
Buffalo River Landing

1 South Street
Buffalo, NY 14204

June 8th, 2015

Permit Set
Project Manual

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CJS Project No. 1209

Permit Set Project Manual

Savarino Companies

500 Seneca, Room 590
Buffalo, New York 14204

Frontier Group of Companies

26 Mississippi Street, Suite 400
Buffalo, New York 14203
716.447.7587

Buffalo River Keepers

721 Main St.
Buffalo NY 14203
716.852.7483

CJS Architects

755 Seneca St.
Buffalo, New York 14210
716.856.6448

Tredo Engineers

755 Seneca St. Suite 202
Buffalo, New York 14210
716.876.7147

EBS Engineering

4050 Ridge Lea Rd. - Suite C
Amherst, NY 14228
716.836.9600

Upstate Fire Protection Engineering, PLLC

Liverpool, NY
315.935.6566

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SECTION 014110
SPECIAL INSPECTIONS AND TESTING SERVICES

PART 1 GENERAL

1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE:

- A. Inspections and testing required by laws, ordinances, rules, regulations or orders of public authorities.
- B. Certifications of materials, products or equipment: Respective Specifications Sections.
- C. Test of materials, adjust and balance of products or equipment: Respective Specification Sections.

1.02 GENERAL REQUIREMENTS

- A. Provide special inspections and testing in accordance with Chapter 17 of the Building Code of New York State
- B. The program of Special Inspections and Testing is a Quality Assurance program intended to ensure that the work is performed in accordance with the Contract Documents.
- C. This specification section is intended to inform the Contractor of the Owner's quality assurance program and extent of the Contractor's responsibilities. This specification section is also intended to notify the Special Inspectors, Testing Laboratories, and other Agents of the Special Inspectors of their requirements and responsibilities.

1.03 SCHEDULE OF INSPECTIONS AND TESTS

- A. Required inspections and tests are described in the attached Statement of Special Inspections and in the individual specification sections for the items to be inspected or tested.
- B. The services and quantities of testing specified are approximate and may vary. Actual services and quantities of testing will be determined by the Owner and/or Architect and Construction Manager during the construction period.
- C. The Architect and Construction Manager will determine the locations for taking sample specimens for testing in accordance with the specifications.

1.04 EMPLOYMENT OF SPECIAL INSPECTOR AND AGENTS:

- A. Special Inspectors must demonstrate, to the Engineer of Record and Building Official's satisfaction, experience and skills to satisfactorily conduct testing indicated without delaying the progress of the work.
- B. The Owner will employ and pay for the services of the Special Inspector's to perform the services specified herein; however, the Contractor shall reimburse the Owner for the cost of those services which, in the opinion of the Architect/Engineer (and Construction Manager), are required due to the following:
 - 1. Failure of materials or workmanship to meet contract requirements.
 - 2. Materials or practices, not complying with the Specifications which could possibly result in defective work thereby rendering it necessary or advisable to perform tests to determine whether or not work is acceptable.
 - 3. Changes in source, quality or characteristics of materials.
 - 4. Site cured cylinders requested by the Contractor.
- C. The Special Inspector shall retain the services of a full time registered Professional Engineer who shall certify all test reports. The Engineer shall be responsible for the training of the testing technicians and shall be in responsible charge of the field and laboratory testing operations.
- D. Special inspections shall be performed by Special Inspectors who are certified as identified below, or are working under the direction of a registered Professional Engineer.
 - 1. Technicians performing sampling and testing of concrete shall be ACI certified Concrete Field Testing Technicians – Grade 1.

2. Inspectors performing inspections of concrete work such as inspections of concrete placement, batching, reinforcing placement, curing and protection, shall be ACI certified Concrete Construction Inspectors or ICBO certified Reinforced Concrete Special Inspectors.
3. Technicians performing visual inspection of welding shall be AWS Certified Welding Inspectors or ICBO certified Structural steel and Welding Special Inspectors; technicians performing non-destructive testing such as ultrasonic testing, radiographic testing, magnetic particle testing, or dye-penetrant testing shall be certified as an ASNT-TC Level II or Level III technician.
4. Technicians performing standard tests described by specific ASTM Standards shall have training in the performance of such tests and must be able to demonstrate either by oral or written examination competence for the test to be conducted. They shall be under the supervision of a licensed Professional Engineer and shall not be permitted to independently evaluate test results.

1.05 CONTRACTOR'S RESPONSIBILITIES

A. COOPERATION AND ACCESS:

1. Cooperate with laboratory personnel and provide access to the work and to manufacturers. Fabricator's facilities as required for the performance of their services.
2. Retain the latest set of construction drawings, field sketches, approved shop drawings, and specification at the project site for use by the inspectors and testing technicians.

B. CASUAL LABOR AND FACILITIES:

Provide Casual Labor and Facilities:

1. To provide access to the work to be inspected or tested.
2. To obtain and handle samples at the site.
3. To facilitate inspections and tests.
4. To construct a storage box on the site of sufficient size to store cylinders, which will afford protection, required by ASTM C-31.

C. SAMPLES:

1. Provide the laboratory with preliminary representative samples of materials to be tested, in requested quantities.
2. When the source, quality or characteristic of an approved material changes or indicates lack of compliance with contract requirements, submit additional samples of materials to testing laboratory.

D. MISCELLANEOUS REPORTS, LISTS, ETC.:

1. When requested by the Architect/Engineer, or the testing laboratory, the Contractor shall immediately provide copies of mill reports, cutting lists, material bills, shipping bills, time and place of shipment of materials to shop and field and any relevant data on previous testing and investigations of materials.

E. NOTIFICATION:

1. Review the Statement of Special Inspections and be responsible for coordinating and scheduling inspections and tests to facilitate the timely sequence of inspection and testing, the Contractor shall give advanced notification to the testing laboratory and the Architect/Engineer (and Construction Manager) that work has progressed to a point where inspection and testing may proceed.
2. Advanced notification, shall be 48 hours (min.) prior to commencement of the following:
 - a. Site Preparation
 1. Excavation for foundations and slab on grade.
 2. Proof-rolling of slab on grade subgrade.
 - b. Soil Compaction:
 1. Delivery of fill to the site.
 2. Placement and compaction of fill or backfill.
 - c. Concrete:
 1. Setting of reinforcing and formwork.
 2. Placing concrete.
 - d. Masonry:
 1. Delivery of masonry units.

2. Setting of reinforcement.
 3. Installation of mortar, grout and masonry units.
 - e. Structural Steel:
 1. Shop fabrication.
 2. Delivery.
 3. Erection.
 4. Alignment and leveling of structure.
 5. Welding and bolting of connections.
 - f. Metal Deck:
 1. Delivery.
 2. Erection and fastening to structure.
- F. CONTRACTOR'S QUALITY CONTROL:
1. The Special Inspection program does not, in any way, relieve the Contractor of his obligation to perform work in accordance with the requirements of the Contract Documents or from implementing an effective Quality Control program. All work that is to be subjected to Special Inspections shall first be reviewed by the Contractor's quality control personnel.
 2. Services of testing laboratory retained by the Owner is for verification of Contractor's compliance and if such tests of inspection indicates failure to comply with the Contract Documents, the Contractor shall bear all cost associated with additional testing and inspection, after the work has been corrected, to verify compliance.
- G. PATCHING:
- Areas where samples are taken for purposes of testing shall be patched to the satisfaction of the Architect.

1.06 LIMITS ON AUTHORITY

- A. The Special Inspectors or Testing Laboratories may not release, revoke, alter, or enlarge on the requirements of the Contract Documents.
- B. The Special Inspectors or Testing Laboratories will not have control over the Contractor's means and methods of construction.
- C. The Special Inspectors or Testing Laboratories are not responsible for construction site safety.
- D. The Special Inspectors or Testing laboratories have no authority to stop the work.

1.07 STATEMENT OF SPECIAL INSPECTIONS

- A. The Engineer of Record (EOR) will prepare the Statement of Special Inspections.
- B. Submit the Statement of Special Inspections with the application for Building Permit.

1.08 RECORDS OF REPORTS

- A. Submit Bi-Weekly reports of each inspection or test to the registered design professional in responsible charge. Reports shall include:
 1. Date of test or inspection.
 2. Name of inspector or technician.
 3. Location of specific areas tested or inspected.
 4. Description of test or inspection and results.
 5. Applicable ASTM standard.
 6. Weather conditions.
 7. Signature of special inspector or technician.
- B. Submit interim reports to the Building Official which include all inspections and test reports received that week. Provide copies to the Architect, and Contractor. The frequency of the interim reports shall be as required by the Township.
- C. Any discrepancies from the Contract Documents found during a Special Inspection shall be immediately reported to the Contractor. If the discrepancies are not corrected, the Special Inspector shall notify the EOR and Building Official. Reports shall document all discrepancies identified and the corrective action taken.

- D. The Testing laboratory shall immediately notify the registered design professional in responsible charge by telephone or fax of any test results which fail to comply with the requirements of the Contract Documents.
- E. Provide a statement to the registered design professional in responsible charge at the completion of the work requiring Special Inspections from each inspection agency and testing laboratory that all work was completed in substantial conformance with the Contract Documents and that all appropriate inspections and tests were performed.

1.09 FINAL REPORT OF SPECIAL INSPECTIONS

- A. Complete Final Report of Special Inspections by the registered design professional in responsible charge and submit to the EOR and Building Official prior to the issuance of a Certificate of use and Occupancy.
- B. Use C.A.S.E. Form 102 – 2001 for the Final Report of Special Inspections.
- C. The Final Report of Special Inspections will certify that all required inspections have been performed and will itemize any discrepancies that were not corrected or resolved.

1.10 SUBMITTALS:

- A. The Special Inspectors and Testing Laboratories shall submit to the EOR and Building Official for review a copy of their qualifications which shall include the names and qualifications of each of the individual inspectors and technicians who will be performing inspections or tests.
- B. The Special Inspectors and Testing Laboratories shall disclose any past or present business relationship or potential conflict of interest with the Contractor or any of the Subcontractors whose work will be inspected or tested.
- C. Submit three copies of the following:
 - 1. Reports of all tests performed on soils, concrete, masonry, structural steel, joists, deck, cold formed framing and paving.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.01 FREQUENCY OF INSPECTIONS

- A. Shall conform to the attached program of Special Inspections.
- B. Definitions:
 - 1. Periodic – In general, no more than a half day site visit, not less than 48 hours apart, unless otherwise directed by Owner, Architect, or Engineer, or specified below.
 - 2. Continuous – In general, the Special Inspector or Agent should be on site before, during, and after operation requiring inspection.

3.02 EXISTING SUBGRADES

- A. Field Verification
 - 1. Observe proofrolling operations.
 - 2. Identify location and extent of soft, loose, or yielded subgrade material that must be removed or undercut.
 - 3. Inspect undercut subgrade.

