise indicated.

Style of Face Construction:

Flush Overlay Style: Provide base, wall and full height units (if any), with drawer fronts, doors and fixed panels (if any) overlaying and concealing face frames of cabinet body, unless otherwise indicated.

Cabinet Construction:

Sides, Dividers, Tops, Bottoms, Shelves and Stretchers: Not less than ¾ in. thick. Provide stretchers at top of base cabinet.

Backs: Not less than 3/8-in. thick.

Joinery: Rabbet backs and set flush into end panels and secure with concealed mechanical fasteners. Connect base cabinet bottoms and stretchers to end and dividers by means of mechanical fasteners. Set tops, bottoms and backs flush with sides.

Subbase: Not less than ¾ in. thick, of height and in relationship to cabinet fronts and exposed ends as indicated.

Toe Board: Not less than 5/8-in. thick, attached to subbase with concealed fasteners.

Substrate (Core) for Exposed Surfacing Material: Particleboard.

CABINET HARDWARE:

General: Provide manufacturer's standard hardware units by complying with ANSI A156.9, of type, material, size and finish as selected by Architect from manufacturer's standard choices.

PART 3--EXECUTION

INSTALLATION:

Anchor cabinets securely in place with concealed (when doors and drawers are closed) fasteners, anchored into structural support members of wall construction.

Attach countertops securely to base units. Splice and glue joints in countertops; provide concealed mechanical clamping of joint. Provide cutouts for fixtures and appliances as indicated.

Complete hardware installation and adjust doors and drawers for proper operation.

CLEANING AND PROTECTION:

Repair or remove and replace defective work as directed upon completion of installation.

Clean exposed and semi-exposed surfaces, touch-up as required and remove and refinish damaged or soiled areas.

Protection: Installer shall advise Subcontractor of final protection and maintained conditions necessary to ensure that work is without damage or deterioration at time of acceptance.

END OF SECTION 12390

SECTION 12670--ENTRANCE MATS

PART 1--GENERAL

SUMMARY:

Work includes but is not limited to:

Provide and install carpet tile mats entry doors 2 and 8 and vinyl molding entrance mat reducers to transition from mats to adjacent flooring.

SUBMITTALS:

No vendor data is required for this Section unless an "or-equal" item is proposed.

PART 2--PRODUCTS

GENERAL:

Mat consists of buffed tire fabric strips 3/8 in. thick, bonded to fiberglass backing, in tile squares.

Acceptable Manufacturers:

Entrance Mat: Cactus Mat Mfg. Co., El Monte, CA 91731.

Vinyl Reducers: Johnsonite, 16910 Munn Road, Chargrin Falls, OH 44023.

MATERIALS:

Entrance Mat: Mat shall be Cactus Kid Futurus carpet tile in 12 x 12 x 3/8-in. size.

Vinyl Reducers: Entrance mat reducer molding to be vinyl of sizes compatible with mat and adjacent floor thickness. Color to be selected from submittals.

PART 3--EXECUTION

Installation/Application/Erection: Install as per factory instructions with adhesive compatible with mat and moldings and/or as recommended by the manufacturers.

END OF SECTION 12670

SECTION 13120--METAL BUILDING SYSTEMS

PART 1--GENERAL

SUMMARY:

The Subcontractor shall furnish and install a metal building system, complete, as shown on the subcontract drawings and as specified herein.

Section Includes, but is not limited to:

1. Design, fabrication, and erection of a metal building system with symmetrical roof peak, eave height and roof slope as indicated on the drawings.
2. Erection of structural framing, installation of metal roof, exterior walls and flashings.
3. Installation of interior metal liner panels as shown on drawings.
4. Miscellaneous structural accommodations as shown on drawings, such as support for hollowcore floor slab where shown.
5. Installation of louvers, vents and ventilators.
6. Installation of all necessary trim, accessories, flashings at all penetration to insure weathertightness.
7. Installation of canopies at al personnel doors.

Related Sections:

03300 Cast-in-Place Concrete (concrete foundations and anchor bolt placement)
05100 Structural Steel and Miscellaneous Metals (other than Metal Building) Section
07190 Vapor Barriers
07200 Thermal Insulation
07901 Joint Sealants
08110 Steel Doors and Frames
08362 Insulated Sectional Overhead Door(s)
08700 Door Hardware

REFERENCES:

The following Codes and Standards, including others referenced therein, form a part of this Section to the extent specified herein:

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC (ASD) Specification for Structural Steel for Buildings – Allowable Stress Design (ASD)
AISC (LRFD Load and Resistance Factor Design Specification for Structural Steel Buildings

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI SG-671	Specification for the Design of Cold-Formed Steel Structural Members
AISI SG-911	Load and Resistance Factor Design Specification for Steel Structural Members

AMERICAN SOCIETY OF CIVIL ENGINEERS

ASCE 7-98	Minimum Design Loads for Buildings and Other Structures

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36	Standard Specification for Carbon Structural Steel
ASTM A 53	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 325	Standard Specification for Structural Bolts, Steel, Heat-Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 500	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 501	Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
ASTM A 529	Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality
ASTM A 568	Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled
ASTM A 570	Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
ASTM A 572	Standard Specification for High-Strength, Low-Alloy Columbium-Vanadium Structural Steel
ASTM A607	Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Columbium or Vanadium, or Both, Hot-Rolled, and Cold-Rolled
ASTM A611	Structural-Quality, Cold-Rolled, Matte Finish
ASTM A 755	Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dipped Process and Pre-Painted by the Coil-Coating Process for Exterior Building Products
ASTM A 992	Steel for Structural Shapes for Use in Building Framing

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	Structural Welding Code Steel
AWS D1.3	Structural Welding Code Sheet

FACTORY MUTUAL

FM	Approval Guide
FM	Data Sheet 1-31
FM	Data Sheet 1-54

METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

MBMA	Recommended Design Practices Manual, for applicable loads and load combinations
MBMA	Metal Building Systems Manual, for collateral loads

INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)

UBC	Uniform Building Code

UNDERWRITERS LABORATORIES (UL)

UL 580	Tests for Uplift Resistance of Roof Assemblies

SUBMITTALS:

Submittals shall be as follows:

Certifications:

Submit, for the proposed building system, proof of affiliation to Metal Building Manufacturers Association (MBMA), American Institute of Steel Construction (AISC) or International Conference of Building Officials (ICBO).

