DIVISION 5 – METALS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work included in this Section:
1. Provide all engineering, labor, materials, equipment, and services, etc., required to engineer, furnish, and install all miscellaneous metal work and related accessories as indicated on the Drawings, specified herein, or otherwise required for a complete and proper job.
2. The Work shall include, but shall not necessarily be limited to:
   a. Miscellaneous structural steel.
   b. Miscellaneous steel plates and angles.
   c. Miscellaneous steel brake metal, pans, closures, trim, and other configurations.
   d. Miscellaneous carpenter's iron as required.
   e. Miscellaneous frames, brackets, and supports for hardware, window systems, and equipment including all mechanical, electrical, medical, athletic, and theatrical equipment. Including seismic bracing for all miscellaneous metal frames, stands, and supports.
   f. Miscellaneous frames and supports for special doors, operable walls, mesh partitions, overhead supported toilet partitions.
   g. Loose lintels and relieving angles.
   h. Steel handrails and guardrails.
   i. Ladders.
   j. Bollards.
   k. Pit covers and frames.
   l. Expansion joint covers.
   m. Steel corner guards.
   n. Trench drains.
   o. Expanded steel treads and landings.
   p. Abrasive nosings for concrete stairs.
   q. Support frames for benches and counters.
   r. Roof blocking fastening requirements.
   s. Masonry wall top clips.

3. It shall be a requirement of the Work of this Section to thoroughly review all of the Contract Documents and provide any and all miscellaneous metal work required for a complete and proper job.

B. Related Work Specified Elsewhere:
1. SECTION 03346: CAST-IN-PLACE CONCRETE
2. DIVISION 23: MECHANICAL
3. DIVISION 26 ELECTRICAL

1.2 SUBMITTALS

A. Product Data: Submit product data for manufactured products specified herein.

B. Shop Drawings:
1. Submit shop drawings for each item or assembly. Shop drawings shall accurately and clearly show in detail the construction, sizes, gauges, dimensions, methods of assembly, supports, finishes, and all other pertinent data and information.
   a. Submit stair, ladder, and railing shop drawings drawn at not less than ¼" scale with components shown in related positions. Provide larger scale custom details, control details and dimensions not governed by job conditions. Show all required field measurements.
   b. Submit lintel fabrication schedule including location, type, size, length, and finish (primed or galvanized coating class.

C. Certifications:

1. Submit manufacturer's certification that the stairs, platforms, railings, and ladders provided are in full compliance with the requirements of the Contract Documents, and are totally suitable for the proposed installations when installed in accordance with the shop drawings.
2. Submit certificates indicating that each welder has satisfactorily passed AWS qualification tests for welding processes involved and if pertinent, has undergone re-certification.
3. Steel fabricator's in-plant special inspections program including: registration of special inspections program, written procedural and quality control manuals and evidence of periodic auditing of fabrication practices by an approved inspection agency.

1.3 PRODUCT HANDLING

A. Deliver of Materials: Deliver, store and handle components in such a manner as to prevent damage to finished surfaces.

B. Storage of Materials: Store components in a dry, clean location, away from uncured masonry and concrete. Cover with tarpaulin or polyethylene sheeting.

1.4 QUALITY ASSURANCE

A. Welding Standards: Comply with applicable provisions of ASW D1.1 "Structural Welding Code – Steel" and ASW D1.3 "Structural Welding Code – Sheet Steel."

B. Stair and railing fabricator shall be a certified member of AISC who participates in a recognized quality assurance program and who is regularly inspected by an independent testing/inspection agency.
   1. In the absence of the above requirements, the fabricator shall be required to hire and pay for an independent testing/inspection agency approved by the Owner, to monitor fabrication and perform random testing of all stairs and railing fabrication procedures.
   2. The fabricator shall submit evidence to the Owner indicating satisfactory completion of projects of similar scope and that fabrication facilities are adequate to meet production requirements.

C. Fabricator's Qualifications: Only fabricators that maintain an agreement with an approved independent inspection or quality control agency to conduct periodic in-plant inspections at the fabricator's plant, at a frequency that will assure the fabricator's conformance to the requirements of the inspection agency's approved quality control program will be approved for this project.

1.5 TESTING AND INSPECTIONS

A. General: Stair and railing materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified testing agency. Such inspections and tests shall not relieve the Contractor of responsibility for providing his own inspections, quality control and materials and fabrication procedures in compliance with specified requirements. Any non-compliant materials or fabricated components shall be removed and replaced.

