****
USACE / NAVFAC / AFCESA / NASA **UFGS-04 21 13.13 (April 2006)**

Preparing Activity: USACE **Replacing without change UFGS-04810 (December 2002)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 19 March 2007

Latest change indicated by CHG tags
****

SECTION TABLE OF CONTENTS

DIVISION 04 - MASONRY

SECTION 04 21 13.13

NONBEARING MASONRY VENEER/STEEL STUD WALLS

04/06

-- End of Section Table of Contents --

****

USACE / NAVFAC / AFCESA / NASA | **UFGS-04 21 13.13 (April 2006)**

Preparing Activity: USACE | **Replacing without change UFGS-04810 (December 2002)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 19 March 2007

Latest change indicated by CHG tags

****

SECTION 04 21 13.13

NONBEARING MASONRY VENEER/STEEL STUD WALLS
04/06

****

NOTE: This guide specification covers the requirements for nonbearing walls consisting of a masonry veneer wythe that is supported laterally by a cold-formed steel framing system. The steel framing does not resist vertical and/or horizontal loads in the plane of the wall.

Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

****

PART 1 GENERAL

****

NOTE: For Army projects UFC 3-310-05A should be used for crack control; ASCE 7 should be used for wind loadings; UFC 3-310-03A SEISMIC DESIGN FOR BUILDINGS will be consulted for seismic considerations; and UFC 3-320-05A should be consulted for caulking and sealant requirements and details.

The project drawings should show all necessary

Architectural and Structural details including wall sections, masonry bond and pattern details, joint locations and details, joint dimensions, weep hole locations, head joint vent locations, flashing, reinforcement locations and details, anchor details, special unit details, masonry dimensions, design loadings when applicable, section properties of steel studs and other cold-formed steel framing members, and other similar details to complement this guidance.

****

1.1 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

****

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

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 316	(1989) ASD Manual of Steel Construction

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI SG-971-Spec	(1996; Supp 2001) Specification and Commentary for the Design of Cold-Formed Steel Structural Members and Commentary; includes SG-2000-1 Supp 1 to 1996 Spec, dated 2000

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

ASHRAE FUN IP	(2005) Fundamentals Handbook, I-P Edition
ASHRAE FUN SI	(2005) Fundamentals Handbook, SI Edition

AMERICAN WELDING SOCIETY (AWS)

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

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA PS1	(1995) Construction and Industrial Plywood (APA V995)

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2005) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 36/A 36M	(2005) Carbon Structural Steel
ASTM A 653/A 653M	(2006a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 82/A 82M	(2005a) Steel Wire, Plain, for Concrete Reinforcement
ASTM C 1002	(2004) Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
ASTM C 1072	(2006) Measurement of Masonry Flexural Bond Strength
ASTM C 1177/C 1177M	(2006) Glass Mat Gypsum Substrate for Use as Sheathing
ASTM C 216	(2006) Facing Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C 270	(2006) Mortar for Unit Masonry
ASTM C 494/C 494M	(2005a) Standard Specification for Chemical Admixtures for Concrete
ASTM C 578	(2006) Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 591	(2005) Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
ASTM C 665	(2006) Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
ASTM C 67	(2006) Sampling and Testing Brick and Structural Clay Tile

ASTM C 744	(2005) Prefaced Concrete and Calcium Silicate Masonry Units
ASTM C 780	(2006) Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
ASTM C 79/C 79M	(2004a) Treated Core and Nontreated Core Gypsum Sheathing Board
ASTM C 90	(2006a) Loadbearing Concrete Masonry Units
ASTM C 91	(2005) Masonry Cement
ASTM C 954	(2004) Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
ASTM C 955	(2006) Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases
ASTM D 1056	(2000) Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 1330	(2004) Rubber Sheet Gaskets
ASTM D 1667	(2005) Flexible Cellular Materials - Poly (Vinyl Chloride) Foam (Closed-Cell)
ASTM D 2103	(2005) Polyethylene Film and Sheeting
ASTM D 226	(2006) Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing

1.2 SUBMITTALS

****

NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within

the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

****

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.][information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings

Detail drawings as specified.

SD-04 Samples

Expansion Joint Materials
Clay or Shale Brick
Concrete Masonry Unit
Prefaced Concrete Masonry Unit
Sample Panel

A portable panel, approximately 600 by 600 mm 2 by 2 feet, containing approximately [24 brick facings] [24 concrete masonry units] to establish the range of color and texture. One of each type of masonry veneer anchor used.

SD-06 Test Reports

Calculations

Calculations demonstrating the structural adequacy of steel lintels and shelf angles for the calculated gravity loads being supported; this analysis shall be in accordance with AISC 316. Test results demonstrating that the veneer anchors are structurally adequate to resist the specified loadings shall be submitted for approval. Calculations demonstrating the insulation shown on the drawings provides the specified U-value for heat transmission of the completed exterior wall construction; this analysis shall be in accordance with ASHRAE FUN SIASHRAE FUN IP. Manufacturer's descriptive data and installation instructions for the insulation, the vapor barrier and the moisture barrier.