The Subcontractor shall submit a certified statement that all standing seam metal roofing, flashings, rain gutter and downspout, wall panels, fascia, structural framing and anchor bolts have been installed in strict accordance with the manufacturer's printed instructions and this specification.

Mill Certification: Provide certification for structural bolts, framing steel, roofing and siding, and steel wall liner panels.

Shop Drawings: Submit shop drawings on the metal building completely detailing all rigid frames, purlins/girts, columns, wall panels, roof panels, ceiling panels, liner panels, doors, base plates, anchor bolts, anchor bolt locations, portal frames and/or cross bracing, flashings and wall base conditions, and any other information required to evaluate the complete structure, including all dimensions and anticipated column base reactions for each load case considered. Unique structural supports or features as noted on the drawings shall also be detailed on the required shop drawings. Shop drawings shall be stamped by a Professional Engineer registered to practice Civil or Structural Engineering in the State of Idaho.

Design Calculations: Submit design calculations showing all loads specified. Design calculations shall include but not be limited to structural steel members and anchor bolts. Design calculations shall be stamped by a Professional Engineer registered to practice Civil or Structural Engineering in the State of Idaho. All calculations and shop drawings shall be submitted for approval prior to shipment and installation.

Anchor Bolt Embedment Depth Calculations: Submit calculations which determine proper embedment depth of the metal building column anchor bolts. Subcontractor shall verify that bolts of sufficient length will be provided by metal building supplier.

Warranties: Submit warranties for approval prior to bid award. Submit executed warranties before final acceptance of the project.

Installation Certification: The Subcontractor shall submit a certified statement that all standing seam metal roofing, flashings, rain gutter and downspout, wall panels, fascia, structural framing and anchor bolts have been installed in strict accordance with the manufacturer's printed instructions and this specification.

Interior Building Volume: The HVAC system is designed around the volume of the specified building. Submit HVAC calculations if an "Or equal" metal building is proposed and the internal volume of the proposed building is 5% greater or smaller than the specified building. Calculations shall include the size of fans, filters and ductwork.

Roof, Wall and Liner Panel Colors: Full range of color samples available from the manufacturer shall be submitted for selection by the Contractor.

See Section 01300, "Submittals" and Vendor Data Schedule for Submittal requirements.

QUALITY CONTROL:

Regulatory Requirements (Codes and Standards): Comply with provisions of the following codes and standards, unless otherwise specified:

Structural Steel: AISC (ASD) or AISC (LRFD)

Cold Formed Steel: AISI SG-671 or AISC SG-911

Primary and Secondary Members:

MBMA	Recommended Design Practices Manual, for applicable loads and load combinations
MBMA	Metal Building Systems Manual, for collateral loads
UBC	Wind, Snow and Seismic loads

Qualifications:

Manufacturer Qualifications: Provide metal building systems and components as produced by an experienced manufacturer with a successful record of in-service performance in the fabrication of metal structures of type and quality indicated. All components shall be provided from one manufacturer. The manufactures shall have the following additional qualifications:

1. Member of MBMA.
2. AISC Certification for Category MB: An AISC-Certified Manufacturer that designs and produces metal building systems and components in an AISC-Certified Facility.
3. Engineering Responsibility: Preparation of Shop Drawings, testing program development, test result interpretation and comprehensive engineering analysis by a qualified professional engineer.

Welding Qualifications: Qualify procedures and personnel according to AWS D1.1 and AWS D1.3.

Erector Qualifications: An experienced erector who has specialized in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in this Project jurisdiction and is experienced in providing the engineering services indicated herein.

WARRANTIES:

Materials: Manufacturer shall provide minimum 20 year performance warranties on roofing and siding against leakage, cracking, chipping, peeling, delaminating, and rusting; chalking in excess of a numerical rating of eight per ASTM D4214 test procedures; or color change in excess of five CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D2244. Warranty shall include labor and materials for replacement of defective items. Warranty shall not be pro-rated over 20-year period.

Workmanship (Assembly): Subcontractor shall provide a minimum five (5) year warranty of roof and wall assemblies and any associated flashing of assemblies 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. Warranty shall include replacement/repair of effected items, labor, and marks to accomplish such.

PART 2--PRODUCTS

MANUFACTURER:

Structural System Manufacturer: Subject to compliance with the specified requirements, provide metal building systems that may be incorporated in the work include the following:

1. Steelox Systems Inc.
2. United Structures of America
3. American Buildings Co.
4. Ceco Building Systems
5. Butler Manufacturing Company
6. Star Building Systems

Roofing and Siding Manufacturer: Subject to compliance with the specified requirements, Provide roofing and siding systems provided by

1. MBCI, Metal Building Components, Inc.
2. Steelox Systems Inc.
3. United Structures of America
4. American Buildings Co.
5. Ceco Building Systems
6. Butler Manufacturing Company
7. Star Building Systems

Design details, dimensions, and sizes are representative only. All dimensions and clearances shall be taken as minimums for evaluation of submittal. Subcontractor shall be responsible for all adjustments required to plans as a consequence of differing building dimensions. Subcontractor shall provide calculations on sizes and number of anchor bolts required to develop building reactions and proper embedment depth of the anchor bolts. All calculations, shop drawings and special process procedures as welding, painting and structural bolting, shall be submitted for approval and shall be stamped by a registered professional engineer licensed to practice Civil or Structural Engineering in the State of Idaho.