3.03 SOILS:

- A. Laboratory Tests:
 - 1. Existing site material
 - a. Cohesive soils and semi-cohesive soils: Provide one optimum moisture-maximum density curve for each type of subgrade soil encountered in accordance with ASTM D-1557.
 - b. Non-Cohesive soils: Provide maximum and minimum index densities and relative densities for each type of subgrade soil encountered in accordance with ASTM D-4254.
 - 2. Borrow materials: Analyze each type of borrow materials before acceptance and delivery to the site. Any change in the source or quality of the material will require a new series of tests to determine acceptability.

- a. Particle size analysis of soils ASTM D-422, ASTM D-421, ASTM D-420, ASTM C-117 recommended practice.
 - b. Plasticity index determination ASTM D-4318.
 - c. Moisture-density curve determination ASTM D-1557 or relative density (ASTM D-4253 or ASTM D-4254) as specified above.
 - d. Frost susceptibility analysis.
- B. Field Tests:
- 1. The Owner's soils testing agency representative shall be present during delivery and compaction of fill materials.
 - 2. Establish suitable bearing grades for foundations and structural fill below slabs on grade.
 - 3. Verify natural soil and structural fill subgrades for all slabs on grade.
 - 4. In-place density tests: Test in accordance with ASTM D-1556 (sand cone method) or ASTM D-2922 (nuclear method) on compacted natural soils or structural fill materials as follows:
 - a. One test for each 2000 sq. ft. of slab on grade and pavement subgrade per 12" lift.
 - b. One test for each 200 cu. yd. of fill and backfill at exterior side of foundation walls and unpaved areas.
 - 5. Verify and monitor compaction operations and equipment.
 - 6. Monitor proof-rolling operations for foundation and slab-of-grade subgrades.

3.04 CONCRETE:

- A. Sampling:
- 1. Concrete samples shall be taken in accordance with ASTM C-172 "Sampling Fresh Concrete".
 - 2. Inspection/Testing proposed materials.
 - 3. Aggregate Analysis.
 - 4. Conduct compression tests to verify that design mix complies with Contract Documents.
- B. Formwork and Reinforcing:
- 1. Inspect formwork and reinforcing prior to placing of concrete.
- C. Batching Inspection:
- 1. Inspect batching, mixing and delivery operations for compliances with the Specifications.
- D. Compressions Tests:
- 1. Label each compression test cylinder identifying the truckload of concrete from which sample was taken and the exact location in construction where deposited.
 - 2. Test specimens in accordance with ASTM C-39 "Methods of Tests for Compressive Strength of Molded Concrete Cylinders". Include weight test.
 - 3. One compression test, as used herein shall consist of 3 test cylinders made from composite samples secured from a single truckload of concrete.
 - 4. Break 1 test cylinder at 7 days and the remaining 2 at 28 days. If desired by the architect, engineer, or construction manager a fourth test cylinder can be made and held for 56 days.
- E. One compression test will be required for each of the following conditions:
- 1. Each 50 cu. yd. of concrete or fraction thereof.
 - 2. Each class of concrete placed in one day.
- F. Slump Tests:
- 1. Slump test shall be made in accordance with ASTM C-143 "Methods for Slump of Portland Cement Concrete".
 - 2. Test Slump of concrete at same frequency and from same truckload as compression tests and more often when directed by the Owner's representative.
- G. Air Content Tests:
- 1. Determine air content by ASTM C-231 "Method of Test for Air Content of Freshly Mixed Concrete by the Volumetric Method".
 - 2. Determine air content at same frequency and from same truckload as for compression tests.

3.05 STRUCTURAL STEEL

- A. Shop Testing and Inspection:
 - 1. Verify and monitor all welder qualifications, welding procedures and welding processes.
 - 2. Monitor fabrication operations.
 - 3. Review all mill reports.
 - 4. Visually inspect and measure weld profiles, at random, prior to application of paint.
 - 5. Review Shop Quality Control Manual and Procedures with shop foreman.
- B. Field Testing and Inspection:
 - 1. Visual inspection:
 - a. Verify and monitor welder qualifications and welding processes.
 - b. Inspect field erection of structural elements.
 - c. Inspect field bolting operations.
 - d. Inspect field welding operations.
 - e. Inspect anchor bolt installation and tightening.
 - 2. High Strength Bolted Connections
 - a. Test all bolted connections for conformance with the AISC "Specification for Structural Joints using ASTM A325 or A490 Bolts", 2000 edition.
 - 3. Magnetic Particle Testing
 - a. Test 5% of field fillet welds, at random, final pass only for conformance with ASTM E709 and ASTM E1444.
 - 4. Ultrasonic Testing
 - a. Test 100% of all field partial and full penetration welds, at random, for conformance with ASTM E164 and AWS D1.1.

3.06 UNIT MASONRY

- A. Brick: Test each type, grade and class of brick per ASTM C67.
- B. Concrete masonry units: Test each type, class and grade per ASTM C140.
- C. Inspect rebar reinforcing, joint reinforcing, ties and anchors for general compliance with the Contract Documents.
- D. Mortar: Test one set of three cubes per ASTM C780 for each days work or every 5000 sq. ft. of wall area, whichever is the lesser.
- E. Grout: Test on set of three compression test cylinders per ASTM C-1019 for each days work or every 25 cu. yds., whichever is the lesser.
- F. Masonry Prisms:
 - 1. Prism tests shall be performed for the purpose of checking the compressive strength of each masonry assembly, including grouted cells but excluding reinforced cells and face brick.
 - 2. Test one set of three prisms per ASTM E447, Method B, for each 5000 sq. ft. of each type of wall construction or a minimum of three sets for the project, whichever provides the greater number of sets.

3.07 METAL DECKING

- A. Visual Inspection
 - 1. Verify and monitor welder's qualifications and welding processes.
 - 2. Inspect field erection procedures for metal decking.
 - 3. Inspect field welding operations.
 - 4. Inspect mechanical fastening operations.

3.08 WOOD

- A. Verify that each Fabricator maintains a complete, accurate, detailed fabrication and quality control procedure evaluated relative to the Code requirements and Fabricator's scope of work.
- B. Inspect Fabricator's Plant based on program described above.
- C. Review the following connections during construction:
 - 1. Field Gluing – Ensure that all subflooring is glued with approve construction adhesive.
 - 2. Nailing – Verify size and spacing of nails for:

- a. Sheathing to wall studs at shear walls.
 - b. Subflooring to floor joists at floor levels.
 - c. Roof Sheathing to framing.
 - d. Confirm proper installation of additional nails required by the construction documents including but not limited to drag struts, holddown locations, braces, etc.
3. Bolting
- a. Confirm size, spacing, and projection of sill bolts.
 - b. Confirm size, spacing and location of holddown anchors.
 - c. Confirm size and spacing of ledge bolts.
 - d. Confirm proper installation of additional bolts required by the construction documents including but not limited to drag struts, holddown locations, braces, etc.
4. Anchoring
- Confirm type, quantity and locations of Simpson-type metal framing anchors such as holddowns, straps, hurricane ties, framing hangers, etc.
- D. Verify general compliance with construction documents and manufacturer's recommended procedures including the installation of additional blocking, bridging, perimeter bracing, etc.

END OF SECTION

SECTION 033000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Furnish all labor, material and equipment necessary to complete all cast-in-place concrete, reinforcement, formwork, and related work.

1.02 SUBMITTALS

- A. Submit 3 copies of the following:
 - 1. Shop Drawings
 - a. Bar reinforcement shop drawings shall include setting plans, wall elevations, bending diagrams, cutting lists, and other information so as to completely and unambiguously define and establish the location, spacing, size, length, bending, shape, splicing, keying at construction joints and all other pertinent information as required. Drawings shall show grades of reinforcing steel. Opposite hand reinforcing shall be detailed separately. Wall reinforcing shall be detailed on wall elevations. Each shop drawing shall show splice length for every size and type of bar used.
 - b. Type, size and location of all accessories required for the proper assembling, placing and support of the reinforcement.
 - c. All openings, depressions, construction and control joints, trenches, sleeves, inserts and all other project requirements affecting reinforcing details and placing.
 - d. Placement drawings indicating joint layout, types, location, and dimensions for the following:
 - 1. Slabs on Grade
 - 2. Walls
 - 3. Slabs on Deck
- B. Manufacturer's Data:

For standard factory manufactured materials.
- C. Proposed concrete design mixes. 3 copies of proposed mix and 3 copies of back-up data.

1.03 CODES AND STANDARDS

- A. Comply with the provisions of ACI-301 "Specifications for Structural Concrete".
- B. Perform all work in accordance with rules and regulations of authorities having jurisdiction. In the absence of other authorities comply with State Building Code. In case of conflict most stringent shall govern.

1.04 RESPONSIBILITY OF CONTRACTOR

- A. The Contractor alone shall be fully responsible for the design, strength, safety and adequacy of all formwork, shoring, bracing and all methods of construction.

1.05 INSPECTION, TESTING AND QUALITY CONTROL

- A. A Testing agency will be employed by the Owner to verify the acceptability of materials and the design of the basic concrete mixes.
- B. The Owner shall pay for the cost of the services of the testing agency except that the Contractor shall reimburse the Owner for the cost of those services, which in the opinion of the Architect, are required because of the following:
 - 1. Failure of materials or workmanship to meet Contract requirements.
 - 2. Materials or practices, not complying with the Specifications, which could possibly result in defective work thereby rendering it necessary or advisable to perform tests to determine whether or not work is acceptable.
 - 3. Changes in source, quality or characteristics of materials.

4. Wasted time of inspectors because of cancellations or delays of concrete placement or other work.
 5. Site cured cylinders requested by the Contractor to verify strengths for removal of forms.
- C. In general, concrete testing will consist of one set of 3 cylinders for each days casting or every 50 cu. yds.
- D. The Contractor shall cooperate by allowing clear and safe access to the work for sampling, inspection and storage of specimens and equipment. He shall construct a storage box on the site of sufficient size to store 24 cylinders and which will afford the protection required by ASTM C31, Paragraph 7 (A).
- E. Those portions of the structure that do not meet the Contract requirements shall be corrected or removed and replaced as directed by the Architect, and all cost of correction, removal and replacement, shall be at the Contractor's expense.
- F. The Contractor shall notify the Architect and testing agency not less that 24 hrs. in advance of the starting of any project concrete operations.

PART 2 PRODUCTS

2.01 FORM MATERIALS

- A. Exposed Concrete: Plywood, metal, metal framed-plywood faced or other acceptable panel type material to provide continuous, straight smooth exposed surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Use overlaid plywood complying with US product standard PS-1 "A-C or B-B High Density Overlaid Concrete form", Class I
- B. Concealed Concrete: Plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for a tight fit.
1. Thickness as required for spans and pressures.
- C. Form Ties:
1. Shall be of approved design, minimum working strength 3,000 lbs. each, so adjustable as to permit complete tightening of forms. After removal of protruding part of tie no metal to be nearer than 1-1/2" to face of concrete. Ties at exposed surfaces shall have wood, plastic or metal cones. Ties below grade shall have water seal washers.
- D. Form Release Agent Shall Be of commercial formulation with maximum VOC of 450 mg/l that will not bond with, stain or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
1. Rich-Cote as manufactured by Richmond Screw Anchor Co., Inc.
 2. Formshield as manufactured by W.R. Grace and Co.
 3. Bay Cote as manufactured by Bay Oil Co.

