

FORM OF PROPOSAL  
AND  
PROJECT MANUAL

**ADDITION TO VEHICLE BUILDING 'B'**  
**For**  
**LUCAS COUNTY**  
**SANITARY ENGINEER'S OFFICE**

PREPARED FOR  
Lucas County Sanitary Engineer  
1111 South McCord Road  
Holland, OH 44528

April 2014

# TABLE OF CONTENTS

## Lucas County Sanitary Engineers Vehicle Building Expansion

---

### **DIVISION 1 – GENERAL REQUIREMENTS**

- 01 01 00 Summary of Work
- 01 23 00 Alternates
- 01 40 00 Quality Requirements
- 01 50 00 Temporary Facilities
- 01 78 00 Project Closeout and Warranties
- 01 78 05 Operating and Maintenance Data

### **DIVISION 2 – SITE CONSTRUCTION**

- 02 40 00 Demolition

### **DIVISION 03 – CONCRETE**

- 03 10 00 Concrete Forms and Accessories
- 03 30 00 Cast-In-Place Concrete

### **DIVISION 05 – METALS**

- 05 50 00 Metal Fabrication

### **DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES**

- 06 10 00 Rough Carpentry

### **DIVISION 7 – THERMAL AND MOISTURE PROTECTION**

- 07 21 00 Thermal Insulation
- 07 61 00 Metal Roofing & Siding
- 07 84 00 Firestopping
- 07 92 00 Joint Sealants

### **DIVISION 08 – OPENINGS**

- 08 11 13 Hollow Metal Doors and Frames
- 08 36 00 Sectional Doors
- 08 81 00 Glass Glazing
- 08 85 00 Glazing Accessories

### **DIVISION 9 – FINISHES**

- 09 21 16 Gypsum Board Assemblies
- 09 91 00 Paints

### **DIVISION 10 – SPECIALTIES**

- 10 44 00 Fire Protection Specialties

### **DIVISION 22 – PLUMBING**

- 22 00 00 General Provisions
- 22 13 16 Sanitary Waste and Vent Piping
- 22 13 19 Storm Piping Specialties
- 22 16 00 Natural Gas Piping

**DIVISION 23 – HVAC**

- 23 00 00 General Provisions
- 23 83 00 Radiant Tube Heaters

**DIVISION 26 – ELECTRICAL**

- 26 00 50 General Provisions
- 26 00 60 Temporary
- 26 05 19 Low-Voltage Electrical Power Conductors and Cables
- 26 05 19.10 Power System Wire Connections and Devices
- 26 05 26 Grounding and Bonding for Electrical Systems
- 26 05 29 Hangers and Supports for Electrical Systems
- 26 05 33 Raceway and Boxes
- 26 24 16 Panelboards
- 26 27 26 Wiring Devices
- 26 28 16 Enclosed Switches and Circuit Breakers
- 26 29 13 Enclosed Controllers
- 26 51 00 Interior Lighting
- 26 56 00 Exterior Lighting

**DIVISION 28 – ELECTRONIC SAFETY AND SECURITY**

- 28 16 00 Intrusion Detection System

**DIVISION 31 – EARTHWORK**

- 31 10 00 Site Clearing

**1. PART 1 – GENERAL**

## 1.1 DESCRIPTION

- A. The work described below encompasses general, mechanical, plumbing, and electrical for the new addition to vehicle building “B” at the Lucas County Sanitary Engineers Office.

## 1.2 SCHEDULE

- A. Work may begin immediately after award of contract and shall be completed in 90 days.

## 1.3 SCOPE OF WORK

- A. Quote Package 101 – General Contract (all trades)
  - 1) This contract consists of the work described in Divisions 1-31 of these specifications and all drawings for the construction of the new addition to vehicle building “B”.

## 1.3 CLEANING UP

- A. The Contractors shall frequently clean up all refuse, rubbish, scrap materials and debris caused by his operations to the end that all items shall present a neat, orderly and workmanlike appearance. Crates and cartons in which materials, equipment or fixtures are received shall be removed daily.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL CONSTRUCTION NOTES**

- 1.1 Each Contractor shall submit with his Quote, on the forms provided, alternate proposals stating the difference in price (additions or deductions) from the lump sum Quote for substitutions omitting or changing the following materials of construction from that shown on the drawings and specified.
- 1.2 The difference in price shall include all omissions, additions, and adjustments as may be necessary because of each change, substitution or omission.

**2. PART 2 – DESCRIPTION OF ALTERNATES****2.1 QUOTE PACKAGE 101 - GENERAL CONTRACT****A. ALTERNATE G-1 – Additional Vehicle Bay**

- 1) Under this alternate, provide all labor, materials and equipment required to add an additional vehicle bay to the base quote building addition.
- 2) For additional information see all drawings and specifications.

◆END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SUMMARY

## A. This Section includes:

1. Administrative and procedural requirements for quality-control services, including inspections, tests, and reports performed by Contractor.
2. Administrative and procedural requirements for coordination, pre-construction and progress meetings.

## B. Description

1. The contractor shall be responsible for all quality control associated with the project. Periodic oversight by the Associate Architect, other authorized personnel, to include submittal approvals, in no way relieves the contractor of this responsibility.
2. All testing shall be divided into three (3) categories as follows:
  - a) Field tests made at the project site as part of the actual construction.
  - b) Factory tests made at the point of manufacture of various products which are shipped to the project site as a unit.
  - c) Certified tests made by approved testing agencies on material and/or equipment which is to be incorporated into the project. This type of testing includes that performed by Factory Mutual, Underwriters' Laboratories, etc.