Type: The metal building shall be a prefabricated, weather-tight, free-standing building having a structural steel frame. The building shall be a rigid frame. The roof slope shall be as shown on the drawings. Clear height (below frame at column) shall be based on the eve height shown on the plans.

DESIGN LOADS:

The building shall be designed for the following applied loads in addition to dead load:

Vertical Live Loads/Snow Load: Roof covering shall be designed for either 50 psf uniformly distributed or a 200-lb concentrated load (over a 1 x 1-ft area) located at center of maximum roofing span.

All building components, except roof covering shall be designed for a 30 psf snow load calculated according to ASCE 7, Importance Factor of 1.0, with an allowance for ice buildup at the eaves.

Wind Load: The wind load on the structure shall be designed for an 90 mph wind speed, (3 second gust) calculated according to ASCE 7, exposure Class "C" and a Importance Factor of 1.0.

Seismic Load: Seismic loads shall be determined and applied in accordance with the UBC Zone 2b, Soil Profile S_D, and an Importance Factor of 1.0.

Auxiliary Load: All dynamic live loads required by the contract document, such as cranes, material handling systems, and vibrating equipment. Weights and locations as shown on drawings/specifications.

Fire Protection Loads: Coordinate fire protection static and dynamic loads (including seismic) imposed by sprinkler system and include such loads and method of attachment in design calculations to assure building structure is capable of supporting all loads.

Subcontractor shall insure that the fire protection subtier provides the required information to the Metal Building Manufacturer.

Collateral Loads: All additional dead loads, other than the weight of the metal building system, fire sprinkler system listed in combination loads, mechanical HVAC systems, electrical systems, and ceilings. Collateral loads shall be a minimum of 10 pounds per square foot as defined in the Metal Building Systems Manual published by the MBMA. Include additional loads for specific systems as referenced in the drawings and/or related specification sections.

Maximum Deflection: Deflection shall be limited to L/240 for all building components. Story drift shall be limited to the requirements of the UBC.

Combination of Loads: The combining of normal loads, fire protection loads, auxiliary loads and collateral loads for design purposes shall be as prescribed and recommended by the MBMA "Recommended Design Practices Manual."

MATERIALS:

Hot-Rolled Structural Shapes: Conform to ASTM A 36, A 572 Grade 50 or A 992.

Tubing or Pipe: Conform to ASTM A 500, Grade B; ASTM A 501, or ASTM A 53.

Members Fabricated from Plate or Bar Stock: 42,000-psi minimum yield strength; Conform to ASTM A 529, A 570, or A 572.

Members Fabricated by Cold Forming: Conform to ASTM A 607, Grade 50.

Galvanized Steel Sheet: Conform to ASTM A 446 with G90 coating. "Class" to suit building manufacturer's standards.

Manufactured Assemblies: Manufactured assemblies, including standing seam metal roofs and sandwich panel metal roof systems shall be listed in the latest edition of the Factory Mutual (FM) Approval Guide and shall meet FM Data Sheet 1-31 and 1-54 installation guidelines.

STRUCTURAL FRAMING COMPONENTS:

Rigid Frames: Rigid frames shall be hot rolled structural steel, factory welded, and shop painted. Furnish complete with attachment plates, bearing plates, and splice members. Factory drilled for bolted field assembly.

Length of span and spacing of frames shall be as shown on drawings except slight roof slope variations are acceptable to meet manufacturer's standard.

End Walls: End walls shall be framed with interior bay frames and/or truss frames to allow future expansion capability.

Wall Wind Bracing: Portal Frames.

Roof Wind Bracing: Shall be rod type, X-bracing.

Secondary Framing: Purlins, eave girts, girts, flange and sag bracings shall be "Z" or "C" roll formed sections pre-punched for fasteners, and shall be shop painted. Roof purlins shall be spaced a maximum of 5'0" O.C. Base channel, sill angle, purlin spacers; minimum 14 gauge cold formed steel, with a primecoat of paint.

Anchor Bolts: The anchor bolts for the rigid frames shall be designed by the pre-engineered building manufacturer. Location and placement shall be coordinated with the foundation piers and rebar shown on the drawings. Any changes in rebar placement or pier size shall be brought to the attention of the Contractor and engineering calculations shall be provided taking into account the changed rebar location. All changes to rebar and pier size due to final

base plate size, anchor bolt size, configuration or number etc. shall be the responsibility of the Subcontractor and made at no additional expense to the Government.

Bolts: Bolts shall be ASTM A 325 in quantities necessary for design loads and connection details. Provide zinc- or cadmium-plated units when in direct contact with panels.

Fabrication: Shop fabricate to the indicated size and section, complete with base plates, bearing plates, and other plates as required for erection, welded in place, and with all required holes for anchoring or connections shop drilled or punched to template dimensions.

Shop connections shall be bolted, or welded.

Field connections shall be bolted.

Shop Painting: Surfaces to be primed shall be cleaned of loose mill scale, rust, dirt, oil, grease, and other matter precluding paint bond. Follow procedures of SSPC-SP3 for power tool cleaning, SSPC-SP7 for brush-off blast cleaning, and SSCP-SP1 for solvent cleaning.

Prime structural steel primary and secondary framing members with manufacturer's standard rust-inhibitive primer having over 50% rust-inhibitive pigment. No lead or chromate will be allowed.

ROOFING AND SIDING:

General: Provide roofing and siding sheets formed to general profile or configuration as specified. Provide flashings, closers, fillers, metal expansion joints, ridge covers, and other sheet metal accessories, factory formed of same material and finish as roofing and siding.