SD-07 Certificates

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

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

1.3 SAMPLE PANEL

****
NOTE: On projects where construction of a sample panel or panels would be disproportionately expensive or is considered not necessary to control quality, this paragraph will be deleted. On complex projects, modify this paragraph to require additional sample panels for different types and colors of masonry when more than one type is used in sufficient quantity or in locations which warrant samples.
****

After the material samples are approved and prior to starting masonry work, a sample masonry panel shall be built on the project site where directed. The sample panel shall be not less than 1.8 m 6 feet long by 1.2 m 4 feet high. The panel shall be of typical wall thickness for the construction represented. The panel shall show color range, texture, bond pattern, expansion joints, and cleaning of the masonry as required in the work. The panel shall also show cold-formed steel framing, insulation, gypsum wallboard, gypsum sheathing, moisture barrier, vapor barrier, veneer anchors, joint reinforcement, steel shelf angles, flashing and weep holes. The approved sample panel shall be used as a standard of workmanship required in the actual installation. The sample panel shall be protected from weather and construction operations and shall not be removed until the masonry veneer/steel stud wall work has been completed and accepted.

1.4 DELIVERY, HANDLING AND STORAGE

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

rust. Insulation, moisture barrier, and gypsum sheathing shall be stored in dry, well ventilated, weather-tight areas protected from sunlight and excessive heat. Air infiltration type vapor barrier shall be stored in accordance with the manufacturer's recommendations.

1.5 EFFLORESCENCE TESTS

****
NOTE: In areas where efflorescence is not considered to be a problem, this paragraph will be deleted. Efflorescence is usually caused by allowing water to enter at the tops of walls and the veneer offsets. Testing for efflorescence is usually not required.
****

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

1.6 DETAIL DRAWINGS

The Contractor shall submit details of cold-formed steel framing and support around openings, including framing connections, steel lintels, steel shelf angles, attachment to other building elements and bridging. Drawings shall indicate thickness, material, dimensions, protective coatings, and section properties of all steel lintels and shelf angles used in exterior wall framing. Drawings shall also indicate size and type of all fasteners including size and type of all welds. If the Contractor opts to furnish inch-pound (IP) CMU products, drawings showing elevation of walls exposed to view and indicating the location of all cut CMU products shall be submitted for approval.

PART 2 PRODUCTS

2.1 VENEER WYTHE

****
NOTE: Choose the veneer type or types (brick and/or CMU) used on the project and revise the paragraphs below as appropriate.

Face brick will be ASTM C 216 Type FBS, FBX or FBH. Type FBS brick is for general use where a wider color range and greater variation in sizes are permitted. Type FBX is used where a high degree of mechanical perfection, narrow color range and minimum permissible variation in size are required. Type FBA is selected to produce characteristic architectural effects resulting from nonuniformity in size color and texture of the individual units. When a Type is not specified the requirements for FBS govern.

The manufacturer's name and color number or color range will be specified or indicated on the drawings along with the following note: "Color(s) or color range(s) indicated are for identification purposes

only and are not intended to limit selection of similar color or color range from other manufacturers."

Architectural or decorative CMU is available in a wide range of patterns and finishes, such as screen, slump, scored, fluted, combed, and split face units. Optional designs of "architectural" units will be shown for competitive bidding purposes when certain types are not locally available.

Modular masonry units shall be used whenever possible. Masonry of other than normal modular sizes are available and, if for architectural reasons, other size masonry units are included in the design, the paragraph will be modified as necessary to specify the sizes selected.

****

The source of masonry materials which will affect the appearance of the finished work shall not be changed after the work has started except with the Contracting Officer's approval. The Contractor has the option to use either hard metric or substitute inch-pound (soft-metric) masonry products. If the Contractor decides to substitute inch-pound masonry products, the following additional requirements shall be met:

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

b. Mortar joint widths shall be maintained as specified.

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

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

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

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

g. Additional metric guidance shall conform to Section 00 31 10 METRIC MEASUREMENTS.

2.1.1 Clay or Shale Brick

Clay or shale brick veneer shall be masonry units conforming to ASTM C 216, Type [FBS] [_____]. Color range and texture shall be as indicated and

shall conform to the approved sample. Grade SW shall be used for all brickwork. Brick unit sizes shall be [modular] [_____] [as shown].

2.1.2 Concrete Masonry Unit

Concrete masonry unit veneer shall be solid and conform to ASTM C 90. Architectural type, color range and texture shall be as indicated and shall conform to the approved sample. Masonry unit sizes shall be [modular] [_____] [as shown].

2.1.3 Prefaced Concrete Masonry Unit

Prefaced concrete masonry unit veneer shall conform to ASTM C 744 using masonry units conforming to ASTM C 90. Prefaced concrete unit facing shall turn over the edges and ends of the unit at least 10 mm 3/8 inch in the direction of the thickness of the unit to form a lip at least 2 mm 1/16 inch thick. Variation in color and texture shall not exceed that of the approved samples. Masonry unit sizes shall be [modular] [_____] [as shown].