2.02 MATERIALS

- A. Bar Reinforcement - Newly rolled billet steel conforming to the following:
1. ASTM A615 Grade 40 for ties, stirrups and bars to be welded. Welded bars shall also comply with ASTM A706.
 2. ASTM A615 Grade 60 for all other bars.
- B. Welded wire fabric reinforcement shall conform to ASTM A185. Sizes as shown on the Drawings. Deliver in sheets, not in rolls.
- C. Reinforcement Accessories:
1. Accessories shall be as manufactured by Superior Concrete Accessories, Inc., Dayton Sure-Grip and Shore Co., R.K.L. Building Specialties Co., Inc. or equal.
 2. Accessories shall include all spacers, chairs, ties, slab bolsters, clips, chair bars, and other devices for properly assembling, placing, spacing, supporting, and fastening the reinforcement.
 3. Accessories in contact with surfaces exposed to view in the finished work shall conform to CRSI Bar Support Specifications, Class C or Class E.

2.03 MISCELLANEOUS RELATED MATERIALS

- A. Non-shrink grout shall be a mixture of water and a specially formulated packaged mixture approved by the Architect/Engineer, such as Masterflow 713 by Master Builders, EUCO N-S by

Euclid Chemical Co., Crystex by L and M Construction Chemicals, or SonogROUT Hyflow by Sonneborn-Contech.

- B. Waterstops shall be extruded from new stock polyvinyl chloride. Provide flat dumbbell type or center – bulb type waterstops at construction joints where indicated.
- C. 10 Mil polyethylene shall be installed under all slabs on grade, and shall be used in the widest possible width. Joints shall be lapped a minimum of 6".
- D. Concrete Curing and Sealing Compound:
Liquid membrane forming type conforming to ASTM C309, type I, class A, VOC compliant.
Acceptable are:
 - 1. Kure-N-Seal WB30 by Sonneborn Contech.
 - 2. Super Diamond Cure by Euclid Chemical Company.
 - 3. Masterkure by Master Builders Company.
 - 4. Dekote 30 by W.R. Grace Company.
- E. Joint Filler shall be preformed filler provided at slab expansion and control joints, joints between floor slabs and walls, and other isolation joints. Acceptable are:
 - 1. Precompressed, impregnated open foam cell.
 - 2. Asphalt saturated fiberboard complying with ASTM D1751.
 - 3. Granulated cork between saturated felt or glass fiber felt complying with ASTM D1752, Type H.

2.04 CONCRETE MIX MATERIALS

- A. Cement - Portland Cement, ASTM C150 Type I or Type II.
- B. Fine aggregate (normal weight) shall consist of washed, inert, natural sand conforming to ASTM C-33.
- C. Coarse aggregate (normal weight) shall consist of well graded, crushed stone or washed gravel conforming to ASTM C-33, 3/4" size.
- D. Lightweight fine and coarse aggregates – rotary kiln, expanded clay or shale conforming to ASTM C330 with FSP not less than 6.0, such as Masslite, Norlite, Solite or approved equal, aggregate sizes shall include fine aggregates designated as "sand size", and coarse aggregate designated as "graded 3/4" size".
- E. Water shall be potable.
- F. Water Reducing Admixture, ASTM A494, type A:
 - "WRDA" - W.R. Grace Co.
 - "PDA25" - Protex Industries, Inc.
 - "Pozzoloth 200N or 122N" Master Builders Co.
- G. Air Entraining Agent, ASTM C260:
 - "Darex AEA" - W.R. Grace Co.
 - "Air Mix" - The Euclid Chemical Co.
 - "MB-VR" - Master Builders Co.

2.05 CONCRETE MIX DESIGN

- A. It is the intent of this Specification to secure, for every part of the work, concrete of homogeneous structure which, when hardened, will have the required strength, appearance and resistance to weathering.
- B. Basic mix proportions shall be established by the Contractor by means of current laboratory tests made with the constituents to be used in the work. If suitable data are not available, Contractor shall engage a testing laboratory to provide them.
- C. Proportions shall be selected to produce an average strength at least 1200 PSI greater than the normal design strength. (Unless standard deviation data are available to justify a lesser factor).
- D. Concrete in pavements and where flat surfaces are exposed to the weather shall have an entrained air content of 6 percent +/- 1 percent. All other concrete shall have an entrapped air content of 3-1/2 percent +/- 1, -2 percent.
- E. The consistency of the concrete at time of deposit as measured by ASTM C143, "Standard Method of Test for Slump" shall be as follows:

<u>Portion of the Structure</u>	<u>Slump</u>
Pavements and slab on ground	3" +/- 1"
Footings	3" +/- 1"
Reinforced slabs, beams	3" +/- 1"
Reinforced walls, columns	4" +/- 1"

- F. No concrete may be placed in the work until the appropriate design mix has been reviewed and accepted by the Architect/Engineer.
- G. Structural lightweight concrete: shall have an oven dry unit weight less than 112 PCF and a corresponding "wet density" not to exceed 121 PCF.
- H. If, during the progress of the work, any difficulty should occur in securing concrete of the required workability and strength, the Architect may order such changes in the proportions or materials, or both, as may be necessary. Any changes so ordered shall be made at the Contractor's expense.

2.06 MIXING AND DELIVERY OF CONCRETE

- A. All concrete shall be ready-mixed produced by a plant acceptable to the Architect. All constituents, including admixtures, shall be batched at the central batch plant.
- B. Cold weather requirements: When the air temperature is at or below 45 degrees F, or when weather reports indicate that the air temperature may fall below 45 degrees F within 24 hrs immediately following the completion of concrete placement, the mixing water and, if necessary, the aggregates shall be heated so that the concrete shall have a temperature of 55 degrees to 80 degrees when placed. If the mixing water is heated, it shall not have a temperature in excess of 140 degrees F at the time it is added to the cement and aggregates.
- C. Hot weather requirements: During hot weather the concrete shall, at the time it is placed, have a temperature from 55 to 80 degrees F but never above 90 degrees F. Provide crushed ice in lieu of equal weight of mixing water if necessary. Ice must be completely dissolved before placing.

PART 3 EXECUTION

3.01 INSTALLATION OF FORMS AND SHORING

- A. Forms shall be so designed by the Contractor to withstand all dead and live loads, including construction live loads, and to not move out of specified tolerances for line and elevation. Forms and form accessories shall be so designed that upon removal they will in no way damage concrete surfaces.
- B. Forms shall be built mortar-tight.
- C. Holes for concrete placement through sides of forms shall not be used.
- D. Forms for beams and other horizontal surfaces shall be constructed with adequate camber resulting in level surfaces before forms are removed.
- E. Before form materials are re-used, surfaces that will be in contact with freshly cast concrete shall be thoroughly cleaned, damaged areas repaired, and all projecting nails withdrawn.
- F. Before reinforcement is placed on or against formwork, surfaces of forms coming in contact with fresh concrete shall be cleaned and then treated with approved form release agent.
- G. Set and maintain concrete formwork to insure completed work is within the tolerance limits listed in ACI 347.

3.02 CONSTRUCTION JOINTS

- A. Joints not indicated on Plans shall be located and constructed so as to least impair strength and appearance of work.

3.03 COORDINATE INSTALLATION OF EMBEDDED ITEMS WITH OTHER TRADES

- A. Install all embedded items to conform to the requirements of ACI 318 and as specified below. Do not install any accessories until the affected trade has verified their type and location.
- B. Coordinate the installation of all inserts required by other trades prior to placing of reinforcing steel.

- C. Install anchor bolts, etc., furnished by other Sections. Use line and transit to locate anchor bolts and secure with templates to prevent displacement during concreting operations. Survey of completed anchor bolt placement and submit discrepancy reports to Architect/Engineer immediately for resolution prior to proceeding with erection of other trades.
- D. Provide steel sleeves for pipes passing through concrete.

3.04 INSTALLATION OF REINFORCEMENT

- A. Reinforcing shall be accurately placed and rigidly secured in position.
- B. Tie reinforcing with annealed #18 gauge (min.) wire, and bend all wire back beyond general plane of reinforcing.
- C. Welded wire fabric reinforcement in slabs shall be continuous, shall have joints lapped at least one full mesh, but not less than 6" and shall be supported at proper elevations by accessories.
- D. Bending, Tack welding, Cutting or substituting reinforcement in the field, other than shown on the Contract Drawings, in any manner is prohibited, unless specific approval for each case is given by the Architect or his designate.
- E. At the time the concrete is placed, all reinforcement shall be free from excessive rust, scale, or other coatings, which might destroy or reduce the bond.
- F. Before concrete is cast, check all reinforcement after it is placed to insure that reinforcement conforms to Contract Drawings and approved shop detail drawings and Specification requirements. Such checking shall be done only by qualified, experienced personnel. In addition, the Architect's representative shall be notified at least 36 hrs prior to concrete placement and given the opportunity to inspect the completed reinforcement and formwork before concrete placement.

3.05 PLACING CONCRETE

- A. Transport concrete mixes to place of final deposit as rapidly as practical by methods, which prevent segregation.
- B. Remove water and all foreign matter from place of deposit. Place no concrete on frozen soil.
- C. Calcium chloride shall not be used anywhere on the site for any purpose.
- D. At construction joints, the surfaces of the concrete already placed shall be thoroughly cleaned of foreign materials and laitance, dampened with water and "Euco Weld" by the Euclid Chemical Company or approved equal, shall be applied. New concrete shall be placed after the bonding compound has dried.
- E. Concrete shall be placed in such a manner as will prevent segregation.
- F. Vertical lifts shall not exceed 18".
- G. Concrete, during and immediately after depositing, shall be thoroughly compacted by means of suitable internal type vibrators.
- H. Chutes, hoppers, spouts, adjacent work, etc., shall be thoroughly cleaned before and after each placement.
- I. All structural slabs and slabs on grade shall be finished to exact elevations shown on the drawings. The slab thickness shall be increased where necessary to compensate for all settlements and deflection due to the weight of the wet concrete.

3.06 REPAIR AND FINISH OF CONCRETE SURFACES

- A. Concrete surfaces shall be repaired by using either the same material as originally cast or by use of a dry-pack material. Areas affected shall be chipped back square and to a depth of 1" min. Holes shall then be moistened with water for minimum of 2 hrs. Then followed by a brush coat of Euroweld as manufactured by Euclid Chemical Co. As soon as Euroweld becomes tacky, immediately plug the hole with a dry pack material consisting of 1:1-1/2 mixture of cement and concrete sand mixed slightly damp to the touch. Hammer the dry-pack into the hole until dense and excess of paste appears on the surface. Finish the patch to the same texture as surrounding concrete. Color of patch after curing shall match adjacent concrete exactly. Adjust color if necessary using white cement or limestone aggregate.