B. The fabricator shall submit evidence of in-plant inspections in conformance with IBC "Structural Tests and Inspections – Inspection of Fabricators (1700).

C. Testing and inspection shall be formed as required by the building code, the Contract Documents or as otherwise directed by the Architect. The cost of field-testing and inspection shall be paid for by the Owner. If Work is found not to conform to the Contract Documents, the Contractor shall be responsible for the cost of all further testing.

D. The Contractor shall cooperate with and facilitate testing and inspection by the testing agency. The Contractor shall, at his own expense, furnish the testing agency stair and railing shop drawings.

E. Shop and field bolted connections and shop and field welded connections shall be inspected.

1.6 STRUCTURAL PERFORMANCE

A. Handrails and Guardrails: Engineer, fabricate, and install handrails and guardrails to comply with requirements of ASTM E985. ASTM E894 and to withstand the following structural loads without exceeding the allowable design working stress of the materials involved including anchors and connections. Apply each load to produce the maximum stress in each of component.
   1. Handrails shall be rigid, free of vibration and able to withstand a concentrated force of 200 pounds applied at any point in any direction and, but not simultaneously, a uniform load of 50 pounds per foot applied in any direction.
   2. Top Guardrails Member shall be rigid and able to withstand a concentrated force of 200 pounds applied at any point and in any direction and, but not simultaneously, a uniform load of 50 pounds per foot applied in any direction, and a simultaneous uniform load of 100 pounds per foot applied vertically downward to the top of the guard.
      a. Infill areas of guardrails shall be rigid and able to withstand a horizontal concentrated force of 200 pounds applied on one square foot at any point in the system including panels, intermediate rails, balusters, or other elements. This loading condition shall not be applied simultaneously with the other loading conditions for guardrails.
      b. Guardrail System shall withstand stresses resulting from railing system loads specified above.

B. Ladders: Engineer, manufacture and install ladders to support in excess of 300 pounds force concentrated live load.

1.7 WARRANTIES

A. Ladders: Provide manufacturer's standard product warranty for ladders against material and manufacturing defects for five (5) years.

B. Color Galvanizing: Provide manufacturer's standard product warrant against excessive corrosion, peeling, chipping, or other failure for a period of twenty (20) years.

PART 2 – PRODUCTS ("Green")

2.1 GENERAL

A. Note: It is the Owner's intent to use energy conserving, environmentally friendly materials to the greatest extent practical. The Contractor is therefore encouraged to use recycled steel products.

B. Miscellaneous metal items shall be standard approved products, fabricated in accordance with best shop practices and, wherever possible, shop assembled, ready for erection.

C. Metals shall be free from defects impairing strength, durability, or appearance and shall be best commercial quality for purposes specified. Metals shall be made with structural properties to safely sustain and withstand strains, stresses, to which they will be normally subjected.

D. Gauges herein specified are minimums and shall refer to U. S. Standard for sheet steel, plate iron, and steel.

2.2 MATERIALS

A. Steel Plates, Shapes and Bars: ASTM A-36.

B. Sheet Steel: Cold-rolled: ASTM A-366; Hot-rolled: ASTM A-569.

C. Steel Tubing: Cold-formed: ASTM A-500, Hot-formed: ASTM A-501.

D. Steel Pipe: ASTM A-53.

E. Fasteners: Provide plated fasteners complying with ASTM B33, Class FE/Zn 25 for electro-plated zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.
   1. Bolts and Nuts: ASTM A307, Grade A; ASTM A563.
   2. Machine Screws: ANSI B18.6.3.
   3. Lag Bolts: ANSI B18.2.1.
   4. Plain Washers: Round, carbon steel, ANSI B18.22.1.
   5. Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.
   6. Expansion Anchors: Carbon steel components zinc-plated to comply with ASTM B633.

F. Note: The fabricator shall no stamp, stencil, or otherwise place his identification on any portion of miscellaneous metals intended to remain exposed to view.

2.3 PAINTING AND PROTECTIVE COATING

A. General: All ferrous metal herein Specified shall be properly cleaned and shop primed, except at the following locations:
   1. Anchors that are built into masonry shall be coated with bituminous paint, unless specified to be galvanized.
   2. Ferrous metal to be encased in concrete shall be left unpainted, unless specified or noted otherwise. Aluminum to be encased in concrete shall be coated with bituminous paint.
   3. Where hot-dip galvanized metal is specified or shown, it shall not be shop primed.
   4. Where spayed-on fireproofing is specified or shown, metal shall not be shop primed.
   5. Where metal is scheduled to receive ceramic tile finish it shall not be shop primed.