## 1.2 PRE-CONSTRUCTION MEETING

## A. Minimum agenda:

1. Status of Contracts and Bonds.
2. Pay Requests
3. Change orders
4. Schedule
5. Shop Drawings
6. Waste removal

## 1.3 PROGRESS MEETINGS

## A. Minimum agenda:

1. Construction progress since last meeting, projected future activities which will affect other contractors, problems which have/will affect construction progress, list any outstanding RFI or submitted awaiting response from Buehrer Group, Inc.

## 1.4 COORDINATION

## A. Coordination:

1. Coordinate activities included in various Sections to assure efficient and orderly installation of each component. Coordinate operations included under different Sections that are dependent on each other for proper installation and operation.

#### 1.5 FIELD TESTING

- A. The contractor shall perform all field testing required of him by the contract documents and all field tests required by the applicable publications referenced in the contract documents.
- B. The contractor shall furnish all equipment, instruments, facilities, and qualified personnel, and shall bear all costs for required testing.
- C. All laboratory work performed under this contract shall be by an approved laboratory. Specifically, laboratories performing work in connection with concrete, steel, and bituminous materials must conform to American Society of Testing and Materials (ASTM) Designation E329. Laboratories performing work not in connection with concrete, steel, and bituminous materials must conform to Section 3 & 4 of ASTM E329.
- D. All test reports shall be certified by a Professional Engineer registered in the State of Ohio. Test reports shall include:
  - 1) Acceptable value for each specification item.
  - 2) Actual test result obtained.
  - 3) Test method(s) used.
  - 4) Statement that product conforms (or does not conform) to the specification requirements.
- E. Original copies of all test reports shall be submitted to the Associate Architect directly by the laboratory.
- F. Sampling and testing shall be repeated as required to insure the in-place product meets all specifications. All samples and tests producing unacceptable results shall be the responsibility of the contractor and shall not result in any additional cost to Genoa Area Local Schools.

#### 1.6 FACTORY AND CERTIFIED TESTING

- A. Certified tests on materials to be incorporated into the project will be acceptable provided the follow provisions are met:
  - 1) Testing must be performed by the manufacturer, or a national organization, or approved testing laboratory.
  - 2) Certified tests must assure full compliance with the contract specifications.
  - 3) An original certification naming the item to be certified, and naming the material specification standard, or other document controlling the quality of the item shall be provided. Test results showing compliance with the named specification, standard or document will be attached.

### 2. PART 2 - PRODUCTS

### 3. PART 3 - EXECUTION

140208

◆ END OF SECTION ◆

## TEMPORARY FACILITIES

**1. PART 1 - GENERAL**

## 1.1 TEMPORARY WATER

- A. The Contractor shall provide water and a means of conveying water to meet the needs of the contractors.

## 1.2 TEMPORARY ELECTRICITY

- A. Power for construction site offices and for other temporary storage and construction buildings shall be paid for and installed by the contractor requiring it.

- B. Capacity - Provide and maintain adequate electrical service for construction use by all trades, except welders, during the construction period at the locations necessary.

- 1) Welders shall provide their own portable generator units.

- C. Requirements of Regulatory Agencies

- 1) Comply with National Electrical Code Article 305 and all other applicable codes and utility regulations.

- D. General Installation

- 1) Install all work with a neat and orderly appearance.
  - 2) Make structurally sound throughout.
  - 3) Maintain to give continuous service and to provide safe working conditions.
  - 4) Modify service as job progress requires.
  - 5) Provide all required facilities, including transformers, conductors, poles, conduits, raceways, fuses, switches, fixtures, and lamps.
  - 6) Locate so that interference with cranes and materials handling equipment, storage areas, traffic areas and work under other contracts is avoided.

- E. Removal

- 1) Remove all temporary equipment and materials completely upon completion of construction.

- F. Payment for Electrical Power Use

- 1) The Owner shall pay for electric energy consumed from existing building for construction purposes.

## 1.3 TEMPORARY SIGNS

- A. Signs or advertisements are not permitted to be displayed.

140248

1.4 TEMPORARY OFFICE & SANITARY CONVENIENCES

A. The General Contractor:

- 1) A temporary office at the site for the use of the General Contractor, his subcontractors, and agents is not required. However the contractor shall maintain a complete set of drawings and specifications marked up to date with revisions at this site at all times when work is proceeding.
- 2) Heat, air conditioning, and lighting of the job site office will be paid by the General Contractor.

B. At or before start of work, the General Contractor shall provide temporary sanitary convenience for workmen, and shall maintain same antiseptic until the completion of his contract. This installation shall be provided in a manner acceptable to the Architect and the governing Board of Health. At completion of the work, the General Contractor shall remove this facility to the satisfaction of the Architect.

1.5 PARKING AND STAGING

A. Parking and Staging Area shall be approved by the Architect and Owner.

1.6 SAFETY

A. All workers will be required to wear Hard Hats and Safety Glasses, and obey any site safety rules required for the site.