3.07 FINISHING OF FORMED CONCRETE SURFACES

- A. Formed concrete surfaces to be painted or exposed to view in the finished work shall be finished as follows:
1. As soon as the forms have been stripped, fins and other projections shall be removed, surface defects shall be patched, and repairs to defective concrete and honeycombed areas shall be made, clean all exposed concrete surfaces and adjoining work stained by the leakage of concrete, to the approval of the Architect/Engineer.
 2. Immediately after removal of forms, remove form tie plugs. Holes shall then be promptly filled upon stripping as follows: Moisten the hole with water, followed by a 1/16" brush coat of neat cement slurry mixed to the consistency of a heavy paste. Immediately plug the hole with a 1:1.5 mixture of cement and concrete sand mixed slightly damp to the touch (just short of balling). Hammer the grout into the hole until dense, and an excess of paste appears on the surface in the form of a spiderweb. Fill hole flush with concrete surface and finish smooth.

3.08 FINISHING FLATWORK

- A. Provide slab surface of following specified flatness and levelness when tested in accordance with ASTM E1155. Remove surface irregularities to provide a continuous smooth finish.
- B. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.
1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances FF 30-FL 18, minimum overall composite and FF 15 – FL 10 minimum local value and a Waviness Index WI2-10 of 0.14 inches. Grind smooth surface defects that would telegraph through applied floor covering system.
- C. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.
- D. Nonslip Broom Finish: Apply nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordination required final finish with Architect before application.

3.09 CURING, PROTECTION AND FORM REMOVAL

- A. Formed surfaces shall be periodically sprayed with water while forms are in place and, after forms are stripped, kept continuously wet and at a minimum temperature of 50 degrees F for 7 days.
- B. Unformed surfaces such as slabs shall be moist cured at a minimum temperature of 50 degrees F for 7 days or given 2 successive uniform coatings of approved curing and sealing compound. Each coat shall consist of not less than 1 gal to 400 sq. ft.
- C. Cold weather protection - When the air temperature is at or below 45 degrees F or when weather reports indicate that the temperature may fall below 45 degrees F within the 24 hr. period following placement of concrete, take all adequate and proper measures as required to maintain the temperature of the concrete between 50 degrees F and 70 degrees F for the specified curing period and to protect the concrete against damage by freezing or the cold, including but not limited to the following:
1. Ascertain that the requirements for heating of aggregates and water have been followed.
 2. Heat formwork, reinforcing and underlying subgrades with live saturated steam so as to raise the temperature well above the freezing point. Concrete surfaces shall be covered to prevent direct contact with the steam.
 3. After placing of concrete, protect against cold by means of tight covering and supply of sufficient heat, where required, to maintain the temperature of the concrete at a temperature of 50 to 70 degrees F for at least 7 days after placement of concrete. The

concrete shall not be protected with salt, hay, manure or any other material containing live or organic acids. Concrete shall be kept continually moist during the curing periods.

4. The section to be concreted shall be completely housed or enclosed wherever practicable before placing of concrete, in a manner that will insure the maintenance of the required temperatures. Such enclosures shall be left in place during the curing period.
- D. Hot weather protection - Take special care during the concreting operations during hot or dry weather. Wet forms just before placing of concrete and keep exposed surface continuously damp. Take special precautions in placing of slabs in unshaded locations so as to prevent flash setting of concrete. Provide a continuous fog spray of water immediately after screeding and maintain in moist condition and take such other protective measures as required to prevent damage from flash setting of concrete. Do not use retardant admixtures, other than specified by the Architect. Except as modified above, follow procedures as outlined in ACI 305.
- E. Removal of Forms:
 1. Remove forms only after concrete has attained sufficient strength to support its own weight and all loads thereon.

3.10 GROUTING OF ANCHOR BOLTS AND BASE PLATES

- A. Grout Mixture: Use an approved packaged grout mix with the minimum amount of water required to produce a flowable grout. Extend grout with 3/8" coarse aggregate for grout placement over 2 inches thick.
- B. Mixing: Per approved grout manufacturer's printed instructions. Do not mix more grout than can be placed within twenty (20) minutes.
- C. Preparation:
 1. Remove all defective concrete, laitance, dirt, etc. from the concrete surface. Saturate the surface of the concrete thoroughly with clean water for at least 24 hours. Remove free water just prior to placing the grout.
 2. Clean, align, and level the base plate into final position and maintain that position during grouting. Bring the concrete and plate to be grouted to a temperature between 65 degrees to 90 degrees F. just prior to grouting.
- D. Grouting:
 1. Place the grout quickly and continuously to provide complete bearing and avoid air entrapment.
 2. After the grout has acquired its initial set, cut off all unconfined, exposed edges, leaving slopes "shoulders". Paint the entire area within 24 hours with an approved curing compound.

END OF SECTION 03310

SECTION 04 2000
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete Block.
- B. Reinforcement and Anchorage.
- C. Flashings.
- D. Lintels.
- E. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 2000 - Concrete Reinforcing: Reinforcing steel for grouted masonry.
- B. Section 04 0511 - Masonry Mortaring and Grouting.
- C. Section 05 5000 – Metal Fabrications. For loose lintels.
- D. Section 06 1000 - Rough Carpentry: Nailing strips built into masonry.
- E. Section 07 9005 - Joint Sealers: Backing rod and sealant at control and expansion joints.

1.03 REFERENCE STANDARDS

- A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International; 2011.
- B. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2009a.
- C. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2013.
- D. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar; 1992a (Reapproved 2008).
- E. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2012.
- F. ASTM C1357 - Standard Test Methods for Evaluating Masonry Bond Strength; 2009.
- G. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2011.
- H. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.
- B. Responsibility of the Contractor: The contractor alone shall be fully responsible for the design, strength, safety and adequacy of all shoring, bracing and all methods of construction, and for the strength, consistency, finish and general quality of masonry. The specifying herein of requirements for construction methods, preliminary approvals by the Architect, inspection, testing and quality control performed by the Owner's testing agency or any other requirements of the Specifications shall be construed as the minimum acceptable, and shall not eliminate, lessen or restrict in any manner the responsibility of the Contractor for all construction methods and for providing completed masonry assembly that fully meets the strength, appearance, and all other requirements of the Specifications and Drawings.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, control joint fillers, anchors, non-chloride accelerators, and other masonry accessories.

- C. Samples: Submit 1 sample of decorative block units to illustrate color, texture, and extremes of color range.
 - 1. Samples to Testing Agency: Mortar and grout constituents, including admixtures.
- D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
- E. Shop drawings: Bar reinforcement shop drawings shall include setting plans, wall elevations, bending diagrams, cutting lists, and other information so as to completely and unambiguously define and establish the location, spacing, size, length, bending, shape, splicing and all other pertinent information as required. Drawings show grades of reinforcing steel, opposite hand reinforcing shall be detailed separately. Wall reinforcing shall be detailed on wall elevations, each shop drawing shall show splice length for every size and type of bar used.
- F. Mill Reports: Submit certified copies of mill reports for reinforcing steel, including statement of compliance with specified ASTM standards.
- G. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.
- H. Test Reports:
 - 1. Concrete masonry manufacturer's test reports for units with integral water repellent admixture.
 - 2. Proposed mortar design mixes, including analysis of aggregates.
 - 3. Proposed grout design mixes, including analysis of aggregates and methods proposed for placing grout.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
 - 1. Maintain one copy of each document on project site.
- B. Fire Rated Assemblies: Conform to applicable code for UL Assembly No. U905.

1.07 INSPECTION, TESTING AND QUALITY CONTROL

- A. A testing agency will be employed by the Owner to verify the acceptability of materials and design of the basic mortar and grout mixes.
- B. Since the requirements throughout this section are written with the intent to secure the best result, it is recognized that perhaps certain deviations may be advisable under the project conditions. Any such deviations may be allowed only after examination by and upon the written authorization of the Architect.
- C. The contractor shall carry out diligently and without delay those corrections as directed by the Construction Manager when construction operations indicate the Specification requirements or construction practices are being or about to be violated.
- D. Coordinate with the testing agency to insure that materials are supplied, sampled, and tested so as not to delay the progress of the job whenever the source, quality or characteristics of the approved material changes or indicates lack of compliance with the contract requirements. The Contractor shall resubmit additional materials for the testing to sample.
- E. The Owner shall pay for the cost of the services of the testing agency except that the Contractor shall reimburse the Owner for the cost of those services which, in the opinion of the Architect, are required because of the following:
 - 1. Failure of materials or workmanship to meet the contract requirements.
 - 2. Materials or practices, not complying with the Specifications, which could possibly result in defective work thereby rendering it necessary or advisable to perform tests to determine whether or not work is acceptable.

3. Changes in source, quality or characteristics of materials.
 4. Wasted time of inspectors because of cancellations or delays of masonry placement or other work.
- F. In general, testing shall consist of the following:
1. CMU: One set of three samples for the purpose of testing the comprehensive strength of masonry units.
 2. Grout: One set of three samples for each days casting or every 25 cu. yds. whichever is the lesser, plus slump tests, entrained air tests, etc... as determined by the Architect/Engineer.
 3. Mortar: One set of three cubes for each days work or every 5000 sq. ft. of wall area whichever is the lesser, plus entrained air tests etc... as determined by the Architect/Engineer.
- G. Masonry Prisms
1. Construct a set of three (3) prisms each for the purpose of testing the compressive strength of the masonry assembly for the reinforced masonry, face brick to be excluded.
 - a. Prisms shall be constructed including all typical conditions, i.e. grouted cells, ties, etc...but excluding vertical reinforcing bars.
 2. Construct and test a minimum of one laboratory prism set, prior to delivery of materials to the project site confirming required prism strength.
- H. The Contractor shall cooperate by allowing clear and safe access to the work for sampling, inspection and storage of specimens and equipment.
- I. If any strength test of laboratory cured cubes or cylinders falls below the required strength by more than 300 psi, or if observations or other evidence indicates deficiencies in protection or curing, or if the mortar or grout is suspected of having been frozen, steps shall be taken to assure that load carrying capacity of the masonry is not jeopardized.
- J. If, in the judgment of the Architect, the ultimate load carrying capacity or durability has been significantly reduced, the masonry shall be removed and replaced at the Contractor's expense unless the Architect deems it appropriate to take field cut prisms. In such case, three prisms shall be taken for each strength test more than 500 psi below the required strength.
- K. Those portions of the structure that do not meet the Contract requirements based on appearance or for any other aesthetic reason shall be corrected or removed and replaced as directed by the Architect and all cost of corrections, removal and replacement, shall be at the Contractors expense.