2.2 MORTAR

****

NOTE: In general, Type S mortar will be used. Type S mortar will be used below grade and in locations of high seismic activity when high flexural bond strength is required. In all other cases, Type N mortar could be used. The lower strength of Type N mortar allows cracking in the masonry wythe at relatively low load levels. Masonry cracking will result in more uniformly distributed anchor forces. Conversely, vertical beam action of the uncracked masonry wythe causes nonuniform distribution of loads to the wall anchors. Those wall anchors near the top of the uncracked masonry wythe have much higher loads than those in the lower half of the wythe.

When specifying masonry cement the mix must be compared to a portland cement-lime mix of the same type. This test compares the compressive and bond strengths of the two cements. The values for the masonry cement must be equivalent to the portland cement-lime mix.

Low alkali cement should be specified for use in mortar if efflorescence caused by the use of available cement is a problem.

The use of admixtures are not recommended in mortars because they may cause efflorescence, may adversely effect the strength of the mortar and may effect the protection of embedded steel items.

****

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

2.2.1 Masonry Cement

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

2.2.2 Admixtures

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

2.3 JOINT REINFORCEMENT

****

NOTE: Since brick masonry is not subject to the same initial drying shrinkage stresses as concrete masonry, horizontal joint reinforcement will not normally be required in brick veneer. However, when a stacked bond placement pattern is used or when in locations of high seismic activity, joint reinforcement will be used. Also, it may be beneficial to use limited amounts of horizontal joint reinforcement in the brick veneer to reduce the tendency of cracking at edges of openings. In projects with brick veneer only, where joint reinforcement is not used, this paragraph will be deleted.

For better long term performance over numerous temperature and moisture cycles, joint reinforcement should be used in CMU veneer construction and is recommended in brick construction.

When used, longitudinal joint reinforcement will consist of at least one continuous corrosion resistant deformed wire with a minimum cross sectional area of 10.97 square mm (0.017 square inch) placed in the veneer wythe.

****

Joint reinforcement shall be of steel wire conforming to ASTM A 82/A 82M. Fabrication shall be by welding. Tack welding will not be permitted. Reinforcement shall be zinc-coated after fabrication in accordance with ASTM A 153/A 153M, Class B-2. Joint reinforcement shall consist of at least 1 continuous longitudinal wire in the veneer wythe. Minimum wire cross section shall be 11 square mm 0.017 square inches.

2.4 COLD-FORMED STEEL FRAMING

****

NOTE: The cold-formed steel framing system will be designed for transverse loads and to support only its self-weight and any vertical load from shelf angles attached to the system. These systems will not be designed as load-bearing walls. When shelf angles are attached to cold-formed steel framing, gaps must be provided on each end of the shelf angle to allow for thermal movements.

The design of the cold-formed steel stud framing system will be completed by a Professional Engineer. The framing system will be designed in accordance with AISI SG-971-Spec specification, without exceeding a deflection of 1/600 times the vertical stud span and allowable stresses. The completed design should result in bending stiffnesses and deflections at openings which are compatible with those of the masonry away from wall openings.

Galvanized sheet steel specified in ASTM A 653/A 653M is available in the following grades:

Grade	Minimum Yield Strength MPa (psi)
A	230 (33,000)
B	255 (37,000)
C	275 (40,000)
D	345 (50,000)
F	345 (50,000)

The specified transverse wall loadings will represent the maximum design wind loading for cladding and the maximum design seismic loading for building components as determined from ASCE 7and UFC 3-310-03A, respectively. Lateral loadings are applied normal to the wall and should be specified in detail, differentiating positive (inward) and negative (outward) loading directions and intensities and indicating, separately, loadings for specific wall areas which are subjected to increased design loadings, such as building corners, additional stories, parapets, etc.

****

Cold-formed framing shall consist of steel studs, top and bottom tracks, runners, horizontal bridging, and other cold-formed members and other accessories. All members and components made of sheet steel shall be hot-dip galvanized in accordance with ASTM A 653/A 653M with a minimum coating thickness of G 60. Framing covered herein shall be used only in framing the exterior masonry veneer steel stud wall system as indicated on the detail drawings. Metal framing for interior partitions are specified in Section 09 22 00 METAL SUPPORT ASSEMBLIES. Metal framing for [_____] is specified in Section [_____].

2.4.1 Steel Studs

****
NOTE: The minimum depth of the steel stud will be 89 mm (3-1/2 inches), the minimum flange width will be 35 mm (1-3/8 inches) and will have a minimum return lip on the flange of 6 mm (1/4 inches). The actual required stud depth, thickness, grade and spacing should be determined prior to the completion of contract documents. Use larger studs only if needed to resist design loadings or to provide space for wall insulation.
****

Studs shall be furnished as shown in the contract drawings.

2.4.2 Runners, Tracks, Bridging and Accessories

Cold-formed steel sheet framing members, components, and accessories, other than the steel studs, shall conform to ASTM C 955 and be of steel conforming to ASTM A 653/A 653M, Grade [33] [_____], having a minimum yield strength of [230] [_____] MPa [33,000] [_____] psi.