◆ END OF SECTION ◆

---

**PROJECT CLOSEOUT AND WARRANTIES****1. PART 1 – GENERAL****1.1 COMPLETION****A. Project Close Out**

- 1) Throughout the progress of the Work, the Contractor shall keep a current, detailed record of changes in the installation of his own work from the conditions, locations, and layout shown on the accompanying drawings or manufacturer details. This information shall be submitted to the Consultant. This requirement does not authorize any deviations without the approval of the Owner or Owner's Representative.
- 2) When all revisions showing Work as finally installed are made, the field record drawings (as-builts) shall be delivered to the Owner before final payment is made.
- 3) Submit the following before final payment is made:
  - a) Project record documents
  - b) Guarantees and warranties
  - c) Applicable waivers of lien
  - d) Invoice(s) reflecting adjustments and previous progress payments
  - e) Consent of Surety to Final Payment
  - f) Signed punch list

**1.2 CLEANING AND CLOSEOUT**

- A. Each contractor or subcontractor, in addition to the responsibilities set forth in the General Conditions, shall keep the premises free from accumulation of waste materials or rubbish caused by their employees or Work.
- B. At the completion of the Project, the Contractor shall restore or replace all property damaged by their Work and remove spots, paint, soil, concrete, writing, droppings, or other foreign material from Work. Remove temporary protection from the Work.
- C. Consultant will issue a punch list, along with a drawing, showing locations of the unacceptable Work items to the Contractor after Substantial Completion of the Project.

- D. Contractor shall be responsible for maintaining work areas in a neat and orderly manner. Upon completion, cleanup shall be performed to the satisfaction of the Owner or Owner's Representative. Contractor shall be responsible for the return of site-exposed surfaces to their original condition prior to the start of the Work.
- E. Contractor shall complete all necessary cleanup within 10 working days after receiving notification of cleanup requirements as outlined in the punch list.

### 1.3 WARRANTIES

- A. Contractor: Provide a written one (1) year warranty against defective materials, defective workmanship, and water leakage. Warranty shall cover 100% replacement of the completed work as required during the warranty period.
- B. Manufacturers:
  - 1) Provide a written minimum twenty (20) year warranty against defective materials from the primary manufacturer furnishing products for silicone elastomeric sealants.
  - 2) Provide a written minimum ten (10) year warranty against defective materials from the primary manufacturer furnishing products for polyurethane elastomeric sealants.
  - 3) Provide a written minimum twenty (20) year warranty against finish fade, chalk and peel from the primary manufacturer furnishing products for sheet metal copings and flashings.
  - 4) Provide a written minimum ten (10) year warranty against defective materials from the primary manufacturer furnishing products for elastomeric coatings.
- C. Before final payment is made, submit a written warranty to Owner agreeing to repair or replace defective materials and workmanship during the warranty period. Include all manufacturer material warranties for the maximum term available for the specified Work.
- D. Defective materials and workmanship include abnormal deterioration, aging, or weathering.
- E. The Contractor is to certify in writing that all work is in accordance with the Contract Documents, including authorized alterations or additions thereto, and that should any defect developed during the warranty period due to improper workmanship or materials under this jurisdiction, such defects are to be repaired or replaced at no expense to the Owner.
- F. The warranty does not include damages caused by vandalism, or natural conditions, exceeding the performance requirements.

140208

- G. The warranty shall be transferable upon exchange of building ownership.
- H. The warranty issued must facilitate visual reviews by the Consultant at approximately the 12 month anniversary of project completion.

**2. PART 2 – PRODUCTS**

2.1 NOT USED

**3. PART 3 – EXECUTION**

3.1 NOT USED

◆ END OF SECTION ◆

**1. PART 1 – GENERAL****1.1 GENERAL REQUIREMENTS**

- A. Compile product data and related information appropriate for the Owner's maintenance and operation of products furnished under the Contract. Prepare maintenance data as specified in this Section and as referenced in other pertinent Sections of the Specifications.
- B. Prepare data in the form of a manual for use by the Owner's personnel.

**1.2 CONTENT OF THE MANUAL**

- A. Contractor, name or responsible principal, address and telephone number.
- B. A list of each product required to be included, indexed to the content of the volume.
  - 1) List with each product the name, address, and telephone number of:
    - a) Subcontractor or installer
    - b) Maintenance contractor, as appropriate
    - c) Identify the area of responsibility of each
    - d) Local source of supply for products, materials, and replacement
  - 2) Identify each product by product name and other identifying symbols as set forth in Contract Documents.
- C. Product Data
  - 1) Include only those sheets which are pertinent to the specific product.
- D. Drawings
  - 1) Shop drawings
  - 2) As-built drawings, for any details differing than those included in the Contract Documents.
- E. Copy of each warranty, guarantee, bond and service contract issued.

- 1) Provide information sheet for the Owner's personnel and give:
  - a) Proper procedures in the event of failure.
  - b) Instances which might affect the validity of warranties/guarantees or bonds.

1.3 MANUAL FOR MATERIALS AND FINISHES

- A. Content for architectural products, applied materials and finishes.
  - 1) Manufacturer's data, giving full information on products.
  - 2) Instructions for care and maintenance.
- B. Provide complete information for products as specified in each respective Section.

1.4 INSTRUCTIONS TO THE OWNER'S PERSONNEL

- A. Prior to final inspection or acceptance, fully instruct the Owner's designated maintenance personnel in the maintenance of each product and system.

**2. PART 2 – PRODUCTS**

2.1 NOT USED

**3. PART 3 – EXECUTION**

3.1 NOT USED

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SCOPE

- A. The Contractor shall fully acquaint himself with all existing conditions that will affect the construction of the new addition to vehicle building "B" at the Lucas County Sanitary Engineers Office.
- B. Although every attempt has been made to indicate all work required to be removed, each Contractor shall visit and examine the site to determine the precise extent of work involved.
- C. The work shall consist of the removal and the satisfactory disposal of the existing fencing, trees, shrubs, and such other items which may exist in the area of construction.
  - 1) The Contractor shall remove from the site and dispose of all demolition material. No burning of materials on site shall be permitted.
  - 2) Any and all salvageable items as indicated on drawings shall be the property of the Lucas County Sanitary Engineer.
  - 3) Note items on drawings to be removed and reused.