B. Surface Preparation:
   1. Exterior steel shall meet requirements of the Steel Structures Painting Council, SS PC-SP6 Commercial Blast Cleaning Standard.
   2. Interior steel and steel to be fireproofed shall meet requirements of SS PC-SP3 Power Tool Cleaning Standard.

C. Shop Primer for Ferrous Metal shall be Tnemec "37 H Chem Prime Universal Phenolic Primer," at 2.0 – 3.0 mils DFT.

D. Galvanizing Repair Paint shall be high zinc content paint Tnemec 90-97.

E. Bituminous Paint shall be cold-applied mastic complying with SSPC-Paint 12 except containing no asbestos fibers.

2.4 GALVANIZING

A. All exterior steel, including lintels, rails, bollards, grates, frames, and all other steel that has any portion exposed to the weather, shall be hot-dip galvanized. Interior steel shall be hot-dip galvanized where so noted or specified. Hot-dip galvanized products shall not be shop primed.

B. Products fabricated from rolled, pressed and forged steel shapes, plates, bars and strips shall be hot-dip galvanized in accordance with ASTM A-123, latest edition.

C. Iron and steel hardware shall be hot-dip galvanized in accordance with ASTM A-153, latest edition.

D. Assembled steel products shall be hot-dip galvanized in accordance with ASTM A-386, latest edition.

E. The weight of coating shall be as designated in ASTM "Comparison of Coating Weight Requirements for Hot-Dip Galvanized Products" in accordance with the class and thickness of material.

F. Where hot-dip galvanizing prior to completion of fabrication (cutting or welding operations) cannot be avoided, joints and cuts shall be finished with four (4) full coats of touch-up galvanizing repair paint as recommended by the fabricator.

G. Hot-dip galvanizing shall be done by a member of the American Galvanizers Association, Inc.

H. All hot-dipped galvanized material shall be stamped to indicate ASTM designation and ounces per square foot of zinc coating required by the Specifications.

I. A notarized affidavit of compliance to the galvanizing specified shall be submitted from the galvanizer upon request.

J. The galvanizing bath shall contain high grade zinc and other early materials. Immediately before galvanizing the steel shall be immersed in a bath of zinc ammonium chloride. The use of wet kettle process is prohibited.

2.5 SHOP COATING OF GALVANIZED STEEL

A. The following miscellaneous metal components shall receive factory applied architectural finish over hot-dip galvanizing:
   1. All exterior rails.
   2. All exterior bollards.

B. Finish shall be "Primergalv" by Duncan Galvanizing, or approved equal. Colors shall be selected by the Architect from the manufacturer's full range of available colors. Coating shall maintain a pull-off strength of 500 psi when tested in accordance with ASTM D4541.
   1. Factory-Applied Universal Primer: Where galvanized steel is specified to receive a factory primer for field applied topcoat, provide factory-applied polyamide epoxy primer over specially prepared galvanized steel, 2.0 mils dry film thickness minimum. Apply primer within 12 hours after galvanizing at the galvanizer's plant in a controlled environment meeting applicable environmental regulations, and as recommended by the coating manufacturer.
   2. Factory-Applied High-Performance Architectural Finish: Where galvanized steel is specified to receive a factory applied architectural finish, provide factory-applied polyurethane color coating, 2.5 mils dry film thickness minimum, over primed galvanized steel as previously referenced. Apply coating at the galvanizer's plant, immediately after the application of the prime coat, in a controlled environment meeting applicable environmental regulations, and as recommended by coating manufacturer.

2.6 ROOF BLOCKING FASTENING REQUIREMENTS

A. Perimeter roof blocking shall be secured to decking, structural steel, spaced steel angles, or plates, as indicated on the Drawings.

B. The Contractor shall provide additional steel angles and plates to suit specific job conditions.

C. Where joist or beams do not extend out of roof edge, provide single or back-to-back steel angles or steel plates welded to perimeter steel beams in configurations indicated on the Drawings or otherwise required for support of blocking at 2'-0" o.c. intervals. Provide pre-drilled holes in steel for bolting of blocking at 24" o.c. with ½" bolts.