2.5 INSULATION

The Contractor shall comply with EPA requirements in accordance with Section 01 62 35 RECYCLED / RECOVERED MATERIALS.

2.5.1 Blanket Insulation

****
NOTE: Insulation specified in ASTM C 665 is available in three types:

Type I - Blankets with no membrane coverings (unfaced).

Type II - Blankets with a nonreflective membrane covering one principal face (kraft paper faced).

Type III - Blankets with a reflective membrane covering one principal face (foil faced).
****

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

2.5.2 Rigid Board-Type Insulation

****
NOTE: The designer will insert the appropriate maximum R-Value to be used for the insulation. Cellular plastic insulation (polystyrene and polyurethane) are thermally efficient; however, certain precautions should be observed in their use due to high smoke development and toxicity of the smoke generated by the burning of these materials. In multistory construction, a fire stop should be provided at each floor.

****

Insulation for wall cavities shall be rigid board-type insulation. Rigid board-type insulation shall be either polystyrene conforming to ASTM C 578, Type I or II, Grade 2 or polyurethane conforming to ASTM C 591. Insulation thickness shall be sufficient to provide an R-value of [_____].

2.6 GYPSUM WALLBOARD

Gypsum wallboard that is installed on the interior side of the cold-formed steel framing system shall be as specified in Section 09 29 00 GYPSUM BOARD.

2.7 EXTERIOR SHEATHING

****

NOTE: Select the appropriate sheathing and remove the other requirements.

****

[Gypsum] [Plywood] sheathing that is installed on the exterior side of the cold-formed steel framing system shall have a minimum thickness of 13 mm 1/2 inch and shall be 1.2 m 4 feet wide. [Glass mat gypsum sheathing shall conform to ASTM C 79/C 79M and ASTM C 1177/C 1177M. Glass mat gypsum sheathing shall have a water-resistant core with a water-resistant glass mat embedded onto core and shall have a zero flame, zero smoke developed, and shall have mold and mildew resistant surface.] [Gypsum sheathing shall conform to ASTM C 79/C 79M. Gypsum sheathing shall have a water-resistant gypsum core with a water-repellent paper firmly bonded to the core.] [Plywood sheathing shall be in accordance with APA PS1, grade C-D with exterior glue.]

2.8 MOISTURE PROTECTION

2.8.1 Moisture Barrier

****

NOTE: When specifying Glass Mat Gypsum Sheathing it is not required to fill holes or gaps with caulk to protect sheathing from weather; however, to meet ASTM E 283 air infiltration, and ASTM E 331 water penetration, joints, holes and gaps should be caulked per manufacturers specifications. Building felt is not required either when installing Glass Mat Sheathing, unless required by local code.

****

The moisture barrier shall be 6.7 kg 15-lb asphalt-saturated felt conforming to ASTM D 226 Type I (No. 15).

2.8.2 Vapor Retarder

The vapor retarder shall be polyethylene film conforming to ASTM D 2103, 0.15 mm 6 mil minimum thickness.

2.8.3 Staples

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

2.8.4 Joint Tape

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

2.9 VENEER ANCHORS

****

NOTE: The anchors specified in this paragraph include anchors for attachment of the masonry veneer to the steel framing system as well as attachment to structural steel or concrete beam, column and floor slab elements. Anchors for attachment of masonry veneer to concrete or concrete masonry backup walls (structural or nonstructural) are not covered by this guide specification. Instead, UFGS Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE or 03 30 00.00 20 CAST-IN-PLACE CONCRETE for concrete walls and UFGS Section 04 20 00 MASONRY for masonry walls should be used. However, dovetail anchors that are attached to concrete members such as beams, columns, and floor slabs which, along with the cold-formed steel framing system, provide lateral support for the masonry veneer, are covered by this guidance.

This paragraph should be edited to reflect the design option selected. The Structural Engineer should calculate the design tension and compression load capacity required for the anchors to resist wind and seismic design loads transferred from the masonry veneer, based on ASCE 7 or UFC 3-310-03A SEISMIC DESIGN FOR BUILDINGS. If the design is left to the Contractor, the required inward and outward loadings should be put on the drawings.

The wire should lie near the center of the veneer wythe. The minimum cover shall be 32 mm (1-1/4 inch) from each face of the veneer.

The designer should calculate the required anchor capacity or use the 900 newtons (200 pounds) as the limit for standard anchors.

If special anchors that are not covered by this paragraph are needed by design, they will be specified to meet the necessary requirements. In no case will corrugated steel sheet ties, wire mesh ties or wire ties with drips be used.