**2. PART 2 - DEMOLITION WORK**

- 2.1 Remove all fencing, trees, shrubs, and other items as may be required to complete the work.

**3. PART 3 - EXECUTION**

- 3.1 See all drawings for any demolition work.

◆ END OF SECTION ◆

---

**CONCRETE FORMS AND ACCESSORIES****1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Temporary metal pan forms, slip forms, and corrugated paper forms for placing concrete.

## 1.2 QUALITY ASSURANCE

- A. Codes and Standards: Unless otherwise specified, design, construct, erect, maintain, and remove forms and related structures for cast-in-place concrete work in compliance with the American Concrete Institute Standard ACI 347-94, "Recommended Practice for Concrete Formwork."

**2. PART 2 - PRODUCTS**

## 2.1 FORM MATERIALS

## A. Forms:

- 1) Use plywood, metal, or metal framed material to provide a continuous straight smooth surface, with bracing as necessary to eliminate bowing and deflection.

## B. Form Coatings

- 1) Form release agent shall be zero-VOC, 100% biodegradable commercial-grade product made from rapidly-renewable plant-based oils.
- 2) Form-coating compounds shall not bond with, stain, nor adversely affect concrete surfaces and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.

**3. PART 3 - EXECUTION**

## 3.1 CONSTRUCTION

## A. Generals:

- 1) Construct forms complying with ACI 347 to the exact sizes, shapes, lines, and dimensions as required to obtain accurate alignment, location, grades, level, and plumb work in finish structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, and inserts, and other features required.
- 2) Removal of forms shall not occur until concrete has hardened sufficiently to carry its own weight. Contractor responsible for timing and safety of form removal.

140208

- 3) Patching and Grouting:
  - a) After forms have been removed, check surface of concrete and correct defects. Fill pin holes and honey combs with neat cement, group and trowel to match surrounding area. Rub entire surface with an abrasive stone until all ribs, ridges, etc. are obliterated.

B. Allowable Tolerances

- 1) Construct formwork to provide completed cast-in-place concrete surfaces complying with the tolerances specified in ACI 347.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Basic information about curing, standard finishing, cements, aggregates, plasticizers and other chemical admixtures, additives, and hardeners.
- B. Cast-in-place concrete, and accessory items shown on the drawings or specified herein.
- C. Concrete equipment bases (foundations), grouting of structural parts bearing on masonry or concrete and testing service.
- D. Sleeves, piping, inserts, conduits, hangers, ties, etc. furnished in connection with the work of the Mechanical Trades or other separate contracts and required to be "built-in", shall be installed as a part of the work of Contractor concerned.

## 1.2 RELATED WORK

<u>Item</u>	<u>Refer To</u>
Dampproofing, Perimeter Insulation Earthwork	Division 7 – Moisture Control Division 31 - Earthwork

## 1.3 QUALITY ASSURANCE

- A. Float Finish (Flt-Fn) - Not Critical Floor Tolerance:
  - 1) Specified Overall Value: FF 25/FL 20.
  - 2) Minimum Local Value: FF 20/FL 17.
  - 3) Apply float finish to monolithic slab surfaces that are to receive trowel finish and other thick finishes as hereinafter specified, and slab surfaces which are to be covered with waterproofing membrane or sand-bed terrazzo, thickset tile, and other areas which receive a mud/setting bed.
- B. Trowel Finish 1 (Tr-Fn1) - Typical office, Corridors, and Normal Sized Rooms (Under 1,000 sq.ft.):
  - 1) Specified Overall Value: FF 30/FL 23.
  - 2) Minimum Local Value: FF 25/FL 20.
  - 3) Apply trowel finish to slab surfaces that are to be covered with resilient flooring, paint, or other thin film finish coating system.
- C. Trowel Finish 2 (Tr-Fn2) – Large Rooms and Public Areas (Over 1,000 sq. ft.):
  - 1) Specified Overall Value: FF 36/FL25.
  - 2) Minimum Local Value: FF 30/FL22.

140208

- 3) Apply trowel finish to monolithic slab surfaces that are to receive resilient flooring, carpet, or other thin finish system.
- D. Nonslip Broom Finish (NsBrm-Fn): Apply nonslip broom finish to exterior concrete platforms, steps and ramps.
- 1) Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom, perpendicular to main traffic route.
- E. Elevated slabs shall have a specified overall value of FF 22 to FF 27 and a minimum local of FF 20 with no FL number defined.
- F. Reference Standards:
- 1) ACI 315, Manual of Standard Practice for Detailing Reinforced Concrete Structures.
  - 2) ACI 318, Building Code Requirements for Reinforced Concrete.
  - 3) ACI 347, Recommended Practice for Concrete Formwork

#### 1.4 SUBMITTALS

- A. Submit a mix design for each class of concrete required.
- B. Submit shop drawings for all reinforcing. Indicate strength, size and details of all bar reinforcing and style.
- C. Submit product literature for admixtures and curing compounds proposed for use. Include chloride content.
- D. Concrete testing shall be done by a testing agency retained by the General Contractor. All concrete testing shall be paid for by the General Contractor.