Roof Panels: The Interlocking-Standing Seam Roof Covering shall carry an Underwriters' Laboratories Inc., Uplift Classification of not less than Class 90 and shall consist of material not less than 22 gauge steel. The panels shall be installed with the ribs upstanding and parallel to the roof slope. The panels shall be "Battenlock" as manufactured by MBCI. All longitudinal interlocking ribs as well as any transverse end laps shall be properly sealed, according to the manufacturer's instructions, with non-drying sealant.

The roof panels shall be secured to each structural support by a steel clip concealed between the adjacent male and female ribs and fastened under that panel's weather surface. Clip shall be long enough to allow a one-inch Styrofoam thermal spacer on top of purlin.

Penetrations through the roof panel by fasteners shall be limited to only those required at the rake, eaves, at end laps and at the ridge. All exposed fasteners shall be fitted with weather-seal washers of hydrocarbon-based elastomer (synthetic rubber) with a compatible metal backing.

Thermal (break) spacers shall be provided continuously at each structural support to minimize thermal conductivity. The thermal spacer shall be a continuous Styrofoam strip, 3 x 1 in. thick.

Wall Panels Exterior: The Interlocking-Ribbed wall covering shall consist of 16 in. wide embossed panels, of not less than 24 U.S. gauge fluoropolymer enamel coated steel with approximately 3 in. deep male and female ribs. The wall panels shall be applied to the structural framing with the interlocking ribs toward the interior of the structure. The interlocking ribs shall be secured 16 in. o.c. at the base, at each intermediate girt and the support at which it terminates by means of an interior fastener, thus eliminating any thru-wall fastening. The panels shall be Shadow Rib as manufactured by MBCI.

All interior fasteners, i.e., screws, bolts and nuts, etc., shall be of carbon steel having a protective coating of either zinc or cadmium.

Roof Panel Finish:

Zincalume Finish: Provide factory applied aluminum-zinc alloy finish to exterior steel roofing panels, ridge caps, flashings and roofing clips of thickness required to prevent corrosion for a minimum of 20 years.

Wall Panel Finish:

Fluoropolymer Finish: Provide factory applied fluoropolymer finish to exterior galvanized steel roofing panels and accessories. The finish shall consist of a 2-coat fluoropolymer coating system consisting of a primer applied to a dry film thickness of from 0.15 mil to 0.25 mil, and a finish coat of polyvinylfluoride or polyvinylidenefluoride applied to a dry film thickness of from 0.80 mils to 1.3 mils.

Liner Panel Finish:

Acrylic-Enamel Coating: Epoxy primer and acrylic-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat

Roof, Wall, and Liner Panel Colors: Full range of color samples available from the manufacturer shall be submitted for selection by the Contractor.

ACCESSORIES:

General: Accessories shall include all flashings, closures, fillers, metal expansion joints, ridge covers, other sheet metal accessories, factory formed of same material and finish necessary to complete assembly and maintain weather tightness.

Flexible Closure Strips: Closed-cell, expanded cellular rubber, self-extinguishing, cut or premolded to match corrugation configuration of siding sheets. Provide to ensure weathertight construction, at base intermediate flashing and top of panels.

INTERIOR LINER PANELS:

Ceiling: A ceiling shall be provided in the Treatment Area, Room 112, only at the roof purlin lower flanges. Minimum length of panels shall be 20 ft 0 in. Fasteners shall be installed at each ceiling purlin. Panel ends shall be provided with trim to cover end joints and wall/ceiling junctures. Finish shall be as described above.

Interior Liner Panels: Interior wall liner panels shall be provided throughout the building on all perimeter walls. The panels shall be 24 gauge, with concealed fasteners. Length of panels shall be full height with no horizontal joints. Finish shall be as described above.

Sealing Tape: Sealing tape shall be 100% solids, pressure sensitive gray polyisobutylene compound tape with release paper backing. Not less than 1/2 in. wide and 1/4 in. thick, nonsag, nontoxic, nonstaining and permanently elastic.

Joint Sealant: Joint sealant shall be one-part elastomeric; polyurethane, polysulfide, or silicon rubber as recommended by building manufacturer.

PIPE PENETRATIONS:

For pipe penetrations through the roof use a "DEKTITE" pipe flashing unit as manufactured by ITW Buildex. Provide a stainless steel hose clamp for positive sealing of flashing to pipe. Metal building manufacturer's flashing system may be utilized if a comparable system is available.

PART 3--EXECUTION

ERECTION:

Framing: Erect structural framing true to line, level and plumb, rigid and secure. Level base plates to a true even plane with full bearing to supporting structures.

Bracing: Install diagonal rod or angle bracing in roof in braced bays.

Diagonal/rod bracing shall not interfere with ceiling purlins.

Framed Openings: Provide shapes of proper design and size to reinforce opening and to carry loads and vibrations imposed, including equipment furnished under mechanical or electrical work. As a minimum, framed openings will be required at all overhead doors, personnel doors and HVAC louvers. Reference drawings and specifications for additional equipment requiring supplemental framing to support these loads. Securely attach required reinforcing members to building structural frame.

ROOFING AND SIDING:

General: Install panels and associated items for neat and weather tight enclosure. Avoid "panel creep" or application not true to line. Maintain "on module" location of seams aligned with wall panel seams. Protect factory finish from damage.

Provide weather seal under ridge cap. Flash and seal roof panels at eave, swaged joints and rake with manufacturer's standard rubber, neoprene, or other closures to exclude weather.

Roof Sheets: Where factory supplied sealant at roof seams is not applicable, provide sealant tape at lapped joints of roof sheets, and between roof sheeting and accessories.

Apply sealant tape continuous to clean, dry surface of weather side of fastenings on end laps and on sidelaps of corrugated or nesting type, ribbed panels and elsewhere to make weatherproof to driving rains.

Wall Sheets: Apply elastomeric sealant continuous between metal base channel (sill angle) and concrete foundation and elsewhere as necessary for waterproofing. Handle and apply sealant and back-up in accordance with sealant manufacturer's recommendations.