****

Anchor assemblies for the attachment of the masonry veneer to the cold-formed steel framing, structural steel and/or concrete beam and column members, and concrete floor slabs [shall be as shown.] [shall be designed for the design loadings shown. Anchors shall transfer the design loadings from the masonry veneer to the cold-formed steel framing system or other support without exceeding the allowable stresses and deflections in the

anchors.] Length of anchor wires shall be such that the outermost wires lie between 32 mm 1-1/4 inch from each face of the masonry veneer. Anchors wires shall not have drips. Wires for veneer anchors shall be rectangular or triangular hoops formed from 5 mm 3/16 inch diameter steel wire conforming to ASTM A 82/A 82M. Anchor assemblies including wires and anchor plates shall be hot-dip galvanized conforming to ASTM A 153/A 153M, Class B-2. The veneer anchor shall have a minimum capacity of [900] [_____] newtons [200] [_____] pounds. The load-displacement capacity of each veneer anchor, both in direct pull-out for tension and compression, shall be not less than 350 kN/m 2000 pounds/inch (or a deflection of 2.85 mm/kN 0.05 inches/100 pounds of load in tension or compression). In the direction perpendicular to the masonry veneer, the anchor assembly shall have a maximum play of 1.6 mm 1/16 inch.

2.9.1 Adjustable Pintle-Eye Type Wire Anchors

****
NOTE: On projects located in areas of high seismic activity and/or where the design basic wind speed is 160 km per hour (100 mph) or more, adjustable pintle-eye type wire anchors should not be used and this paragraph should be deleted.
****

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

2.9.2 Dovetail Anchors

****
NOTE: If no connections of masonry veneer to concrete members are required, this paragraph should be deleted.
****

Dovetail slots are specified in Section [03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE][03 30 00.00 20 CAST-IN-PLACE CONCRETE].

2.10 CONNECTIONS

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

2.10.1 Framing Screws, Bolts and Anchors

****
NOTE: This paragraph should be edited to reflect the design option selected.
****

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

2.10.2 Welding

****
NOTE: The welding of cold-formed steel should be

performed by qualified workmen. The Contractor, Subcontractor or Fabricator shall provide verification that welders are qualified in accordance with AWS D1.3.

****

Welded connections shall be designed and all welding shall be performed in accordance with AWS D1.3, as modified by AISI SG-971-Spec. Welders shall be qualified in accordance with AWS D1.3. All welds shall be cleaned and touched-up with zinc-rich paint.

2.10.3 Veneer Anchor Screws

****

NOTE: This paragraph should be edited to reflect the design option selected.

****

Screws for attachment of the veneer anchors to the cold-formed steel framing members shall be [No. 12.] [as shown.] [as required by design to provide the needed pullout load capacity but not less than No. 12.] Screws shall be shown on the detail drawings. The length of screws shall be such that the screws penetrate the holding member by not less than 16 mm 5/8 inch.

2.10.4 Gypsum Sheathing Screws

****

NOTE: Screws conforming to ASTM C 954 are for application of gypsum board or metal plaster bases to steel studs from 0.8 mm to 2.8 mm (0.033 inches to 0.112 inches) in thickness.

****

Screws for attachment of gypsum sheathing to cold-formed steel framing shall conform to [ASTM C 1002, Type S] [ASTM C 954].

2.11 SYNTHETIC RUBBER WASHERS

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

2.12 EXPANSION JOINT MATERIALS

****

NOTE: In buildings where complete structural lateral support system separation joints are not present, this paragraph shall be deleted.

****

Expansion joint materials shall be bellows or U-shaped type conforming to Section 07 57 13 FLASHING AND SHEET METAL. Premolded type shall be closed-cell cellular rubber conforming to ASTM D 1056 or closed-cell vinyl or polyvinyl chloride conforming to ASTM D 1667.

2.13 FLASHING

****

NOTE: Sections showing the flashing details

including the continuity of flashing at wall opening lintels and sills, at floor levels, and at the veneer base should be detailed on the drawings.

****

Copper or stainless steel flashing shall conform to the requirements in Section 07 57 13 FLASHING AND SHEET METAL. Flashing shall be supplied in a continuous sheet extending from the exterior sheathing across the cavity and through the masonry veneer as shown.

2.14 STEEL LINTELS AND SHELF ANGLES

****

NOTE: Steel lintels and shelf angles which are supported vertically by the masonry veneer or by concrete or steel hot-rolled shape structural members should be designed by the Structural Engineer and shown on the drawings.

Shelf angles which are supported vertically by the cold-formed steel framing wall should be designed by the designer of the cold-formed steel framing system. The total deflection due to imposed loads of shelf angles shall not exceed 1/600 of the span or a maximum value of 7.5 mm (0.3 inches). The total rotational deflection which includes shelf angle rotation plus deflection of the horizontal leg of the angle shall not exceed 2 mm (1/16 inch) at midspan between angle supports.

****

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

2.15 CAULKING AND SEALANTS

Caulking and sealants shall be as specified in Section 07 92 00 JOINT SEALANTS.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Wall sections, types of construction and dimensions shall be as shown. Metal door and window frames and other special framing shall be built and anchored into the wall system as indicated. The Contractor shall submit Calculations as specified in the Submittals paragraph.

3.2 STEEL STUD WALL FRAMING

****

NOTE: This paragraph should be edited to reflect the design option selected. Details of the steel stud system should be shown on the drawings.

The top and bottom track connections will be in double rows or with single fasteners as indicated.

On 200 mm (8 inch) and thicker walls with long spans the double rows of anchors will be used. Otherwise, a single anchor at each stud is sufficient.