#### 1.5 FIELD REFERENCE MANUALS

- A. Provide at least one copy of CRSI's "Placing Reinforcing Bars", in the field office.
- B. Keep one copy of ACI-301 "Specifications for Structural Concrete for Buildings," in the field office.
- C. Keep one copy of ACI-SP-15 "Field Reference Manual" in the field office.

## 2. PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Portland Cement: ASTM C150, Type I.
- B. Aggregates
  - 1) ASTM C33, normal weight aggregates.
- C. Water: Potable.

- D. Concrete Admixtures: Containing less than 0.1 percent chloride ions.
- 1) Air-Entraining Admixture: ASTM C 260, for exterior exposed concrete and foundations exposed to freeze-thaw.
  - 2) Water-Reducing Admixture: ASTM C 494, Type A, for placement and workability.
  - 3) High-Range Water-Reducing Admixture, Super Plasticizer: ASTM C 494, Type F or G for placement and workability.
  - 4) Water-Reducing, Accelerating Admixture: ASTM C 494, Type E for placement and workability.
  - 5) Water-Reducing, Retarding Admixture: ASTM C 494, Type D for placement and workability.

## 2.2 RELATED MATERIALS

- A. Plastic Vapor Retarder: ASTM, E1745, Class C, not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.
- B. Chemical Bonding Agent: Film-forming, freeze-thaw resistant compound suitable for brush or spray application, complying with ASTM C881.
- C. Concrete Curing Materials
- 1) Moisture-Retaining Cover: One of the following, complying with ANSI-ASTM C171 for concrete floors, that are to be exposed or to receive floor sealer.
    - a) Waterproof paper
    - b) Polyethylene film
    - c) White burlap-polyethylene sheet
  - 2) Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 ounce per sq.yd., AASHTO M182, Class 2.
  - 3) Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound, complying with ANSI/ASTM C309, Type I, Class B, with 18 to 20 percent minimum solids. Provide for concrete floors that are to receive applied finished floor materials.
- D. Self-Leveling Underlayment
- 1) Self-leveling cement-based. When mixed with water, it becomes a fluid material, seeking its own level, producing a smooth surface. Compressive strength: 4100 psi minimum at 28 days. Flexural strength: 1300 psi at 28 days. Tensile strength: 750 psi at 28 days. Shrinkage: .025 after 7 days.
- E. Sand Cushion: Well graded, 100 percent passing 3/8 inch screen.
- F. Epoxy Adhesive: ASTM C881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.

## 2.3 CONCRETE ADMIXTURES

- A. Use air-entraining admixture in exterior concrete. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement, having air content within the following limits:
- 1) Concrete structures and slabs exposed to freezing and thawing, deicer chemicals or subjected to hydraulic pressure:
    - a) 5 percent to plus/minus 1 percent for 2 inch nominal maximum aggregate size.
    - b) 5-1/2 percent to plus/minus 1 percent for 1-1/2 inch nominal maximum aggregate size.
    - c) 6 percent to plus/minus 1 percent for 3/4 and 1 inch nominal maximum aggregate size.
    - d) 7 percent to plus/minus 1 percent for 1/2 inch nominal maximum aggregate size.
    - e) Exterior Concrete in Moderate Exposure Regions: 4-1/2 percent to plus/minus 1 percent for 1 inch nominal maximum aggregate size.
- B. Calcium chloride is not permitted.

## 2.4 PROPORTIONING AND DESIGN OF MIXES

- A. Proportion mixes by either laboratory trial batch or field experience methods as specified in ACI 301, using materials to be employed on the project for each class of concrete required.
- B. Minimum Cement Content: Concrete mixes shall be limited to the cement content specified in the Concrete Schedule.

## 2.5 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with the requirements of ASTM C94 and as herein specified.
- 1) Delete the references for allowing additional water to be added to the batch for material with insufficient slump. Addition of water to the batch will be permitted only to replace water lost due to evaporation and only under the direct control of the concrete testing agency field representative.
  - 2) During hot weather or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.

## 2.6 REINFORCING

- A. Deformed Bars: ASTM A615. Minimum yield strength to be 60 ksi.

140208

- B. Steel Wire: ASTM A82, plain, cold-drawn steel.
- C. Welded Wire Fabric: ASTM A185.
  - 1) Use 6" x 6" - W2.9 x W2.9 for 6" exterior concrete aprons and interior slabs as shown on drawings.
- D. Supports for Reinforcement (including welded wire fabric): Bolsters, chairs, spacers and other devices for spacing, supporting, and fastening reinforcement in place.
  - 1) Use wire bar type supports complying with CRSI recommendations, unless otherwise indicated. Do not use wood, brick and other unacceptable materials.
  - 2) Over waterproof membranes, use precast concrete chairs to prevent penetration of the membrane.
  - 3) For footings, trench footings, slabs on grade, and grade beams use precast concrete bricks ( $f_c = 3000$  PSI min. at 28 days). (Concrete masonry bricks not acceptable.)

## 2.7 GROUTING

- A. Grouting all steel bearing plates, columns and other structural parts set to structural hardened concrete, using Castle Chemical "Aquabar Imperial," Sauereisen "F-100", Master Builders "Master Flow #713", Upco "Upcon", or U.S. Grout Corporation "Five Star Group" adding only water. These are non-metallic, non-shrinking grouts and must be prepared and installed in strict accordance with the manufacturer's written recommendations. Use driest practical mix. Unless noted otherwise, use a minimum of 3/4" thickness of grout under bearing plates.

## 3. PART 3 - EXECUTION

### 3.1 CONCRETE PLACEMENT

- A. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete. "
- B. Cold Weather Placing
  - 1) Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306.
- C. Hot Weather Placing
  - 1) When hot weather conditions exist that would seriously impair the quality and strength of concrete, place concrete in compliance with ACI 305, and as herein specified.