2.7 MASONRY WALL TOP CLIPS

A. Provide steel clip angles at both sides of the tops of masonry walls secured to building structure, coordinate with the Work of Section 05100: Structural Steel. In general, size, spacing, and attachment of wall clips shall be determined by whether the wall in non-structural (architectural) or is a structural element (fire wall, load-bearing wall or shear wall for example) and shall be as indicated on the Drawings. Wall clips specified herein

or partition top anchors specified in Section 04200: Unit Masonry and Mortar shall be provided for all masonry walls unless specifically indicated otherwise.

2.8 MISCELLANEOUS FRAMING AND SUPPORTS

A. Provide steel framing and supports for applications indicated that are not a part of structural steel scope as required to complete the Work. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent construction. Fabricate from steel shapes, plates, and steel bars of welded construction using mitered joints for field connections. Cut, drill, and tap units to receive hardware, hangers, and similar items. Equip units with integrally welded anchors for casting into concrete or building into masonry.

2.9 LADDERS

A. Ladders shall be standard, 6063-T6 aluminum alloy, fixed ladders as manufactured by O'Keefe's Inc., or approved equal. Ladders shall have channel rails and 1-1/4" serrated square rungs spaced no more than twelve (12") inches on centers. Ladder shall be at least eighteen (18") inches clear between rails. Inclined ladders (ship's ladders) shall have 4-1/8" deep treads and handrails. All aluminum shall be mill finish. Provide floor and wall mounting brackets as required. All ladders shall be in strict compliance with OSHA/ANSI A14.3 standards. Ladders twenty (20') feet or more in height shall be equipped with platforms. Provide the following ladder models:
1. Interior pit and roof access: Series 500.
2. Exterior roof access: Series 502.
3. Exterior roof access with parapet: Series 503.

2.10 BOLLARDS

A. Unless otherwise indicated on the Drawings, bollards shall be six (6") inches diameter galvanized steel pipe (to be filled with concrete). Bollards shall be not less than 6'-6" in length with 3'-6" exposed above finish grade.

2.11 PIT COVERS AND FRAMES

A. Unless otherwise indicated on the Drawings, steel pit covers shall be ¼" thick galvanized steel checkerplate. Frames shall be appropriately sized galvanized steel angles with suitable stops and anchoring devices.

2.12 EXPANSION JOINT COVERS

A. Metal expansion joint covers shall be manufactured by Balco Inc., C/S Construction Specialties, MM Systems Corp., or approved equal.

2.13 TRENCH DRAINS

A. Trench drain grates, covers, pans, and frames shall be heavy-duty, H20 wheel loading, cast iron grates and frames with an integral galvanized steel-formed pan. Units shall be 12-1/2" wide, Model No. TCMB-10/TGMB-10, as manufactured by McKinley, or approved equal.

2.14 METAL CHANNEL FRAMING SYSTEMS (UNISTRUT)

A. Various building materials and equipment such as suspended lights and service columns shall be provided with concealed metal channel framing systems as required to permanently and safely anchor such items to suitable building primary structural components.

B. Metal channel framing systems shall be Unistrut Metal Framing as manufactured by UNISTRUT Corporation, or approved equal. Framing shall be electrogalvanized steel. Systems shall be complete and shall be properly engineered, fabricated, and installed by the manufacturer or its authorized representative/installer. Installer shall have not less than five (5) years experience.

C. The Work of Channel Framing systems shall include, but shall not necessarily be limited to:
   1. Field inspection to verify job conditions, dimensions, and suitability of primary structure to receive channel framing.
   2. Engineering of all channel framing, attachments between framing members, attachments between framing systems and building structure, and anchor points to receive attachments by the manufacturer of the building material or equivalent to be supported by the channel framing systems.
   3. Coordination of framing load capacity and anchor point types and locations with the requirements of the related material or equipment manufacturer.
   4. Submission of structural calculations including, but not limited to design criteria, stress and deflection analysis and selected framing, fittings and anchors prepared by a professional structural engineer licensed in the United States of America or the United States Virgin Islands.
   5. Submission of shop drawings.

2.15 LOOSE STEEL LINTELS

A. Loose lintels shall be fabricated from A-36 steel from angles, shapes and masonry anchors of size and type scheduled for openings in masonry walls, unless otherwise indicated on the Drawings.

B. All dimensions for locations of rails shall be field measured. Drawing dimensions shall be considered approximate and actual field conditions shall be ascertained before fabrication of rails.