When the exterior wall framing is installed as in-fills between elements of the building structural framing system, the top track shall be designed to prevent building gravity loads from entering the cold-formed steel framing system.

****

The top track of the stud wall system shall be slip jointed to accommodate vertical deflections of the supporting members as shown on the drawings. [Top and bottom tracks shall be securely anchored to resist track rotation by alternating fastener locations to provide two rows, one row near each track flange as shown on the drawings.] [Top and bottom tracks shall be anchored by one anchor at each stud location as shown on the drawings.] Both flanges of all steel studs shall be securely fastened with screws to the flanges of the top and bottom tracks as shown on the drawings. All details for affixing steel studs to runners and all other sheet steel framing members along with all details necessary for anchorage of the steel stud wall system to the building structural systems shall be as shown on the drawings. Horizontal bridging shall be provided as necessary. Studs shall be spaced [400 mm 16 inches on center.] [600 mm 24 inches on center] [as indicated on the drawings.] [as required to resist the specified design wind or seismic loadings, but not exceeding 600 mm 24 inches on center.] Coordinate stud spacing with sheathing and anchor requirements. At wall openings for doors, windows and other similar features, the framing system shall provide for the installation and anchorage of the required subframes or finish frames. Steel frames shall be securely attached through built-in anchors to the nearest stud on each side of the opening with self-drilling screws. Double studs shall be provided at both jambs of all door openings. Door frames and other built-in items shall be [spot grouted at the jamb anchor locations.] [grouted solid.]

3.3 STEEL SHELF ANGLES

Unless otherwise shown, steel shelf angles shall be provided in segments that do not exceed 3.0 m 10 feet in length. At building corners, shelf angle segments shall be mitered and securely attached together by welding with legs no less than 1.2 m 4 feet where possible. Shelf angle segments shall not be connected together but instead shall be installed with 6 mm 1/4 inch wide gaps between the segments. Fabrication and erection tolerances shall be in accordance with the AISC Code of Standard Practice, as indicated in AISC 316.

3.4 INSULATION

The actual installed thickness of insulation shall provide a maximum thermal R of [_____] for the completed exterior wall construction as determined in accordance with ASHRAE FUN SIASHRAE FUN IP. Insulation thickness shall be as shown on the approved drawings. Installation, except as otherwise specified or shown, shall be in accordance with the manufacturer's instructions which shall be approved by the Contracting Officer. Insulation shall be installed between wall framing members. Rigid insulation shall be installed in accordance with the manufacturer's instructions with proper connections through the insulation to prevent the insulation from carrying loads directly. Insulation with facings shall be secured to the sides of the framing members to provide a continuous seal so

that the entire weight of the insulation is carried by the framing members. Where electrical outlets, ducts, pipes, vents or other utility items occur, insulation shall be placed on the dry side of the item away from excessive humidity.

3.5 GYPSUM WALLBOARD

Gypsum wallboard shall be installed on the interior face of the cold-formed steel framing system. Installation shall be as specified in Section 09 29 00 GYPSUM BOARD except at vertical slip joints, the gypsum wallboard shall be connected to the vertical studs to prevent movement at the slip joint.

3.6 EXTERIOR SHEATHING

Sheathing shall be installed on the exterior face of the cold-formed steel framing system with self-drilling screws. Screws shall be located a minimum of 10 mm 3/8 inch from the ends and edges of sheathing panels and shall be spaced not more than 200 mm 8 inches on each supporting member except at vertical slip joints, the sheathing shall be connected to the vertical studs to prevent movement of the slip joint. Edges and ends of gypsum sheathing panels shall be butted snugly with vertical joints staggered to provide full and even support for the moisture barrier. Holes and gaps resulting from abandoned screw installations, from damage to panels, and from cutting and fitting of panels at junctures with doors, windows, foundation walls, floor slabs and other similar locations shall be filled with exterior rubber-base caulk.

3.7 MOISTURE PROTECTION

3.7.1 Moisture Barrier

The asphalt-saturated felt or other approved moisture barrier shall be installed on the outer face of the exterior sheathing. The moisture barrier shall be installed horizontally and shingled with each sheet lapped not less than 150 mm 6 inches over the sheet below. Vertical end joints shall be lapped not less than 150 mm 6 inches and shall be staggered. Attachment of the moisture barrier shall be with staples spaced not greater than 400 mm 16 inches on center or as required by the manufacturer.

3.7.2 Vapor Retarder

****

NOTE: The purpose of the vapor retarder is to keep the wall insulation dry. So, the vapor retarder should be installed on the side of the insulation where the greatest concern about moisture infiltration into the insulation exists. In colder regions, where moisture from heated inside air is the major concern, the retarder should be placed inside the insulation. In warm and humid regions, where moisture from outside air is the major concern, the retarder should be placed outside the insulation. Vapor retarders should never be installed on both sides of the insulation.

****

A vapor retarder shall be installed [between the steel studs and the gypsum wall board] [between the steel studs and the exterior sheathing]. The

vapor retarder shall be installed in accordance with the manufacturer's recommendations to form a complete retarder to vapor infiltration. The joints shall be lapped and sealed with tape.