### 3.2 INSTALLATION

- A. Verify that excavations are free of water and ice, are of the required dimensions, and are acceptable for receiving the concrete.

140208

- B. Determine field conditions by actual measurements.
- C. Notify Architect not less than 24 hours in advance of placing concrete.
- D. Footings may be cast against earth cuts when soil conditions permit with written approval of the Architect.
- E. Bond all curbs and equipment pads to base slabs with bonding agent in accordance with Manufacturer's directions.
- F. Surfaces scheduled to receive membrane waterproofing shall have all form tie holes and bug holes (in excess of 1/2" long and 1/4" deep) filled with concrete. Fins and irregular construction joints shall be ground smooth or filled.

### 3.3 CONTROL JOINTS

- A. Interior Slabs-On-Grade:
  - 1) Provide (1/2" thick) isolation joints at columns and at walls. Where isolation joint will be exposed or view, set top of joint filler below top of slab at a distance equal to the filler thickness, to receive sealant. Where not exposed to view, set top of filler flush with top of slab.
  - 2) Location of control joints shall be as detailed on the plans. See structural drawings.
  - 3) Use metal screed key joint.
  - 4) Sawed control joints shall be sawed 1/8" wide and depth equal to 1/4 of slab thickness unless otherwise approved. Terminate reinforcing at all control joints. A keyed construction joint may be located where a sawed joint is shown. Sawed control joints shall be used ONLY when indicated on the drawings or when authorized by the Architect. Sawed joint shall be cut within 8 hours of concrete setting up.
- B. Exterior Slabs-On-Grade
  - 1) Location of controls joints in exterior slabs shall be located as shown on plans or as follows, if not noted.
  - 2) Sidewalks shall have control joints 7/8" deep and spaced 4'-0" to 6'-0" center to center (depending upon the width of the walk). Tool all joint edges. Expansion joints in walks and concrete curbing required at maximum of thirty (30) feet.

### 3.4 FINISHES

- A. All floor surfaces shall be within + or - 3/4" of finished floor elevations designated on plans and specified in part 1.3. If variations greater than this exist, the Architect may direct the Contractor to grind the surfaces to bring them within the requirements. Patching of low spots shall not be permitted. Grinding shall be done as soon as possible, preferably within 3 days, but not until the concrete is sufficiently strong to prevent dislodging coarse aggregate particles .

- 1) All floors shall be measured in accordance with ASTM E1155, "Standard Test Method for Determining Floor Flatness and Levelness Using The 'F Number' System."
- 2) See also 3.2.F above.

B. Where floor drains occur, pitch slabs uniformly toward drains.

### 3.5 CURING, SEALING AND PROTECTION

A. Temperature: When air temperature during placement is less than 40° F, or will be within 24 hours, temperature of concrete as placed is to be between 50° F. and 90°F (55° F and 90° F for section less than 12" thick). Maintain concrete temperature within these limits for the full curing period of seven days.

B. Curing:

- 1) The concrete floor/slab curing compound shall be a transparent liquid formulated from chlorinated rubber, plasticized and stabilized, and capable of forming a continuous film. It shall contain not less than 18% solids and shall meet the following specifications. Apply at the rate of 300 to 350 square feet per gallon:
  - a) Interior: ASTM C-309-73 Type 1-D, Class "B", clear or translucent with fugitive dye.
  - b) Exterior: ASTM C-309-73 Type 2, Class "A".
- 2) Maintain through measurement of the material applied and the number of square feet covered.
- 3) Apply curing compound by Low Pressure Spray Method, after final finishing operation, and as soon as the water sheen has disappeared. Overnight delays will not be allowed.
- 4) ALL containers of curing compound shall bear the manufacturer's labels indicating the manufacturer and the solids content. Material must be approved by the Architect.
- 5) Whichever curing method is used, it is to commence immediately after disappearance of water sheen, and continue for at least seven days. Do not allow curing to be delayed overnight.
- 6) Prevent excessive moisture loss from formed surfaces . If forms are removed before seven days have elapsed, cure the formed surfaces by moist-curing or application of curing compound for the remainder of the curing period.

### 3.6 FIELD QUALITY CONTROL

- A. Contractor shall maintain records of all tests indicating exact location of the structure represented by each test.
- 1) Obtain concrete for required tests at point of placement.

140208

- 2) For each concrete class, perform one strength test for each 50 yards or fraction thereof placed in any one day.
  - 3) Determine slump for each strength test .
  - 4) Determine air content for each strength test of concrete.
  - 5) Determine concrete temperature for each strength test when air temperature is less than 40 degrees, or will be within 24 hours.
- B. Do not place concrete when slump, air content, or temperature vary from allowable.
- C. When concrete fails to meet the acceptance criteria specified in Section 17.2, ACI 301, the Architect may order further testing of in-place concrete, in accordance with Section 17.3. When such tests are ordered, cost of testing shall be paid by Contractor.
- D. The Contractor shall bear all costs of correcting rejected work.