Align bottoms of wall panels. Fasten flashings, trim around openings, etc. with self-tapping screws.

Sheet Metal Accessories: Install louvers and other sheet metal accessories in accordance with manufacturer's recommendations for positive anchorage to building and weathertight mounting.

Ceiling and Interior Wall Liner Panels: Install all ceiling and wall liner panels as shown on the drawings. Provide a metal base angle set in sealant, continuous along bottom of interior wall liner panels to achieve a positive seal as shown on drawings. Apply continuous sealant along all panel joints and junctures with intersecting surfaces in order to maintain watertight seal in the Decontamination Bay, Room 113 and Treatment Area, Room 112.

FIELD QUALITY CONTROL:

Contractor Supplied Testing:

General: The Contractor's Representative will inspect high-strength bolted connections and perform tests, visual inspection and prepare test reports unless noted otherwise.

Shop Bolted Connections: Inspect in accordance with AISC specifications.

Shop Welding: Inspect during fabrication of structural steel.
Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

1 END OF SECTION 13120

SECTION 13200--TRUCK SCALE

PART 1--GENERAL

SUMMARY:

The Subcontractor shall furnish and install a fully electronic low profile type motor truck scale complete as shown on the subcontract drawings and specified herein. Upon completing installation of the scale, the Subcontractor shall be responsible to complete prescribed testing as specified hereinafter to verify that the scale systems are properly installed and can be operated as designed.

Work includes, but is not limited to:

Furnish and install one fully electronic low profile motor truck scale with concrete support slab and other associated components. Scale shall have a capacity of 60 tons and a platform of 70 ft x 10 ft. The scale platform, instrumentation controls, and load cells shall be furnished by the scale manufacturer. The platform support shall be furnished by the Subcontractor and include concrete pad and approaches.

Related Sections:

03300 Cast-In-Place Concrete
02200 Earthwork

SUBMITTALS:

Shop Drawings: Submit shop drawings showing the layout and installation requirements of the truck scales.

Product Data: Submit truck scale product specifications and technical data from manufacturer.

Test Results: Submit test procedure and results upon completion of satisfactory scale operation testing by representatives of scale manufacturer.

Warranty: The scale system components shall be warranted against defective material or workmanship for one full year from date of shipment.

QUALITY CONTROL:

Qualifications: The truck scale shall be furnished and installed by a firm qualified, accredited and regularly engaged in this type of work. Factory maintenance and repair service personnel trained in repair of low profile truck scales shall be readily available within a 500-mile radius of the job site. This service shop will use only factory trained technicians and have available at least 20,000 lbs. of certified test weights for scale testing. The scale

manufacturer shall also be in a position to offer a scale service maintenance contract which outlines a plan by which representatives of the scale manufacturer periodically check and service all scale equipment.

Materials, Products and Equipment: Materials, products and equipment shall be first quality and be furnished and installed in strict accordance with the subcontract drawings, the approved shop drawings, and these specifications.

PART 2--PRODUCTS

GENERAL:

All materials, products and equipment shall be as manufactured by the manufacturer specified in this section.

EQUIPMENT:

The scale is to be a fully electronic low profile type truck scale with steel deck.

Load Cell System: Load cells shall be stainless steel, fully hermetically sealed. Load cell cables shall be jacketed stainless steel.

Instrumentation: The scale shall have Intalogix Series 2500 digital instrumentation. This system shall include the following features and capabilities:

- A four inch remote display at the scale
- A digital indicator located in the Admin Trailer not more than 100 feet from the scale
- An RS 232C port for transferring load weight measurement from the digital indicator to a waste tracking computer in the Admin Trailer
- An accuracy of +/- 0.10 % applied load
- An electrical supply voltage of 120 Vac
- Self diagnostics with all load cell outputs displayed simultaneously
- Complete calibration from within the Admin Trailer
- Scale is to have the ability to be analyzed via a modem

PART 3--EXECUTION

INSTALLATION:

The scale shall be installed, on a concrete pad to be provided by the Subcontractor, by technicians trained in the business of installing motor truck scales. Installation will not be considered complete until the scale is tested with 20,000 lbs. of state certified weights and put into operation by representatives of the scale manufacturer.

QUALITY CONTROL TESTING:

Subcontractor Supplied Testing: The subcontractor shall be responsible for having the scale tested by scale representatives with 20,000 lbs. of state certified weights.

FIELD QUALITY CONTROL:

Surveillance will be performed by Contractor's Representative to verify compliance of the work to the drawings and specifications.

END OF SECTION 13200

SECTION 13505--UNDERGROUND FIRE PROTECTION PIPING

PART 1--GENERAL

SUMMARY:

Work includes, but is not limited to:

Layout, fabricate, install, flush, and test a complete underground supply system including pipe, fittings, thrust blocks, rodded connections and all necessary accessories and components to assure a complete and operable system. Subcontractor shall be responsible for coordinating all existing and new work.

RELATED SECTIONS:

02200 Earthwork
09900 Painting

REFERENCES:

INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)

UBC - 1997	Uniform Building Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 13 - 1999	Standard for the Installation Sprinkler Systems
NFPA 14 - 1999	Standard for the Installation of Standpipe, Private Hydrant, and Hose Systems
NFPA 24 - 1999	Standard for the Installation of Private Fire Service Mains and their Appurtenances

FACTORY MUTUAL (FM)

FM Approval Guide	Fire Protection
FM Data Sheet 3-10	Installation and Maintenance of Private Fire Service Mains and Their Appurtenances

UNDERWRITERS LABORATORIES INC. (UL)

UL Directory - 2001	Fire Protection Equipment
UL 194	Pipe and Fittings
UL 1285	PVC Pipe and Couplings for Underground Fire Service

NATIONAL ASSOCIATION OF CORROSION ENGINEERS (NACE)

RPO 169 Control of External Corrosion on Underground or Submerged Metallic Piping Systems – Item No. 21001

SYSTEM DESCRIPTION:

Project Drawings: The project drawings do not attempt to show complete details of the site utilities, which affect the fire protection installation. The drawings in part are diagrammatic and do not show all offsets, fittings, valves, equipment, etc. It is absolutely essential to study the architectural, structural, mechanical, and electrical drawings and confer with the various trades involved, to the end that there is no conflict between the fire protection system and the work of other trades and to assure that the owner secures the best arrangement of work consistent with the use of space.