3.8 VENEER ANCHORS

****
NOTE: If special anchors are required by the design, their installation requirements will be specified to meet the necessary special conditions.

The wire should lie between 16 mm (5/8 inch) from each face of the veneer for solid unit masonry.
****

Veneer anchors shall be attached with screws through the sheathing and rigid insulation to the steel studs or other support members at the locations shown. When rigid insulation is used, the method of connecting the veneer anchor through the insulation shall be approved by the Contracting Officer. Veneer anchors shall be installed with the outermost wires lying between 16 mm 5/8 inch from each face of the masonry veneer. Synthetic rubber washers shall be used between the anchor connector plates and the moisture barrier. A clutch torque slip screw gun shall be used on screws attaching veneer anchors to cold-formed steel members. Veneer anchors with corrugated sheet metal or wire mesh members extending across the wall cavity shall not be used. There shall be one veneer anchor for each 0.2 square meters two square feet of wall and shall be attached to steel studs and other supports with a maximum spacing of 600 mm 24 inches on center. For pintle-eye anchors the vertical distance between the pintle section horizontal wires and the eye section horizontal wires shall not exceed 13 mm 1/2 inch. Dovetail slots shall be installed as specified in the Section [03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE][03 30 00.00 20 CAST-IN-PLACE CONCRETE].

3.9 FLASHING

****
NOTE: Base, head and sill flashing details should be shown on wall section on the drawings. To be most effective, the flashing should extend through the exterior face of the masonry veneer and turn down to form a drip. If flashing is to extend through the veneer, the last sentence of the paragraph should be retained and the appropriate portions of Section 07 60 00 FLASHING AND SHEET METAL shall be changed to reflect this type of flashing installation. If, for esthetic reasons, it is necessary to conceal the flashing, the last sentence of the paragraph will be deleted.
****

Continuous flashing shall be provided at the bottom of the wall cavity just above grade. Flashing shall also be provided above and below openings at lintels and sills, at shelf angles, and as indicated on the drawings. Flashing shall be as detailed and as specified in Section 07 57 13 FLASHING AND SHEET METAL. Flashing shall be lapped a minimum of 150 mm 6 inches at joints and shall be sealed with a mastic as recommended by the flashing manufacturer. Ends over doors, windows and openings shall be turned up and secured. Flashing shall be lapped under the moisture barrier a minimum of

150 mm 6 inches and securely attached to the gypsum sheathing. Flashing shall extend through the exterior face of the masonry veneer and shall be turned down to form a drip.

3.10 MASONRY VENEER

****

NOTE: The wall cavity air space should be a minimum of 50 mm (2) and a maximum of 100 mm (4 inches) wide. Coordinate cavity dimensions with standard lintel and shelf angle dimensions.

Bond pattern should be running bond unless there are compelling architectural reasons to select another pattern.

****

Exterior masonry wythes shall be constructed to the thickness indicated on the drawings. A cavity consisting of a [50] [_____] mm [2] [_____] inch minimum width air space will be provided between the moisture barrier and the masonry veneer. Masonry veneer shall not be installed until the exterior sheathing, moisture barrier, veneer anchors and flashing have been installed on the cold-formed steel framing system. Extreme care shall be taken to avoid damage to the moisture barrier and flashing during construction of the masonry veneer. Any portion of the moisture barrier and flashing that is damaged shall be repaired or replaced prior to completion of the veneer. Masonry [shall be placed in running bond pattern.] [shall be placed in stacked bond pattern. Longitudinal reinforcement consisting of at least one continuous galvanized steel wire shall be placed in the veneer wythe. The minimum wire size shall be 9 gauge.] [bond pattern shall be as indicated on the drawings.] Vertical joints on alternating courses shall be aligned and kept vertically plumb. Solid masonry units shall be laid in a non-furrowed full bed of mortar, beveled and sloped toward the center of the wythe on which the mortar is placed. Units shall be shoved into place so that the vertical mortar joints are completely full and tight. Units that have been disturbed after the mortar has stiffened shall be removed, cleaned and relaid. Mortar which protrudes more than 13 mm 1/2 inch into the cavity space shall be removed. Means shall be provided to ensure that the cavity space is kept clean of mortar droppings and other loose debris. Chases and raked-out joints shall be kept free from mortar and debris. Faces of units used in finished exposed areas shall be free from chipped edges, material texture or color defects or other imperfections distracting from the appearance of the finished work.

3.10.1 Surface Preparation

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

3.10.2 Hot Weather Construction

Temperatures of masonry units and mortar shall not be greater than 50 degrees C 120 degrees F when laid. Masonry erected when the ambient air temperature is more than 37 degrees C 99 degrees F in the shade and when the relative humidity is less than 50 percent shall be given protection from the direct exposure to wind and sun for 48 hours after the installation.

3.10.3 Cold Weather Construction

Temperatures of masonry units and mortar shall not be less than 4 degrees C 40 degrees F when laid. When the ambient air temperature is 0 degrees C 32 degrees F or less, masonry veneer under construction shall be protected and maintained at a temperature greater than 0 degrees C 32 degrees F for a period of 48 hours after installation. The proposed method of maintaining the temperature within the specified range shall be submitted for approval prior to implementation. No units shall be laid on a surface having a film of frost or water.