### 3.7 CONCRETE SCHEDULE

CONCRETE SCHEDULE		
ITEM OR STRUCTURE	FINISH	COMPRESSIVE STRENGTH AND OTHER REQUIREMENTS
Concrete not otherwise indicated (Class II)	RfFm-Fn SmFm-Fn, if exposed	4000 P.S.I. at 28 days Max W/C Ratio = 0.44
Trench footings, footings (Class I)	RfFm-Fn SmFm-Fn, if exposed	3000 P.S.I. at 28 days Max W/C Ratio = 0.45
Interior formed concrete exposed to view (Class II)	SmFm-Fn	4000 P.S.I. at 28 days Max W/C Ratio = 0.45
Lean concrete fill at soft soils of over excavations (Class IV)	--	1500 P.S.I. at 21 days
Exposed interior floor slabs and interior slabs scheduled to receive resilient, thin film, and wood flooring finishes (Class II)	Tr-Fn1 Tr-Fn2 Tr-Fn3	3000 P.S.I. at 28 days Max W/C Ratio = 0.45
Exterior walks, stoops, steps, aprons, and curbs; exterior formed concrete exposed to view; exterior concrete not otherwise indicated (Class III)	NsBrm-Fn Grt-CI-Fn	4000 P.S.I. at 28 days 4% - 7% entrainment Max W/C Ratio = 0.40

- A. Minimum cement content shall be as follows:

Class I:	470 pounds
Class II:	517 pounds
Class III:	564 pounds
Class IV:	376 pounds

**140208**

- B. Aggregate for toppings over precast deck and fill for metal stair pans shall be 3/8 inch maximum size (Class V).

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 RELATED WORK

- A. Anchor Bolts, Sleeves and Supports required for Electrical and Mechanical Equipment, refer to – Division 13, 22, 23 and 26. Shop Drawings – General Conditions.
- B. Anchor bolts and leveling plates have been supplied and set under another contract.

## 1.2 GENERAL REQUIREMENTS

- A. Include all supplementary miscellaneous items implied or required to complete the work indicated, even though such items may not be specifically shown or specified, and include all necessary templates or patterns required for built-in work.

## 1.3 SUBMITTALS

- A. Shop drawings are required for all fabricated steel products. See General Conditions for submittal procedure. Shop Drawings shall be reviewed and approved by General Contractor and Architect prior to fabrication of steel.

**2. PART 2 - PRODUCTS**

- 2.1 Cast Iron - Shall be of soft gray iron, true to patterns, smooth and straight, and free from defects impairing strength, durability or appearance.
- 2.2 Malleable Iron - Genuine Wrought Iron conforming to ASTM Spec. A-41 for bolts, rods, and bars; A-42 for plates, and A-162 for sheets.
- 2.3 Steel - Conform to ASTM Specifications A-36 for structural steel; and A-27 for cast steel. Architectural and miscellaneous steel not otherwise indicated or specified shall be mild steel.
- 2.4 Anchor Bolts - Steel shall conform to ASTM A307 refer to details.
- 2.5 Connection Bolts - Steel shall conform to ASTM A325 unless noted otherwise.
- 2.6 Aluminum - ASTM 6063-T5 for extrusions, ASTM A-10 for sheet aluminum; and 6063-T6 for pipe (schedule 40).
- 2.7 Shop Primer - Ferrous Metal - Glidden No. 5209 GLID-GUARD Metal Shop Primer, Fast Dry with 1.0 mils dry film thickness. Sherwin-Williams, Pittsburgh, ICI and Benjamin Moore, equivalent material will be accepted.
- 2.8 Shop Primer - Galvanized Metal & Aluminum - Glidden No. 5229 GLID-GUARD All-Purpose metal Primer with 1.4 mils dry film thickness. Sherwin-Williams, Pittsburgh, ICI and Benjamin Moore equivalent material will be accepted.
- 2.9 Metal Bollards

140208

- A. Metal bollards shall be fabricated from schedule 40 steel pipe.

### 3. PART 3 - EXECUTION

#### 3.1 WORKMANSHIP

- A. Steel and wrought iron shall be well formed to shape and size with sharp lines or angles. Shearing and punching shall leave clean true lines and surfaces. Weld or rivet permanent connections. Do not use screws or bolts where they can be avoided; where used, heads shall be countersunk, screwed up tight and threads nicked to prevent loosening. Curbed work shall be evenly sprung.
- B. Mill machined joints, where required, to a close fit. Provide necessary rabbets, lugs, and brackets so that work can be assembled.
- C. Conceal fastenings where practicable. Provide thickness of metal to give ample strength and stiffness. Form joints exposed to weather to exclude water. Provide holes and connections for other attached items.
- D. At proper time, deliver and set in place, work to be built into adjoining construction.
- E. Galvanizing – Provide a minimum of two ounces of galvanizing per sq. ft. of area of all galvanized items. Hot dip galvanize after fabrication in accordance with ASTM-A-123.
- F. Miscellaneous Items - Provide all bolts, anchors, straps, fasteners, and similar items as shown on the drawings and as required to complete the intended work.
- G. Field Measuring - Shop fabricate all miscellaneous metal items. Field measure railings and other miscellaneous items, as required to obtain the proper fit of the various parts.

#### 3.2 PAINTING AND PROTECTIVE COATING

- A. All ferrous metal shall be properly cleaned and give one shop coat of primer. Anchors that are built into masonry or concrete shall be coated with asphalt paint unless specified to be galvanized. Where hot-dip galvanized or zinc-coated metal is required, it shall not be shop primed unless specifically called for; but all abraded places and welding shall be touched-up with aluminum paint. Where hot-drop galvanizing or when zinc coating is specified, it shall be done in accordance with the standard specifications of the American Hot Dip Galvanizers Association.