Layout Criteria: The underground fire protection piping shall be laid out and installed in accordance with the referenced codes and standards.

Thrust Blocks: Thrust blocks shall be used to restrain fire mains. Thrust blocks shall be sized by a NICET Level IV certified person. The soil shall be considered to have a maximum 3000-psf horizontal bearing strength. A minimum safety factor of 2 shall be used in thrust block calculations.

Piping: Piping located beneath a building and up to approximately 5 feet away from the building must use Cement Lined Ductile Iron. All other installed piping may be PVC.

Pipe sleeves shall be installed per NFPA.

A pipe sleeve 4 inches in diameter larger than the pipe passing through the floor shall be installed around the system riser.

Depth of bury shall be as outlined in the referenced codes. However, in no case shall it be less than 6 ft. to the top of pipe. Any depth of bury less than 6 ft. will require pre-authorization by the Contractor. The fire water pipeline shall be sized as shown on drawing sheet FP-3.

Fire Hydrants: Fire hydrants and valves are to be installed to proper finished grade. Hydrants shall be set so that the 2½" outlets are 20 inches (plus or minus 2 inches) above finished grade level and to have the pumper connection pointing toward the road way for Fire Department access. Protective devices placed around the hydrant shall be located in a manner that will not interfere with connecting hoses too or flowing water from the hydrant ports.

The key valve for the hydrant shall be located such that connection of fire hose to the 4½" pumper connection will not hinder the operation of the valve.

Valving: Sectional and control valves installed on the underground fire main shall be equipped with electrical supervision. Electrical duct banks and/or conduit leading to the supervision device shall not be placed directly over the underground fire main.

Pipe Identification: Identification tape shall be spiral wrapped around the underground fire main.

The tee connecting the new piping to the existing system shall be protected by a sacrificial galvanic anode installed in accordance with NACE Standard RPO-169.

SUBMITTALS:

Vendor data requirements for this section are summarized on the Vendor Data Schedule.

Layout: The fire water supply system layout shall be submitted as a complete package for review. Complete packages shall include thrust block calculations, thrust block details, and piping method including make and model of all equipment used. Partial submittals will be considered as incomplete and will not be reviewed. The layout must receive an "A" or "B" designation by the Contractor prior to beginning of installation and shall comply with NFPA 13, 14, 24 FM 3-10, and FM Approval Guide requirements.

The Subcontractor shall submit all layout drawings for approval prior to construction. All drawings shall be completed on size D (22" X 34") CAD generated drawings. Lettering size shall be a minimum of 1/8 (.125)" inch for all lettering on the main body of the drawing. Border and title block shall follow format in this drawing package. Drawings shall be done using AutoCAD or a similar program, which generates drawing files, which are compatible with AutoCAD 2000 and use a simplex font. An electronic copy of the As-Built configuration shall be furnished in addition to the original drawing plots.

An electronic copy of border and title block format, as well as the associated drawings are available upon request. An A/E Drawing Standard format is available upon request.

Thrust block calculation shall be submitted for information. These calculations shall show the formula used, overall size, and the individual side dimensions for the thrust blocks used in this installation. A detail shall be provided on the layout drawings that correlates to the dimensions provided by the calculations.

Quality Control Submittals:

Procedures: The Subcontractor shall submit a hydrostatic test procedure and a detailed, job specific flushing procedure. The flushing procedure shall outline where the flushing water will be obtained and how it will be disposed of in a safe manner. It shall also outline how the flow will be monitored to assure adequate flow and how long the flow must be maintained to adequately flush the piping. This procedure must be submitted for review prior to any connections to existing plant piping.

Certifications: A Contractor's Material and Test Certification for Under-Ground Piping shall be completed and accepted, for each major portion of the work covered by this specification prior to final acceptance of the installation.

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

QUALITY CONTROL:

Qualifications: The Subcontractor for the underground fire protection piping shall have a NICET Certified Engineering Technician (CET) in Fire Protection with a minimum Level IV rating. This person shall be required to certify that the drawings are in accordance with this specification and all the regulatory requirements. All drawings shall be signed by the CET.

Manufacturers: Firms regularly engaged in the manufacture of underground fire protection piping accessories of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

Installer: A firm with at least 3 years of successful installation experience on projects with fire sprinkler piping similar to that required for this project. The installing Subcontractor shall be licensed, by the State of Idaho, as a Fire Protection Sprinkler Contractor.

Materials: Provide piping, fittings, and devices with a UL listing and FM approval unless a specified product is only covered by one of the agencies. Exceptions will be made on a case by case basis for the products submitted as or equals. If no product exists that has both a UL listing and FM approval, it will be acceptable to use a product that has been published in either organization's publications.

Regulatory Requirements (Codes and Standards): Comply with the provisions of the following codes and standards unless otherwise specified herein.

NFPA 13
NFPA 14
NFPA 24
FM Data Sheet 3-10

DELIVERY, STORAGE AND HANDLING:

All materials shall be delivered to and stored at the job site in a manner, which will prevent foreign material from getting inside the piping and valves.

PART 2--PRODUCTS

MATERIALS AND EQUIPMENT:

PVC Pipe: Underground fire water piping shall be Class 200 PVC and shall be UL 1285 listed. Pipe shall be JM Pipe model Blue Brute Model Class 200, PW Pipe Model Twinseal Class 200 DR14. The piping shall be rated for a working pressure of 175 psi, and shall have a 6-ft minimum depth of coverage to top of pipe.