C. In general, heights of handrails shall be 2'-10" above nosings. Heights of guardrails shall be 3'-6" above finish floor, unless otherwise noted on the Drawings. Handrails shall be mounted to provide 2-1/4" minimum clear space to walls or other surfaces at stairs and 1-1/2" minimum clear space at all other locations.

D. Space intermediate balusters as indicated on the Drawings or as otherwise required providing maximum clear space between all members of less than four (4") inches. Guardrails shall not have an ornamental pattern that would provide a ladder effect. Space railing posts as indicated on the Drawings, and in accordance with railing engineering requirements.

E. In general, handrails at stairs shall extend a minimum of 12" beyond the top riser and at least 12" plus the width of one tread beyond the bottom riser. At the top, the handrail extension shall be parallel to the working surface. At the bottom, the handrail shall continue to slope for a distance of the width of one tread from the bottom riser, with the remainder parallel to the walking surface.

F. In general, handrails at ramps shall be parallel to the walking surface at all locations and shall extend a minimum of 12" beyond the top of the ramp and at least 12" beyond the bottom of the ramp.

G. Steel Railing Fittings shall be as per Julius Blum and Co., or approved equal. All fittings for exterior use shall be galvanized. Fittings shall be:
   1. Weld on caps: No. 938
   2. Round slip flanges: No. 611 and No. 1611
   3. Wall returns: No. 665 and No. 1665
   4. Brackets: No. 386 and No. 1386

PART 3 – EXECUTION

3.1 VERIFYING CONDITIONS

A. Coordinate all work with the work of other trades. Verify all field dimensions and that the work fits the work of other trades. Perform all cutting, fitting, and drilling required. Furnish all necessary templates and patterns required to build items into work of other trades. Provide holes and connections for the attachment of work of other trades.

3.2 GENERAL FABRICATION AND INSTALLATION

A. Metal surfaces shall be clean and free from mill scale, flake rust, and rust pitting, well formed and finished to shape and size, with sharp lines and angles and smooth surfaces. Shearing and punching shall leave clean true lines and surfaces. Weld or rivet permanent connections. Welds and flush rivets shall be finished flush and smooth on surfaces that will be exposed after installation. Welds shall be continuous unless otherwise noted. Welds shall not have voids or pockets and shall be ground to provide smooth transitions between metal surfaces. Do not use screws or bolts where they can be avoided; where used, heads shall be countersunk, screwed up tight and threads nicked to prevent loosening.

B. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to weather shall be formed to exclude water. Provide holes and connections for the work of other trades.

C. Castings shall be size determined by work type for which they form parts. Each member if possible shall be in one piece, make joints at moldings or fillets. Casting thickness shall be uniform, sufficient to ensure perfect workmanship, required strength for design use. Make castings clean, smooth, true to pattern, free from defects. Moldings, ornaments shall be rather more deeply cut than indicated to counteract flattening effects of casting, finishing; exactly reproduce form, feeling of models. Edges shall be sharp, come from molds clean, smooth, perfect.

D. Non-slip surfaces shall be made safe for foot traffic with non-slip abrasive embedded uniformly in wearing surface at casting time.

E. Connections and accessories shall be adequate to safely sustain, withstand stresses, strains, to which they will be normally subjected.
   1. Connections to steel unless otherwise specified shall be steel.
   2. Connections to genuine wrought iron work shall be wrought iron or steel.
   3. Connections to cast iron, unless otherwise specified shall be steel.
   4. Bolts, nuts, screws for exterior work shall be electrogalvanized, unless otherwise noted.

F. Furnish all standard screws, bolts, washers, and other such fastening devices as are necessary for attaching this work to other materials. Anchors and other connecting devices required in concrete or masonry shall be built-in as the work progresses. NOTE: Special attention shall be given to the firm and secure anchoring of overhead mounted materials and equipment.

G. Do cutting, punching, drilling, tapping required for attachment of other work coming in contact with miscellaneous metal where indicated or where directions for same are given prior to or with review of shop drawings.

H. Unless otherwise indicated, bolt, and screw heads shall be flat countersunk in exposed faces of ornamental or finished character; elsewhere as required. Cut off bolts, screws, etc., where exposed, flush with nuts, or other adjacent metal. Except as otherwise required, weld shop-assembled connections; welds, bolts, or machine screws may be used for field connections. Exposed fastenings shall be the same materials, color, and finish as metal to which they apply, unless otherwise required.