1.07 MOCK-UP

- A. Construct a masonry wall as a mock-up panel sized 10 feet long by 10 feet high; include mortar and accessories and structural backup in mock-up.
- B. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
 1. Masonry sand shall be covered to prevent the entrance of water from rain or melting snow and to prevent contamination from all sources.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 1. Conform with ASTM C90, hollow load-bearing concrete masonry units, Grade N, Type 1.
 2. Aggregate: Normal weight, conforming to ASTM C331, excluding cinders.
 3. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the drawings for specific locations.
 4. Special Shapes: Provide non-standard blocks configured for corners, lintels, and headers.

- a. For vertically reinforced masonry use two-core open-end A shapes. This will facilitate the placement of the units around the reinforcing.
- 5. Units with Integral Water Repellent: Concrete block units as specified in this section with polymeric liquid admixture added to concrete masonry units at the time of manufacture.
 - a. Performance of Units with Integral Water Repellent:
 - 1) Water Permeance: When tested per ASTM E514 and for a minimum of 72 hours.
 - (a) No water visible on back of wall above flashing at the end of 24 hours.
 - (b) No flow of water from flashing equal to or greater than 0.032 gallons per hour at the end of 24 hours.
 - (c) No more than 25% of wall area above flashing visibly damp at end of test.
 - 2) Flexural Bond Strength: ASTM C1357; minimum 10% increase.
 - 3) Compressive Strength: ASTM C1314; maximum 5% decrease.
 - 4) Drying Shrinkage: ASTM C1148; maximum 5% increase in shrinkage.
 - b. Use only in combination with mortar and grout that also has integral water repellent admixture.
 - c. Use water repellent admixtures for masonry units, mortar and grout by a single manufacturer.
 - d. Manufacturers:
 - 1) Substitutions: See Section 01 6000 - Product Requirements.

2.02 GROUT MATERIAL

- A. Grout for reinforced masonry shall be proportioned in accordance with ASTM C476.
 - 1. Required grout strength at 28 days is 3000 psi. Laboratory and field samples shall be tested as described in NCMA TEK #23 by the National Concrete Masonry Association.

2.03 MORTAR MATERIALS

- A. Cement
 - 1. Portland Cement: Comply with ASTM C150
 - a. Type I used generally.
 - b. Type III used when conditions require high early strength.
 - c. White Portland Cement: Non-staining Atlas White, Type-1, Portland Cement by Lehigh Portland Cement Co. or approved equal.
 - 2. Masonry Cement: Comply with ASTM C91.
- B. Lime
 - 1. Hydrated Lime: Comply with ASTM C207, Type S.
 - 2. Quicklime: Comply with ASTM C5.
- C. Sand
 - 1. Comply with ASTM C144.
 - 2. Where white mortar joints are indicated, use fine pure silicon sand.
- D. Water shall be potable, clean and free from deleterious materials.
- E. Admixtures
 - 1. Waterproofing
 - a. Omicron Mortarproofing by Master Builders, Hydratite Plus by W.R. Grace and Co. or approved equal.
 - b. Required in mortar for sloping or horizontal exterior brick work.
 - 2. Accelerators: Dur-O-Guard by Dur-O-Wal, Inc. Accelguard 80 by Euclid Chemical Co. or approved equal.
 - 3. Color Additives
 - a. SGS Mortar Colors by Solomon Grind-Chem Services, Inc. or approved equal.
 - b. For use in face brick mortar only.
 - c. Color as selected by the Architect from manufacturer's available selections.
- F. Mortar Preparation

1. Measurement and Mixing: Comply with the requirements of ASTM C270.
2. Mortar Types
 - a. Type "M" (ASTM C270)
 - 1). 1 part Portland Cement, 1 part masonry cement, sand equal to 2-1/4 to 3 times the volume of the cements used or;
 - 2). 1 part Portland Cement, 1/4 part lime and sand equal to 2-1/4 to 3 times the volume of the cements and lime used.
 - 3). Use: Exterior walls and reinforced masonry.
 - b. Admixtures
 - 1). Adhere to manufacturers recommended proportions for mortar quantities being mixed.
 - 2). Mortar color subject to Architects approval.
 - c. Pointing mortar for glazed concrete block: 1 part white Portland Cement, 1/8 part lime and 2 parts fine white sand.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers of Joint Reinforcement and Anchors:
 1. Dur-O-Wal Products
 2. A.A. Wire Products
 3. Ty-Wal
 4. Approved equal. For substitutions: See Section 01 6000 - Product Requirements.
- B. Reinforcing Steel: Type specified in Section 03 3000; size as indicated on drawings
- C. Single Wythe Joint Reinforcement: Truss or ladder type; ASTM A1064/A1064M steel wire, at interior walls reinforcing shall be milled galvanized conforming with ASTM A641, Class 3, at exterior walls reinforcing shall be hot dipped galvanized conforming with ASTM A153, Class B-2; #9 side and cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure. Provide fabricated corners and/or tee sections at all corners and intersections.
- D. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.
 1. Protective Coating
 - a. Flat metal zinc coated in accordance with ASTM A153, Class B-2.
 - b. Wire zinc coated in accordance with ASTM A153, Class B-2.
- E. Reinforcing Bar Positioners
 1. For Vertical Bars
 - a. Galvanized, sized for specific bars to securely center the bar in the block work during grouting operations.
 - b. As manufactured by AA Wire Products "#AA 239", Dur-O-Wal "#D/A 810", or approved equal.
 2. For Horizontal Bars in Bond Beams
 - a. Galvanized
 - 1). Bottom Reinforcing: Use standard chairs or bolsters as specified in Section 03200.
 - 2). Top Reinforcing: As manufactured by AA Wire Products "#AA 236" or "#AA 238", Dur-O-Wal "#D/A 811", or approved equal.

2.05 FLASHINGS

- A. Plastic Flashings: Sheet polyvinyl chloride; 40 mil thick.
 1. Manufacturers:
 - a. Hohmann & Barnard, Inc; X-Seal Transition Membrane: www.h-b.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Flashing Sealant/Adhesive: Butyl type as specified in Section 07 9005.

- C. Compressive Filler: Fiberglass sill sealer or strips of fiberglass insulation, by Owens-Corning, or approved equal.
- D. Control Joint Fillers: Extruded rubber, designed for use with standard sash block, conforming to the requirements of ASTM D-2000 2AA-805 with a Durometer hardness of 80 when tested in accordance with ASTM D2240. Actual filler configurations to fit required conditions as selected from configurations available in the Dur-O-Wal "Rapid Control Joint" products line, or approved equal.

2.06 ACCESSORIES

- A. Nailing Strips: Softwood lumber, preservative treated; as specified in Section 06 1000.
- B. Weeps: Cotton rope.
- C. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
 - 1. "Sure Klean #600" by the Process Solvent Co., Inc., "Vana-Trol" by the Process Solvent Co., Inc., "Thoro Klean" by Standard Builders Products, or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.
- C. Leave all openings and build chases, recesses, etc... as required under all Specification Sections, even though not indicated. Close up and fill around all openings where materials or equipment pass through or are built into masonry construction.

3.03 COLD AND HOT WEATHER REQUIREMENTS

- A. Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

3.04 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement. Lay units plumb, true to line, and with level courses accurately spaced.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running. Stop off horizontal run by racking back in each course; toothing is not permitted.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave. Do not furrow bed joints.

3.05 PLACING AND BONDING

- A. Do not install cracked, broken, or chipped masonry units exceeding ASTM allowances.
- B. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- C. Lay hollow masonry units with full mortar coverage on horizontal and vertical face shells.
 - 1. Provide full mortar coverage on webs as well as on horizontal and vertical face shells in all courses of the following:
 - a. Starter courses of supporting concrete.
 - b. Adjacent to cells or cavities to be filled with grout.

- D. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- E. Remove excess mortar and mortar smears as work progresses.
- E. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
- F. Interlock intersections and external corners, except for units laid in stack bond.
- G. Adjust units to final position while mortar is soft and plastic. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- H. Lay out material accurately as to require minimum amount of cutting of standard units. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- I. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.
- J. Isolate masonry partitions from vertical structural framing members with 3/4" minimum control joint unless otherwise detailed.
- K. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.
- L. Protect all masonry from damage and staining.
- M. Cover top of walls with non-staining waterproof coverings when work is not in progress.

3.06 WEEPS/CAVITY VENTS

- A. Install weeps in veneer and cavity walls at 24 inches on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.

3.07 REINFORCEMENT AND ANCHORAGE - GENERAL

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically. Where anchors, etc. project within the cores of masonry units, such cores shall be filled with mortar or 2000 psi concrete.
- F. In addition to the above, provide the following for reinforced masonry:
 - 1. Securely position all vertical reinforcing at the center of the block unit.
 - 2. Provide cleanout openings at the bottom of all grouted and reinforced cores. After inspection, these openings shall be closed and braced to adequately resist the pressure of the fluid grout.
 - 3. Remove all mortar projections from the cells to be grouted.
 - 4. Remove all mortar droppings and debris from foundation bearing surface and reinforcing bars.

3.08 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 - 1. Extend flashings full width at such interruptions and at least 4 inches into adjacent masonry or turn up at least 4 inches to form watertight pan at non-masonry construction.
 - 2. Remove or cover protrusions or sharp edges that could puncture flashings.
 - 3. Seal lapped ends and penetrations of flashing before covering with mortar.

- B. Extend metal flashings to within 1/4 inch of exterior face of masonry.
- C. Extend plastic, laminated, EPDM, and flashings to within 1/4 inch of exterior face of masonry.

3.09 LINTELS

- A. Install loose steel lintels over openings.
- B. Do not place masonry units on steel lintels if core holes are visible from below. (Notify Architect)
- C. Concrete block which directly support steel lintels shall have cores filled with mortar.

3.10 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.11 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 051200 STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Furnish all labor, material, and equipment necessary to complete all structural steel work as shown and/or specified.
- B. Related Work Specified Elsewhere:
 - 1. Testing Laboratory Services: Section 014110.
 - 2. Grouting of Leveling, Bearing and Base Plates: Section 033000.
 - 3. Shear Connectors: Section 053000.
 - 4. Miscellaneous Metal: Section 055000.
 - 5. Shoring for composite construction: Section 033000.
 - 6. Field Paint for Exposed Steel.
- C. Furnished but Installed Under Other Sections:
 - 1. Anchor Bolts and Leveling Plates: Section 033000.
 - 2. Loose Lintels: Section 042000.
- D. Specified Elsewhere But Included Under This Section:
 - 1. Contractor's Responsibilities Associated with Testing Laboratory Services: Section 014110.