Ductile Iron Fittings: Underground fittings shall be ductile iron mechanical or slip joint, cement lined and be UL 198 listed. The fittings shall be rated for a working pressure of 175 psi, and shall have a 6-ft minimum depth of coverage to top of pipe. Fittings shall be U.S. Pipe, Models Tyton Joint and/or Mechanical Joint. Plain end fittings should not be used.

Rodding: Studs or threaded rod shall conform ASTM A 307 Grade B and use nuts that conform with ASTM A 563 Grade A, heavy hex. Washers shall be steel or ASTM A 126 class A cast iron, round or square as required. Rod couplings or turnbuckles shall be ASTM A 197 malleable iron. Rodding shall be used where piping penetrates foundation or floor slabs.

Post Indicating Valve (PIV): PIVs shall consist of a UL listed and FM approved, resilient wedge gate valve and indicator post from the same manufacture. The valve shall be mechanical joint or flanged. The PIV shall be a Clow Model F-6120, Waterous Series 500.

Fire Hydrants: Hydrants shall be dry barrel with a with a 5¼ in. minimum main valve opening, rated for a working pressure of 175 psig, open counterclockwise and have two 2½ in. hose connections and one 4½ in. pumper connection. Hose connections shall be National Standard fire hose threads.

Hydrants shall have drain holes and mechanical joint (MJ), flanged, or TYTON connections, allow for servicing from above ground and be equipped with a traffic safety flange to allow for a clean break when the hydrant is hit.

Hydrants shall be a Clow Medallion, Model No. F-2545, Waterous model WB-67UF.

Key Valve with Road Box: Key valves shall be resilient wedge gate valve, Clow Model F-6106, Waterous Series 500. The valves shall have mechanical joint, flanged, or other approved ends. Provide 4" cast ductile iron valve stand pipe, road box and key valve wrench.

Valve Tamper Switch: All valves controlling fire protection water supplies shall be provided with electronic valve supervision capabilities. Switch shall have two sets of S.P.D.T. contacts, use Potter Model PCVS.

Set Screw Retaining Gland: Provide set screw retaining gland and associated screws. Use Megalug 1100 Series for ductile iron pipe or Series 2000PV for PVC pipe. This gland is to be UL or FM approved.

Underground Pipe Identification: New underground pipelines shall be identified by use of a plastic ribbon no less than 3 in. in width with a message printed on the ribbon which identifies the actual pipeline contents. The plastic ribbon shall be color coded in conformance with the following:

Categories of Pipeline Contents	Tape	Lettering
Fire Water	Red	White

PART 3--EXECUTION

INSTALLATION:

Materials: Only new and approved pipe, fittings, and devices shall be employed in the installation of the underground system.

Thrust Blocks: Forms shall be used in the placement of the thrust blocks. Thrust blocks shall be placed against undisturbed soil. If the thrust blocks can not be placed against undisturbed soil it will be permissible to compact the soil behind the thrust block to a minimum of 90% proctor.

Thermite Weld Wire Connections: Electrical connection of copper wire to metallic surfaces shall be by the thermite weld method where it is safe to do so. In the event conditions at the negative connection site preclude thermite welding, an above ground connection may be made with a pipe clamp.

The area where the connection is to be made shall be cleaned to bare metal by making a 2" square window in the coating, and then filing or grinding the surface to produce a bright metal surface. Wire sleeves shall be used on wire size as recommended by the manufacturer. The proper mold for pipe size and wire shall be used as recommended by the manufacturer. The mold and base metal shall be clean and dry.

After the weld connection has cooled, remove slag, visually and physically test the quality of the connection by tapping with a hammer. The weld should present a well formed appearance with minimal loss of weld material.

Clean the completed thermite weld connection area with a wire brush. Prime and-install a prefabricated weld cap over each connection. Other welded underground wire to pipe connections shall be cleaned and coating repaired in the same manner.

Underground Pipe Identification: Ribbon shall be spiral wrapped around the pipeline at no less than 1 wrap per 3 ft. of run.

SPECIAL CONDITIONS:

See Special Conditions for pipe tie-in information.

FIELD QUALITY CONTROL:

One set of approved installation shop drawings shall be maintained on the project site during construction. The Subcontractor shall redline all changes daily. The redline drawings shall be incorporated on the "as-built" design drawings by the Subcontractor.

Acceptance Tests:

Flushing of Piping: New underground mains and lead-in connections to system risers shall be flushed thoroughly immediately after tie-in to system is made or before connection is made to the sprinkler piping.

Flush underground mains through hydrants at dead ends of the system or through accessible aboveground flushing outlets allowing the water to run until clear and move any foreign material out of the piping.

If water is supplied from more than one source or from a looped system, divisional valves shall be closed to produce a high velocity flow through each single line.

A flow of 880 gpm (6 inch line), 1560 gpm (8" line), 2440 gpm (10 inch line), or 3520 gpm through a 12 inch line will produce a velocity of at least 10 ft/sec (3.0 m/sec), which is necessary, for cleaning the pipe and for lifting foreign material to an above-ground flushing outlet.

Test of Piping System: All new underground Fire System piping shall be hydrostatically tested at not less than 225-psi pressure for two hours.

1. Slowly fill with water each section of the main to be tested.
2. Expel all air by opening hydrants at the highpoints of the system and at both ends, or by bleeding air through the sprinkler drains.
3. Open wide the valve controlling the admission of water before shutting the hydrants or drains.
4. After the system has been filled with water and the entrapped air expelled, close the valve controlling the section being tested and begin applying pressure.
5. Increase the water pressure in 50-psi increments until the specified test pressure is attained.