3.10.4 Tolerances

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

TABLE 1

Variation From Plumb	
In adjacent units	3 mm
In 3 m	6 mm
In 6 m	10 mm
In 12 m or more	13 mm

Variation From Level Or Grades	
In 3 m	3 mm
In 6 m	6 mm
In 12 m or more	13 mm

Variation From Linear Building Lines	
In 6 m	13 mm
In 12 m or more	19 mm

Variation From Cross Sectional Dimensions Of Walls	
Plus	13 mm
Minus	6 mm

TABLE 1

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

Variation From Level Or Grades

In 10 feet	1/8 inch
In 20 feet	1/4 inch
In 40 feet or more	1/2 inch

Variation From Linear Building Lines

In 20 feet	1/2 inch
In 40 feet or more	3/4 inch

Variation From Cross Sectional Dimensions Of Walls

Plus	1/2 inch
Minus	1/4 inch

3.10.5 Mixing of Mortar

Mortar shall be mixed in a mechanically operated mortar mixer for at least 3 minutes but not more than 5 minutes. Measurement of ingredients for mortar shall be by volume. Measurement of sand shall be accomplished by the use of a container of known capacity or shovel count based on a container of known capacity. Water shall be mixed with the dry ingredients in sufficient amount to provide a workable mixture which will adhere to the vertical surfaces of the masonry units. Mortar that has stiffened because of loss of water through evaporation shall be retempered by adding water to restore the proper consistency and workability. Mortar that has reached its initial set or that has not been used within [2-1/2] [_____] hours shall be discarded.

3.10.6 Cutting and Fitting

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

3.10.7 Masonry Units

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

3.10.8 Mortar Joints

Mortar joint widths shall be uniform and such that the specified widths are maintained throughout. Joints shall be of thickness equal to the

difference between the actual and nominal dimensions of the masonry units in either height or length but in no case shall the joints be less than 6 mm 1/4 inch nor more than 13 mm 1/2 inch wide. Joints shall be tooled slightly concave. Tooling shall be accomplished when mortar is thumbprint hard and in a manner that will compress and seal the mortar joint and produce joints of straight and true lines free of tool marks.

3.10.9 Joint Reinforcement

****
NOTE: Horizontal joint reinforcement will not normally be required in brick veneer, except when stacked bond pattern is used.

If joint reinforcement is not used in brick veneer, this paragraph will be deleted. Where joint reinforcement is used, it will be located and the type and size indicated on the drawings.
****

Unless otherwise shown, joint reinforcement shall be spaced at 400 mm 16 inches on center vertically. Joint reinforcement shall not be placed in the same masonry course as veneer anchors unless the anchors are designed to accommodate the wire. Joint reinforcement shall be placed so that longitudinal wires are centered in the veneer wythe for solid units. Longitudinal wires shall be fully embedded in mortar for their entire length. Splices in joint reinforcement shall be lapped a minimum of 150 mm 6 inches. Joint reinforcement must be discontinuous at all veneer joints. The minimum cover for joint reinforcement is 16 mm 5/8 inches.

3.10.10 Veneer Joints

****
NOTE: Unless both brick and concrete masonry units are being used, choose the appropriate type of joint for the masonry unit that is used.
****

[Brick expansion joints] [and] [concrete masonry veneer joints] shall be provided at the locations shown on the drawings. Details of joints shall be as indicated on the drawings. Joints shall be clean and free of mortar and shall contain only backer rod and sealant, installed in accordance with Section 07 92 00 JOINT SEALANTS. Horizontal reinforcement shall not extend through the joints.

3.10.11 Weep Holes

****
NOTE: The maximum spacing of the open head joint weep holes should be specified as 600 mm (24 inches).

Weep holes details and required spacings should be shown on a wall section, along with the flashing details, on the drawings.
****

Weep holes shall be provided at all flashing locations at intervals of [600] [400] mm [24] [16] inches. Weep holes shall be placed in head joints just above the flashing. Weep holes shall be formed by leaving head joints

open or head joint vents may be used. Weep holes shall be kept free of mortar and other obstructions.

3.10.12 Head Joint Vents

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

3.10.13 Discontinuous Work

When necessary to temporarily discontinue the work, masonry shall be stepped back for joining when work resumes. Toothing may be used only when specifically approved. Before resuming work, loose mortar shall be removed and the exposed joint shall be thoroughly cleaned. Top of walls subjected to rain or snow shall be covered with nonstaining waterproof covering or membrane when work is not in process. Covering shall extend a minimum of 600 mm 2 feet down on each side of the wall and shall be held securely in place.

3.10.14 Cleaning

****
NOTE: This paragraph should be edited for the type of masonry, brick or concrete masonry units, used in the veneer.
****

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

3.11 BUILDING EXPANSION JOINTS

****
NOTE: In buildings that have no complete structural lateral support system separation joints, this paragraph will be deleted.

****

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

-- End of Section --