1.02 QUALITY ASSURANCE

- A. Erector's Qualifications:
 - 1. Satisfactorily completed projects of similar magnitude.
- B. Fabricator's Qualifications:
 - 1. Satisfactorily completed projects of similar magnitude.
 - 2. Facilities and capacity to provide fabricated steel to facilitate timely completion of project.
- C. Welder's Qualifications:
 - 1. All shop and field welding is to be performed by operators who have passed the test as prescribed in AWS D1. 1 Chapter 5 "Qualifications", and qualified to perform the type of welding required.
 - 2. Each welder working on the project shall be assigned an identification symbol or mark and shall mark or stamp his identification at each completed weldment, both in the shop and field.
 - 3. The fabricator and erector shall submit to the Architect welder's qualifications prior to fabrication and erection.
- D. Inspection and Quality Control:
 - 1. The Fabricator shall provide effective full time quality control over all fabrication activities. This shall include ultra-sonic, magnetic particle, dye penetrant, x-ray, or other effective means of insuring that all welds fully conform to A.W.S. Standards. The Owner's testing agency may visit the plant as directed by the Architect to verify that a quality control program is being maintained and to spot check weldments and welding procedures. All fabricated items may also be subject to inspection in the field including ultra-sonic testing. Inspection by the testing agency is not intended to be comprehensive or complete and full responsibility for quality control shall remain with the Fabricator.
 - 2. The Owner or his representative shall have the right to reject any item not fully conforming to all requirements of the Contract Documents.

1.03 REFERENCE CODES AND STANDARDS

- A. Comply with the provisions of the following, except as otherwise indicated.

1. AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings".
 2. AISC "Code of Standard Practice for Steel Buildings and Bridges".
 3. AISC "Manual of Steel Construction".
 4. AISC "Specifications for Structural Joints using ASTM A325 or A490 Bolts" approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Council.
 5. AWS D1.7 "Code for Welding in Building Construction".
 6. SSPC "Structural Steel Painting Manual".
 7. Painting Manual, Vol. 1, "Good Painting Practice" and Painting Manual, Vol. 2, "Systems and Specifications", Steel Structures Painting Council.
 8. All pertinent Federal, State, and Local Codes.
- B. In case of conflict between specified codes and standards, the most stringent requirements govern. In case of conflict between codes and standards and Project Specifications, Project Specifications shall govern.

1.04 SUBMITTALS

- A. Shop Drawings:
1. Include all information necessary for steel fabrication and erection, including:
 - a. Standard details of proposed beam end connections with load capacities, and other job standards for appropriate parts of the work. Submit for approval before preparation of detail drawings. Consistently use standard details on Detail Drawings where appropriate.
 - b. Anchor bolt, leveling plate and bearing plate: Plans showing the location, size, and identification marks of all base plates, screws, bolts, grade of steel, and setting elevations.
 - c. Erection plans, showing type, size, weight, location identification marks of all members and all information regarding field welds and bolts.
 - d. Detail Drawings, showing complete details of all members including identification marks, dimensions, sizes, grade of steel, holes, shop and field welds, connection details, shop and field bolts, cleaning requirements prior to painting, type of paint and other pertinent data.
 - e. Include on drawings all temporary members required for erection.
 - f. Submit one print and one digital copy of shop drawings for review.
 2. Product Data:
For all standard manufactured products, including paint.
 3. Certificates:
 - a. Prior to delivery of steel to the project site, submit certified copies of mill test reports including name and location of mill and analysis of chemical and physical properties of steel to be used on this project.
 - b. Provide certification that welders to be employed in the work have satisfactorily passed AWS qualification tests within the previous 12 months.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Rolled Steel Wide-Flange Shapes & WT shapes cut from wide flange: ASTM A-992.
- B. Rolled Steel Plates, Bars, and Non Wide-Flange Shapes: ASTM A-36 unless otherwise indicated.
- C. Cold-Formed Steel Tubing: ASTM A-500, Grade B.
- D. Structural Pipe: ASTM A-501 or A-53 Grade B.
- E. High Strength Bolts: ASTM A-325, A-490.
- F. Standard Anchor Rods: ASTM F1554, Grade 36.
- G. Electrodes for Welding: AWS E70 Series.
- H. Paint for Shop Primer:
 1. Non-exposed Steel

- a. Paint for shop primer shall have not less than 50 percent solids, per volume, and shall withstand the following tests without any change in adhesion, film integrity, hardness, color, blistering or cracking:
 1. Freeze Thaw: ASTM D2246, 30 cycles
 2. Salt Spray Resistance: ASTM B117, 500 hours
 3. Light and Water Resistance: ASTM D822, 5000 hours
 - b. Acceptable Products:
 1. #99 or #88 Primer by Tnemec Co., Inc.
 2. Ceco #265 by Cheesman-Elliot Co.
 - c. Paint shall provide a minimum bond capacity for the adhesion of spray fire-proofing of 100 psf or greater. Submit certificates of compliance.
 - d. Other products will be considered if request is accompanied by certified test reports showing compliance with all the above requirements.
2. Exposed Steel:
 - a. Acceptable Product: Series 90-93 Zinc Primer by Tnemec Company.

2.02 DESIGN

- A. Connections:
 1. Design and detail all connections to resist the loads and reactions indicated on the Drawings or specified herein. Details shall supplement and be consistent with details shown on the Drawings. Proper account of eccentricity shall be taken in the design of connections so that there is no overstressing of any material either in the connections themselves or in the connected members. The design of all connections shall be subject to the approval of the Architect/Engineer.
 - a. Shop and field connections shall be made using minimum 3/4" diameter high strength bolts or by welding, unless otherwise indicated.
 - b. Beam-to-column connections shall be such as to minimize eccentric loading on the column. Unrestrained simple beam end connections shall be detailed and fabricated so as to minimize end restraint of the beam. All parts of such connections (such as welds, bolts and material) shall be designed taking eccentricity into account.
 2. Temporary Bracing:
The Contractor shall be fully responsible for the design, strength, safety and adequacy of all temporary bracing and all methods of construction. The specifying herein of requirements for bracing or construction methods, preliminary approvals by the Architect, or any other requirements of the Specifications shall be construed as the minimum acceptable, and shall not eliminate, lessen or restrict in any manner the responsibility of the Contractor for all construction methods and for the safety and stability of the structural steel work at all stages of erection, until such time as the permanent bracing system becomes effective.

2.03 FABRICATION

- A. Installation of High Strength Bolts:
 1. Shop installed high strength bolts shall be installed as specified below under "Execution".
- B. Welding:
 1. Shop welding shall be done by either shielded metal arc welding, submerged arc welding or flux core arc welding. (SMAW, SAW, FCAW). Gas metal arc welding (GMAW) is not permitted.
 2. Prepare joint welding procedures and program of welding sequence (for each component and for welding joining components to each other) and submit to Architect for approval before any welding is done. After approval, welding procedures and sequences shall be followed without deviation unless specific approval for change is obtained from Architect. Architect may require requalifications of operators for such changes in welding procedures by test prescribed in AWS "Standard Qualification Procedures".
- C. Cutting:
 1. Manual oxygen cutting shall be done only with a mechanically guided torch, except as permitted below:

- a. Gas cut edges, which are not to be welded, and which will be free of substantial stresses (as determined by the Architect/Engineer) may be cut manually with an unguided torch provided that specified AISC edge distances to holes are maintained.
 - b. Gas cut edges which will be subjected to substantial stress (over 1/2 the allowable stress, as determined by the Architect/Engineer), or which are to be welded may be cut manually with an unguided torch to a line not within 1/8" of the finished dimension, with final removal of material completed by chipping or grinding to produce a surface quality equal to that of the base metal edges.
- 2. Punch and drill steel for attachment of other materials indicated on the Drawings or noted in the Specifications to be attached to the steel.
- 3. Holes for bolted connections shall not be oxygen cut. Components prepared in this manner will be rejected.
- 4. All re-entrant corners shall be shaped notch-free to a radius of at least 1/2".
- 5. Cut no openings without the written approval of the Architect/ Engineer.
- D. Milled Ends:
 - 1. Where loads are transferred by bearing at ends of columns, ends shall be milled.
- E. Identification:
 - 1. Each structural steel member shall have its assigned position and identification mark or symbol plainly indicated thereon near one end. Marks shall agree with those shown on the Shop Drawings and Erection Drawings.

2.04 SUPPLEMENTAL FRAMING:

- A. Provide supplemental framing at all openings as shown on the Drawings and at all suspended loads.
- B. Where open web joists are used, provide additional framing to transfer loads from the supplemental framing and suspended loads to panel points. Coordinate with the steel joist Contractor and provide him with sufficient information to enable him to incorporate shop welded connections to panel points on his Shop Drawings. Where such information is not so provided, structural steel Contractor shall supply and install the necessary connections.

2.05 SHOP PAINTING:

- A. Cleaning and Preparation:
 - 1. Painted Steel
 - a. Non-exposed steel specified to be painted shall be cleaned in accordance with SSPC-SP3.
 - 1. Non-exposed steel is defined as steel not exposed to the elements. Usually contained within building envelope.
 - b. Exposed steel to be painted shall be cleaned and lightly sandblasted in accordance with SSPC-6. Connections are to be included.
 - 1. Exposed steel is steel, which is exposed to the elements.
 - 2. Unpainted Steel
 - a. Unpainted steel to receive fire-proofing shall be free of all oil, grease, loose mill scale, salt, dirt and any other substance that impairs proper adhesion of the fire-proofing.
 - b. All other unpainted steel shall be cleaned of oil and grease by solvent cleaners and cleaned of dirt and other foreign materials by thoroughly sweeping with fiber brushes.
- B. Surfaces to be Painted:
 - 1. All steel surfaces, except as follows:
 - a. Surfaces to receive metal deck and/or shear connectors fastened by welding.
 - b. Contact surfaces of high strength bolted connections.
 - c. Steel to be encased in concrete.
 - d. Surfaces within 2" of field welds.
 - e. Machine finished surfaces (e.g., bearing surfaces of columns and column base plates).
- C. Surfaces to Receive Protective Coating:

Machine finished surfaces such as bearing surfaces of column and base plates.
- D. Method and Rate of Paint Application:
 - 1. Non-exposed Steel

- a. Apply one prime coat of paint to dry, clean surfaces by brush, spray or roller with no running or sagging.
 - b. The coverage rate per coat shall not be more than 400 sq. ft. per gal. resulting in a minimum wet film thickness of 4 mils and providing a minimum dry film thickness of 2 mils.
 - c. If for any reason any surface to be field welded or bolted is painted, remove such paint completely to within stated limits before field welding or bolting. If any machine finished surface is painted, remove such paint completely, and touch up specified finish if required, before shipping or erection.
- 2. Exposed Steel
 - a. Single coat of Zinc Primer, minimum dry film thickness 4.0 mils, to be applied in strict conformance with manufacturer's printed requirements.