I. Make up threaded connections tightly so that threads will be entirely concealed by fittings.

J. Work to be built in with masonry shall be of form required for anchorage, or be provided with suitable anchors, expansion shields, toggle bolts, etc. as required for proper anchorage. Fastening to wood plugs in masonry shall not be permitted.

K. Install all supporting members, fastening, framing, hangers, bracing, brackets, straps, bolts, angles, and the like required to set, connect work rigidly and properly to structural steel, masonry, other construction.

L. All items shall be installed plumb, straight, square, level and in proper elevation, plane, location and alignment with other work.

3.3 STEEL RAILING FABRICATION AND INSTALLATION

A. Fabricate handrails and railing systems to comply with the requirements indicated for design, dimensions, details, finish, member sizes and anchorage but not less than that required to support structural loads.

B. Interconnect railing and handrail members by butt-welding or welding with internal connectors, unless otherwise indicated. At tee and cross intersections, cope ends of intersecting members to fit contour of pipe to joined end and weld all around. Form changes in direction of railings by welding fabricated flush elbow fittings, by radius bends as indicated, or by flush radius bends. Remove burrs and splatter.

C. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each configuration required. Maintain cylindrical cross section of pipe throughout the entire bend without buckling, twisting, cracking or otherwise deforming.

D. For components exposed to exterior or moist environments, provide weepholes or other means of evacuating entrapped water. All exterior rails, fittings and brackets shall be hot-dipped galvanized after fabrication.

E. Provide wall returns at all ends to adjacent surfaces and secure as required. Close exposed ends by welding 3/16" thick steel plate in place, except where clearance of end of pipe and adjoining wall surface is less than ¼", or unless otherwise detailed.

F. Welds shall be continuous and thoroughly fused without undercutting or overlap. Grind exposed welds smooth to form a uniformly smooth surface.

G. Provide miscellaneous steel for connection of rail supports as detailed on the Drawings. Do not support railing temporarily by any means that does not satisfy structural performance requirements.

H. Set rails plumb and aligned. Set rails horizontal or parallel to rake of stairs. Support wall handrails on brackets, in accordance with railing engineering requirements. Space closer together if so indicated on the Drawings. Connect railing posts to stair framing to stair framing by direct welding, unless otherwise indicated.

I. Install handrail brackets away from handrail ends and finish ends with return fittings. Use drill-in expansion anchors at concrete or masonry walls. Mount handrails only on gypsum board assemblies that have been reinforced to receive railing anchors.

J. Provide expansion joints in railings at intervals not to exceed forty (40') feet. Provide slip joints with internal sleeves extending two (2") inches beyond the joint on either side. Fasten the internal sleeve securely on one side only. Locate expansion joints within six (6") inches of posts.

K. Where railings are to be set in concrete, railing posts shall be set in 6" matching sleeves as follows: Clean dust and foreign matter from sleeves. Moisten interior of hole and surrounding surface with clean water. Mix fast setting cement with water and stir until a smooth, creamy consistency is produced. Pour mixture into annular space until it overflows the hole. Taper cement away from rails to promote proper drainage. Wipe off excess, leaving a build-up of approximately 1/8".

3.4 LADDERS

A. All ladders shall be installed in strict accordance with the manufacturer's instructions, the American Standard Safety Code for Fixed Ladders and all applicable OSHA regulations.

B. Completed ladder installations shall be rigid and free from vibration.

C. Ladders in elevator pits shall extend not less than 3'-6" above outside finish floor level as required by OSHA and shall be located as recommended by the elevator manufacturer.

D. Exterior roof ladders shall extend no less than 3'-6" above parapet walls or upper roof surfaces as applicable, and shall have looped returns as required by OSHA. Rungs shall be held off a minimum of 9" off adjacent wall.

E. Interior roof hatch ladders shall extend from the floor to the roof surface. Rails shall extend to just below the underside of the roof hatch.

F. Ladders twenty (20') feet or more in height shall be provided with cage closures as required by OSHA.

3.5 EXPANSION JOINT COVERS

A. Covers shall extend full width of openings.

B. Covers shall be installed level, plumb, and flush with finish surfaces, and shall be fastened with anchor shields and bolts in strict confidence with the manufacturer's instructions and recommendations.

C. Provide all corners, tees, transitions, etc., as required for a complete and proper job.

D. Provide fire rated expansion joint covers with all required safing insulation and fire stopping at fire rated locations. Entire assembly shall be installed in strict accordance with the manufacturer's instructions and tested assemblies.

END OF SECTION