6. After each increase in pressure, make observations of the stability of the joints. In these observations, include such items as protrusion or extrusion of the gasket, leakage or other factors likely to affect the continued use of a pipe in service.
7. During the test increase the pressure to the next increment only after the joint has been determined to be stable. This applies particularly to movement of the gasket.
8. After the pressure has been increased to the required maximum value and held for two hours with no loss in pressure.
9. Decrease the pressure to 0 psi while observing for leakage. Then slowly increase the pressure to the specified maximum and hold the pressure for one more hour.

Warning: Do not use the fire pumps to supply pressure. A pipeline break during testing could result in damage from the large flow of escaping water. Instead, use a small hydrostatic test pump.

Test for Dry-Barrel Hydrants:

Each dry barrel hydrant shall be tested as follows:

1. Following the hydrostatic pressure test, close the hydrant main valve.
2. Remove one outlet-nozzle cap and place the palm of one hand over the outlet-nozzle opening.
3. Drainage should be sufficiently rapid to create a noticeable suction.
4. If the hydrant fails the drainage test, partially open the hydrant with the outlet-nozzle caps on to create a pressure that will clear the drain valve. If this fails, then the drain valve assembly should be removed and inspected. If the drain valve is clear, then the problem may be that the drain outlet is plugged from outside the hydrant Repair will require digging down around the outside of the hydrant and clearing the drain outlet.

The underground fire water main must be flushed and accepted per the Contractor's Material and Test Certificate.

Testing and flushing shall be witnessed by the Contractor's Representative.

END OF SECTION 13505

Appendix A

Contractors Material and Test Certificate for Underground Piping

CONTRACTOR'S MATERIAL AND TEST CERTIFICATE FOR UNDERGROUND PIPING

PROCEDURE

Upon completion of work, inspection, and tests shall be made by the contractor's representative and witnessed by an owner's representative. All defects shall be corrected and system left in service before contractor's personnel finally leave the job.

A certificate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners, and contractor. It is understood the owner's representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinances.

Property Name	**Date**

Property Address

PLANS	Accepted by approving authorities (names)		
	Address		
	Installation conforms to accepted plans	☐ YES	☐ NO
	Equipment used is approved	☐ YES	☐ NO
	If no, state deviations		
INSTRUCTIONS	Has person in charge of fire equipment been instructed as to location of control valves and care and maintenance of this new equipment? If no, explain	☐ YES	☐ NO
	Have copies of appropriate instructions and care and maintenance charts been left on premises? If no, explain	☐ YES	☐ NO
LOCATION	Supplies Buildings		
UNDERGROUND PIPES AND JOINTS	Pipe Types and Class / Type Joint		
	Pipe conforms to _____ Standard	☐ YES	☐ NO
	Fittings conform to _____ Standard	☐ YES	☐ NO
	If no, explain		
	Joints needing anchorage clamped, strapped, or blocked in accordance with _____ Standard	☐ YES	☐ NO
	If no, explain		
TEST DESCRIPTION	Flushing: Flow the required rate until water is clear as indicated by no collection of foreign material in burlap bags at outlets such as hydrants and blow-offs. Flush at flows not less than 390 GPM (1476 L/min) for 4-inch pipe, 880 GPM (3331 L/min) for 6-inch pipe, 1560 (5905 L/min) for 8-inch pipe, 2440 GPM (9235 L/min) for 10-inch pipe, and 3520 GPM (13323 L/min) for 12-inch pipe. When supply cannot produce stipulated flow rates, obtain maximum available and concurrence of the INEEL Fire Marshall. Hydrostatic: Hydrostatic tests shall be made at not less than 200 psi (13.8 bars) for two hours or 50 psi (3.4 bars) above static pressure in excess of 150 psi (10.3 bars) for two hours. Leakage: New pipe laid with rubber gasketed joints shall, if the workmanship is satisfactory, have little or no leakage at the joints. The amount of leakage at the joints shall not exceed 2 qts. Per hr. (1.89 L/h) per 100 joints irrespective of pipe diameter. The leakage shall be distributed over all joints. If such leakage occurs at a few joints the installation shall be considered unsatisfactory and necessary repairs made. The amount of allowable leakage specified above may be increased by 1 fl oz per in. valve diameter per hr. (30 mL/25 mm/h) for each metal seated valve isolating the test section. If dry barrel hydrants are tested with the main valve open, so the hydrants are under pressure, an additional 5-oz per minute (150-mL/min) leakage is permitted for each hydrant.		
FLUSHING TESTS	New underground piping flushed according to approved flushing procedure dated _____ by _____(company)	☐ YES	☐ NO
	If no, explain		
	How flushing flow was obtained ☐ Public Water ☐ Tank or Reservoir ☐ Fire pump	Through what type opening ☐ Hydrant butt. ☐ Open pipe **Give C factors and pitot readings in comment section.**	

	Lead-ins flushed according to approved flushing procedure dated _____ by _____(company) If no, explain	☐ YES ☐ NO
	How flushing flow was obtained ☐ Public Water ☐ Tank or Reservoir ☐ Fire pump	Through what type opening ☐ Y conn. To flange and spigot ☐ Open pipe
HYDROSTATIC TEST	All new underground piping hydrostatically tested at psi for hours	Joints covered ☐ YES ☐ NO
LEAKAGE TEST	Total amount of leakage measured gals hours	
	Allowable leakage gals hours	
HYDRANTS	Number installed	Type and Make / All operate satisfactorily ☐ YES ☐ NO
CONTROL VALVES	Water control valves left wide open If no, state reason	☐ YES ☐ NO
	Hose threads of fire department connections and hydrants interchangeable with those of fire department answering alarm.	☐ YES ☐ NO
REMARKS	Date left in service	
SIGNATURES	Name of installing Contractor	
	Tests Witnessed By	
	For Operating Contractor Title Date	
	For Installing Contractor Title Date	

Additional Explanation and Notes