PART 3 EXECUTION

3.01 ERECTION:

- A. Verify that anchor bolts and bearing plates are of the size required and accurately located, prior to erection of the steel.
- B. Set base plates and bearing plates level to correct elevations and support temporarily on steel wedges, shims, leveling devices, or as shown on Drawings, until corresponding supported member has been positioned, plumbed and anchor bolted. Leave protruding leveling devices in place until after grout has been placed and has attained required strength, and then cut off flush with top or edges of base plate, or both, except as otherwise noted.
- C. Align, level, and adjust all members accurately prior to final fastening. Bearing surfaces and surfaces that will be in permanent contact shall be cleaned prior to final assembly of members. Drift pins shall be used only to bring together the several parts. They shall not be used in such manner as to distort or damage the metal.
- D. As erection progresses, the work shall be securely connected to safely resist all dead load, wind and erection forces. Temporary bracing shall be introduced wherever necessary to safely resist all loads to which the structure may be subjected, including erection equipment and its operation. Such bracing shall be left in place as long as may be required for safety.
- E. Oxygen cutting in the field shall not be done except with written permission to the Architect. When permitted, it shall be executed in accordance with the requirements herein specified.
- F. All temporary supports, flooring, planking, and scaffolding necessary in connection with the erection of the structural steel, or the support of erection equipment, shall be provided as a part of the erection work. The temporary floors shall be as required by Federal, State and Municipal Laws and governing safety regulations.
- G. Protect expansion joints during all construction phases such to prevent any accumulation of debris or other deleterious materials in the sliding plane.

3.02 FIELD WELDING:

- A. Field welding shall be done with shielded metal arc welding (SMAW) or flux core arc welding (FCAW) only.
- B. The Contractor shall provide safe and substantial work platforms at proper height to permit best possible field welding technique. Temporary enclosure, shielding, etc., shall be provided to protect welding operators and joints to be welded against the elements during welding operations.

3.03 INSTALLATION OF HIGH STRENGTH BOLTS:

- A. Provide safe and substantial work platform for bolting crews.
- B. Each bolting crew working on the project shall be assigned an identification symbol or mark. Each bolting crew shall mark this identification on each joint completed.
- C. Joints shall be made without the use of erection bolts, the high strength bolts required for the joint serving that purpose themselves. Where proper fix-up cannot be obtained, corrective work or additional plumbing, leveling, etc. may be required. Use not more than 2 washers per bolt.
- D. Correct poor matching of holes by drilling to next larger size and use of larger size bolt, if approved by Architect/Engineer. Welding for redrilling shall not be done.

- E. High strength bolts shall be installed by the "modified turn-of-the-nut method", or by the use of load indicator washers, or by the use of torque control bolts. (See below)

3.04 INSTALLATION OF HIGH STRENGTH BOLTS BY "MODIFIED TURN-OF- THE-NUT METHOD":

- A. Install high strength steel bolts in accordance with the turn-of-the-nut method in the AISC approved "Specification for Structural Joints using ASTM A325 or A490 Bolts", with the following additional requirements:
1. Use hardened washer under bolt head or nut, whichever is turned in tightening (unless oversize holes have been approved, in which case washers are required under head and nut).
 2. At the start of each day, each operator shall field test his power impact wrench as directed by the testing agency or Architect and as described below using bolts representative of those to be used in the work.
 3. Field testing of each impact wrench shall consist of tightening, in a hydraulic tension-measuring device such as a Skidmore Wilhelm Calibrator furnished by the Contractor, three bolts of each size to be used, with a hardened washer under either bolt head or nut, whichever is turned in tightening. Bolt tension readings shall be taken at "snug-tight plus fraction of turn" (tabulated in Table 4) conditions to confirm that bolts and equipment have the capacity to develop the minimum tension tabulated in Table 3.
 4. While power impact wrenches are being field tested, the testing agency shall be given the opportunity to determine the torque-tension relationship for its manual torque indicator wrench for every combination of impact wrench and bolt size to be used in the work for the day. These torque values shall be used as the inspection standard in testing the actual installations.
 5. Install bolts using powered impact wrenches with sufficient capacity and an adequate supply of compressed air.

3.05 INSTALLATION OF HIGH STRENGTH BOLTS BY THE USE OF LOAD INDICATOR WASHERS:

- A. Load indicator washers used as direct tension indicators shall be installed as follows:
1. The load indicator washer shall be placed on the bolt with the protrusions facing the bolt head.
 2. The assembly shall be fitted into place and the nut installed. Hardened round washers shall be used under the nut to reduce frictional resistance.
 3. Sufficient bolts in the joint shall be "snugged" to draw the connecting members into close contact, then all bolts shall be tightened until the average gap between the face of the load indicator washer and the underside of the bolt head is reduced to at least .015", but not closed completely.
 4. Tightening shall progress systematically from the most rigid part of the joint to its free edges until the load indicator washers on all bolts are closed to at least the required gap. Gaps shall be checked with a feeler gauge. Complete closure of the gap should be avoided, but it is not necessarily reason for rejection provided bolts have not been tightened more than one complete turn beyond snug position.
 5. When it is required to use the load indicator under the nut, a hardened round washer shall be fitted between the load indicator washer and the nut. After the bolt is installed in the connection, the load indicator washer shall be placed on the bolt with the protrusions facing the nut. The hardened round washer shall be placed against the load indicator washer protrusions before the nut is installed. For this assembly, tightening is continued until the average gap between the load indicator washer and the hardened round washer is closed to at least .0152" if the bolt head is turned during installation, and to at least .010" if the nut is turned in accordance with the procedure given above.
 6. If the load indicator washer must be placed under the head, and the head must be turned, then a hardened round washer must be used between the load indicator washer protrusions and the bolt head. For this fastener assembly, the average gap between the load indicator washer and the hardened round washer shall be closed to .010".
 7. Install bolts using pneumatic powered impact wrenches with sufficient capacity and an adequate supply of compressed air.

3.06 INSTALLATION OF HIGH STRENGTH BOLTS BY TORQUE CONTROL BOLTS:

- A. A hardened washer shall be installed under the nut (unless oversized holes have been approved, in which case washers are required under head and nut).

- B. Torque control bolts shall be installed by a special torquing device recommended by the manufacturer. The torquing device shall engage the spline end of the fastener and prevent the bolt from rotating while the nut is being tightened. The bolts shall then be tightened until the counter-torque is sufficient to shear the spline end from the bolt.
- C. At least 3 torque control bolts from each shipment shall be tested in a hydraulic tension-measuring device such as a Skidmore-Wilhelm Calibrator furnished by the Contractor. Bolts are to be fully tightened using the same equipment proposed for use in the structure. Tests shall be performed in the presence of the testing agency. If any bolt fails to reach the minimum tension required by ASTM A325, that bolt shall then be tightened using a calibrated torque wrench until the required tension reading is observed on the calibrator. Bolts from that shipment shall then be tested in the field using the same calibrated torque wrench and the cost of such testing shall be at the Contractor's expense.

3.07 CORRECTIVE WORK:

- A. Structural steel members or assemblages having fabrication errors, or which have deformations preventing proper assembly and fitting of parts, shall be reported immediately to the Architect. They shall not be incorporated in the finished work. Such members or assemblages may be corrected if permitted by the Architect, such corrective work shall be in accordance with the Contract Documents.
- B. Submit to the Architect for approval Drawings showing reasons for and details of proposed corrective work, and receive approved Drawings prior to performing the corrective work.

3.08 FIELD TOUCH-UP PAINTING:

- A. After erection all exposed metal surfaces where shop coat is missing or has been damaged shall be touched-up using the same type of paint as approved for the shop coat.
- B. Prior to touch-up, all areas to be painted shall be thoroughly cleaned of rust, dirt and weld slag.
- C. Touch-up paint shall extend a minimum of 2" onto undamaged finish.
- D. Paint shall be uniformly applied to dry surfaces to a dry film thickness of no less than 2 mils, 4 mils for exposed steel.

END OF SECTION

SECTION 05300 METAL DECKING

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Testing Laboratory Services: Section 01411.
- B. Concrete Reinforcement: Section 03310.
- C. Temporary Shoring of Metal Deck (If Required): Section 03310.

1.02 QUALITY ASSURANCE

- A. Welder's Qualifications:
 - 1. Qualifications of welders shall be as prescribed in the "Standard Qualification Procedures" by the American Welding Society.
 - 2. Welding operators shall have been previously qualified to perform the type of work required for this project.
- B. Reference Standards:

Unless otherwise indicated herein, perform work in accordance with the following standards:

 - 1. Steel Deck Institute: "Code of Recommended Standard Practice".
 - 2. American Welding Society: "Code for Welding in Building Construction".
 - 3. American Iron and Steel Institute: "Specifications for the Design of Light Gauge Cold-Formed Steel Structural Members".
 - 4. Factory Mutual: Loss Prevention Data 1-28 Insulated Steel Deck.

1.03 SUBMITTALS

- A. Shop Drawings:
 - 1. Indicate all details of fabrication and installation.
 - 2. Deck: Include type, gauge, finish, location, openings, dimensions, anchorage details, lap details, accessories and shoring requirements (if any).
 - 3. Shear Connectors: Include type, number, location, typical details and welding data.
- B. Product Data:
 - 1. For each type of Deck.
 - 2. For Shear Connectors.
- C. Certification:
 - 1. Evidence of welders qualifications.
 - 2. Certifications from an approved independent Testing Laboratory indicating compliance with specified fire resistance requirements.

1.04 STORAGE AND HANDLING

- A. Do not store deck in direct contact with ground.
- B. Do not damage deck during handling.
- C. If mud, dirt or other foreign matter does accumulate on the deck, completely remove such accumulation prior to erection.

PART 2 - PRODUCTS

2.01 DESIGN

- A. Span each deck unit over 3 or more spans, minimum load capacity equivalent to SDI Standard Load Tables.
- B. Where deck spans less than 3 spans, increase the gauge of the deck to provide the same load capacity as shown in SDI Standard Load Tables for 3 or more spans.

2.02 COMPOSITE METAL DECK, 2"

- A. Acceptable Products:
 - 1. Type 3 VLI by Vulcraft Div. Nucor Corp.
 - 2. Type 2.0 SB by Wheeling Corrugating Co.

3. Type 2.0 CD by New Millennium Building Systems.
- B. Material:
 1. Steel sheet, ASTM A-446, with minimum yield strength of 33,000 PSI.
 2. Physical Properties:
 - A. Depth 2"
 - B. Gauge 20
 - C. 36 inch C/C Modules
- C. Fire Resistance Requirements:
Composite assembly consisting of metal deck plus concrete, as indicated on the drawings, shall provide a 2 hour fire resistant rating as listed by U.L.
- D. Finish:
 1. Phosphate treatment to both surfaces prior to roll forming. One shop coat of rust-inhibitive paint roller coated on underside only.
 2. Protect with a zinc coating conforming to ASTM A525, Class G-60.
 3. Decks requiring field painting shall be given a phosphate treatment by the manufacturer.

NOTE: Refer to "FM Loss Prevention Data 1-28, Table 1" for maximum spans, minimum gauge, etc. If roofing insulation is applied with adhesive or asphalt, use deck without stiffener groove in top surface. Those specified below have grooves.

2.03 NON-COMPOSITE METAL ROOF DECK, 1-1/2"

- A. Acceptable Products:
 1. Type B of BW by Wheeling Corrugating Co.
 2. Type 1.5B by Vulcraft Div. Nucor Corp.
 3. Type B by New Millennium Building Systems.
- B. Material:
 1. Steel Sheet, ASTM A611 with a minimum yield strength of 33,000 PSI.
 2. Physical Properties:
 - a. Depth 1-1/2"
 - b. Gauge 20
- C. Fire Resistance Requirements:
Comply with "FM Loss Prevention Data 1-28" for attaching deck.
- D. Finish:
Protect with a zinc coating conforming to ASTM A-525 coating designation G90.

2.04 HEADED STUD SHEAR CONNECTORS

- A. Material:
 1. ASTM A108, grades 1015, 1020, minimum yield strength 50,000 PSI and minimum tensile strength of 60,000 PSI.
 2. Size and length and quantity as indicated on drawings.

2.05 ACCESSORIES

- A. Roof Sump Plates: 24" square, minimum 20 gauge flat sump pan, required at each roof drain where metal deck is to receive rigid insulation.
- B. Closures:
 1. Metal Closures: Minimum 20 gauge steel with same finish as adjacent deck.
 2. Flexible Closure Strips: Rubatex by Rubtex Corporation, or approved equal and shall conform to profile of various decks as required.

2.06 FIELD TOUCH-UP (Galvanized Surfaces)

- A. Acceptable Products:
 1. Z.R.C. Cold Galvanizing Compound by Z.R.C. Chemical Products Company.
 2. Zinc clad 5 primer by Sherwin Williams Company.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prior to proceeding with installation of deck, the following shall have been completed:
 1. Related steel framework plumbed, aligned and completed.
 2. Temporary shoring installed (if required).
 3. Ice, oil, dirt, rust, and other materials which may adversely affect welding shall have been removed.

3.02 INSTALLATION

- A. Placing Deck Units:
 - 1. Position metal deck units on supporting steel and accurately align to final position with units resting tightly on top of all supporting members. Do not stretch or contract the side lap interlocks.
 - 2. Minimum bearing on steel supporting members shall be 2".
 - 3. Minimum end laps shall be 2".
 - 4. Center ends of deck over center of supports.
- B. Cutting and Fitting:
 - 1. Shop Cutting: Cut to proper length before shipping to the field.
 - 2. Field Cutting By Metal Deck Erector:
 - a. Notch to fit around columns and other similar fabrication.
 - b. All holes and openings which are located and dimensioned on the structural drawings.
 - c. Holes in deck larger than 6" and up to 12" in diameter:
 - 1. Deck erector shall furnish and install 1-1/2" x 1-1/2" x 3/16" galvanized steel angle 5'-0" long on one or both sides of each hole, perpendicular to flutes, as required. (Both sides if any portion of hole occurs in middle 1/3 of deck span, otherwise one side.)
 - 2. Attach angle to underside of deck by bolting or puddle welding at each bottom flute.
 - 3. Do not space holes closer than 5'-0" on center in any span.
 - 3. Field Cutting By Other Trades:
 - a. Holes and openings required for work under other Sections of the Specifications, which are not located and dimensions on the structural drawings and are 6" in diameter or less shall be cut by the respective trade. Not more than one rib shall be cut per panel per span.
 - b. Method and Quality of Cutting: All cuts shall be neat and trim in appearance, cut deck with metal saw, drills or cutting torch.
- C. Closures:
 - 1. Provide metal closures for all openings in composite metal deck 1/16" wide and over, including the following:
 - a. Cover plate to close panel edge and end conditions and where panels change direction or abut.
 - b. Column closures to close openings between metal deck and structural steel columns.
 - c. Where deck is cut for passage of pipes, ducts, columns, etc. and deck is to remain exposed, provide a neatly cut sheet metal collar to cover edges of deck.
 - 2. Restrictions:

Do not cut openings greater than 6" diameter in deck unless they are shown on the reviewed shop drawings or unless approved in writing.
- D. Fastening Deck Units:
 - 1. Arc weld deck to supporting steel as follows:
 - a. Use welding washers for decks less than 22 gauge.
 - b. Provide 3/4" diameter puddle welds at 12" O.C. each end and at all intermediate supports of all deck units. Stagger welds at intermediate supports with welds at end supports.
 - c. Longitudinal edges and edge laps supported by steel members shall be fastened with 3/4" diameter puddle welds at a maximum spacing of 3'-0" along the length of the panel.
 - d. Refer to drawings for additional requirements which may be indicated in special areas.
 - 2. Fasten deck to supporting steel less than 1/4" in thickness as follows:
 - a. Self-drilling fasteners (#10 minimum) with size and spacing as required to provide a diaphragm shear capacity equal to or greater than provided by welding requirements above.

- b. Submit diaphragm shear capacity data for approval prior to installation.
- 3. Longitudinal side laps of adjacent panels shall be 3/4" diameter welded or #12 self-drilling fasteners between support at intervals not exceeding 3'-0". Confine welding to decks 20 gauge or heavier.

3.03 HEADED STUD SHEAR CONNECTORS

- A. Procedures:
 - 1. Install in accordance with AWS Code by experienced operators using automatic welding equipment.
 - 2. Use electrical power ceramic ferrules, etc., in accordance with recommendations of stud manufacturer.
 - 3. Weld through the metal deck.
- B. Location:

Shear connectors shall be accurately located, using chalk lines and templates.

3.04 FIELD TOUCH-UP PAINTING

- A. Preparation:
 - 1. Thoroughly clean areas to receive touch-up paint of all rust, dirt, oil and weld slag.
 - 2. Accomplish touch-up soon after deck is erected.
 - 3. Touch-up shall include but not limited to abrasions, scars, cut edges and welds.
 - 4. Extend paint minimum of 2" onto undamaged finish.
 - 5. Minimum dry film thickness: 2 mils.
- B. Galvanized Surfaces:

Apply material specified for galvanized surfaces.
- C. Painted Surfaces:

Apply same material used for prime coat.

END OF SECTION

SECTION 05 4000
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formed steel stud exterior wall framing.

1.02 REFERENCE STANDARDS

- A. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2011c.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention .

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Design framing system under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing:
 - 1. CEMCO; _____: www.cemcosteel.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FRAMING SYSTEM

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.
- B. Design Criteria: Provide completed framing system having the following characteristics:
 - 1. Design: Calculate structural characteristics of cold-formed steel framing members according to AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
 - 2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.
 - 3. Design Loads: In accordance with applicable codes.
 - 4. Live load deflection meeting the following, unless otherwise indicated:
 - 5. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

6. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.03 FRAMING MATERIALS

- A. Studs and Track: ASTM C955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
 1. Gage and depth: As required to meet specified performance levels.

2.04 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.
- B. Anchorage Devices: Powder actuated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify field measurements and adjust installation as required.

3.02 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.
- B. Align floor and ceiling tracks; locate to wall layout. Secure in place with fasteners at maximum 24 inches on center. Coordinate installation of sealant with floor and ceiling tracks.
- C. Place studs at 16 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using clip and tie method.

END OF SECTION

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel and aluminum items.

1.02 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; 2012.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2012.
- C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.
- E. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010.
- F. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.; 2011.
- G. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).
- H. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).
- I. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings; 1982 (Ed. 2004).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
- C. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.04 QUALITY ASSURANCE

- A. Design lintels, door frames, railings, and elevator beams under direct supervision of a Professional Structural Design Engineer experienced in design of this Work and licensed in the State in which the Project is located.
- B. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel (AC172).

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- C. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- D. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

2.03 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.

- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED ITEMS

- A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
- B. Lintels: As detailed; prime paint finish.
- C. Sill Angles for Railing Assemblies: ASTM A36/A36M steel angles with anchoring devices and sizes as indicated in shop drawings for railing assembly, drilled and tapped for fastener types, sizes, and spacing indicated, prime paint finish.
- D. Door Frames for Overhead Door Openings: Channel sections; prime paint finish.
- E. Recessed Mat Frames : As detailed; steel, galvanized finish.
- F. Elevator Hoistway Divider Beams: Beam sections; prime paint finish.

2.05 FINISHES - STEEL

- A. Prime paint all steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete, items to be imbedded in masonry, and items specified for glav. finish.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
- F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.06 FINISHES - ALUMINUM

- A. Exterior Aluminum Surfaces: Class I color anodized.
- B. Interior Aluminum Surfaces: Class I natural anodized.
- C. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.
- D. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

2.07 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.

- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components indicated .
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 5100
METAL STAIRS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stairs with concrete treads.
- B. Structural steel stair framing and supports.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete fill in stair pans ; mesh reinforcement for landings.
- B. Section 03 3000 - Cast-in-Place Concrete: Placement of metal anchors in concrete.
- C. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.

1.03 REFERENCE STANDARDS

- A. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures; 2006.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2012.
- C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- E. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
- F. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2013.
- G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- H. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2007.
- I. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010.
- J. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).
- K. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings; 1982 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Include the design engineer's stamp or seal on each sheet of shop drawings.
- C. Delegated Design Data: As required by authorities having jurisdiction.

1.05 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.
- B. Fabricator Qualifications:
 - 1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.

PART 2 PRODUCTS

2.01 METAL STAIRS - GENERAL

- A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
 - 1. Regulatory Requirements: Provide stairs and railings complying with the most stringent requirements of local, state, and federal regulations; where requirements of the contract documents exceed those of regulations, comply with the contract documents.
 - 2. Structural Design: Provide complete stair and railing assemblies complying with the applicable local code.
 - 3. Dimensions: As indicated on drawings.
 - 4. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
 - 5. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
 - 6. Separate dissimilar metals using paint or permanent tape.
- B. Metal Jointing and Finish Quality Levels:
 - 1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
 - a. Welded Joints: Continuously welded and ground smooth and flush.
 - b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
 - c. Exposed Edges and Corners: Eased to small uniform radius.
 - d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.
- C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.02 METAL STAIRS WITH CONCRETE TREADS

- A. Jointing and Finish Quality Level: Architectural, as defined above.
- B. Risers: Closed.
- C. Treads: Metal pan with field-installed concrete fill.
 - 1. Concrete Depth: 1-1/2 inches, minimum.
 - 2. Tread Pan Material: Steel sheet.
 - 3. Tread Pan Thickness: As required by design; 14 gage, 0.075 inch minimum.
 - 4. Concrete Reinforcement: None.
 - 5. Concrete Finish: Applied abrasive grit.
- D. Risers: Same material and thickness as tread pans.
 - 1. Nosing Depth: Not more than 1-1/2 inch overhang.
 - 2. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch wide.
- E. Stringers: Rolled steel channels.
 - 1. Stringer Depth: 12 inches.
 - 2. End Closure: Sheet steel of same thickness as risers welded across ends.
- F. Railings: Steel pipe railings.
- G. Finish: Shop- or factory-prime painted.
- H. Under Side of Stair: Exposed to view, to be finished same as specified for other exposed to view surfaces.

2.03 HANDRAILS AND GUARDS

- A. Wall-Mounted Rails: Round pipe or tube rails unless otherwise indicated.
 - 1. Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.
- B. Guards: Pipe railings as specified in Section 05 5213.