◆ END OF SECTION ◆



b)	Light Framing	Construction
c)	Appearance Framing	Appearance
d)	Structural Light Framing	No. 2
e)	Structural Joists & Planks	No. 2
f)	Studs	Stud

## 2.2 WOOD GROUNDS AND BLOCKING

- A. Provide Wood grounds and blocking of size and shape required for securing wood trim, curtain tracks and where required to secure other work or equipment in place. Set grounds true to line, level plumb and secured in place. Wood blocking or nailers on steel framing shall be bolted in place.

## 2.3 PRESERVATIVES

- A. Wood sills, plates, posts, etc. in contact with masonry or concrete; furring strips on masonry or concrete; cant strips, nailers and blocking in contact with masonry or concrete and in connection with built-up roofing; and wall girts less than 8" above grade shall be pressure treated in accordance with the current AWPB Standard LP-2. All milling parallel to the grain shall be done prior to pressure treating.
- B. Treat filed cuts and holes with two heavy brush coats of the same preservative.
- C. Certification - Each piece of pressure treated wood shall bear the AWPB Quality Mark.

## 2.4 ROOF TRUSSES

- A. Wood roof trusses shall be equal to those manufactured by Automated Building Components, Inc., Stark Truss Company, Inc., or Trusco, Inc. and shall meet all of the requirements of the OBC. Truss manufacturer shall provide stress diagrams of all trusses in accordance with OBC requirements.

## 2.5 FIRE TREATED LUMBER (Where Required)

- A. Dimension lumber incorporated in the building shall be fire retardant-pressure treated and each piece shall bear an Underwriters' Laboratory Label "FR-S".
- B. Seasoning
- 1) Dry to 19 percent moisture content.
  - 2) Stamp each piece AWPB "Dry".

## 2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated, that comply with requirements specified.
- 1) Where rough carpentry work is exposed to weather, in ground contact, or in areas of high relative humidity, provide fasteners with hot-dip, zinc-coating per ASTM A153.
  - 2) Recycled Content: Fabricated from 100 percent re-melted steel.

140208

- B. Nails, Wire, Brads, and Staples: ASTM F1667
- C. Wood Screws: ASME B18.6.1
- D. Lag Bolts: ASME B18.2.1
- E. Bolts: Steel bolts complying with ASTM A307, Grade A with ASTM A563 hex nuts and, where indicated, flat washers.

## 2.7 METAL FRAMING ANCHORS

- A. General: Provide galvanized steel framing anchors of structural capacity, type, and size indicated, with allowable design loads as published by manufacturer that meet or exceed those indicated.
- B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653, G60 coating designation, structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

## 3. PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.
- C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- D. Apply field treatment complying with AWWA M4 to cut surfaces of preservative-treated lumber and plywood.
- E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with IBC Table 2304.9.1, Fastening Schedule.

### 3.2 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

- A. Install wood grounds, nailers, blocking, and sleepers where shown, and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.
- C. Install permanent grounds of dressed, preservative-treated, key-beveled lumber not less than 1-1/2 inches wide, and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

**140208**

**3.3 WOOD FURRING**

- A. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Firestop furred spaces of walls at each floor level, and at ceiling with wood blocking or noncombustible materials, accurately fitted to close furred spaces.

**3.4 ROUGH HARDWARE**

- A. Provide and install all rough hardware and metal fastenings as shown on drawings, specified herein, or required, for proper installation of carpentry and millwork.
- B. Nails, spikes, screws, bolts and similar items shall be of sizes and types to rigidly secure members in place.
- C. Fasteners, notwithstanding these specifications, shall be in accordance with the Recommended Nailing Schedule, designated as Appendix "A" of the Ohio Building Code.

**3.5 FRAMING**

- A. Cut wood framing square on bearing, closely fitted, accurately set to required lines and levels and rigidly secure in place. Do not use shims for leveling on bearings.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Organic and inorganic insulation applied for thermal protection in walls and ceilings and at foundation perimeter.
- B. Vapor retarders.

## 1.2 SUMMARY

- A. Provide glass fiber and rigid insulation, as indicated on the drawings and in this specification in the locations shown and described. Provide vapor retarder (barrier) at all exterior wall, soffit, etc. locations which have glass fiber insulation and in locations noted on drawings.

## 1.3 SUBMITTALS

- A. Product Data: Submit product literature, samples and installation instructions for specified insulation.
- B. Submit manufacturer's literature on products to be used giving data such as fire rating, R or K value density, burning characteristics etc.
- C. Submit manufacturer's certification that insulation products are formaldehyde-free or submit GreenGuard certification of low-emissions.

## 1.4 DELIVERY, STORAGE AND PROTECTION

- A. Protect insulation from physical damage and from becoming wet, soiled, or covered with ice or snow before, during and after installation. Comply with manufacturer's recommendations for handling, storage and protection during installation.
- B. Label insulation packages to include material name, production date and/or product code.

## 1.5 MANUFACTURER

- A. Owens-Corning Fiberglass Corporation, Certainteed, Dow or Manville or approved equal.

**2. PART 2 - PRODUCTS**

## 2.1 GENERAL

- A. Insulation materials shall be formaldehyde-free or shall be certified low-emission by the GreenGuard testing program.

## 2.2 MATERIALS

- A. Extruded Polystyrene Board Insulation:

- 1) Rigid, cellular polystyrene thermal insulation formed from polystyrene base resin by an extrusion process using hydrochlorofluorocarbons as blowing agents to comply with ASTM C578 for type and with other requirements indicated below:
  - a) Provide foundation perimeter insulation, wall insulation and floor insulation positioned as shown on drawings.
  - b) Type IV, 1.60 pounds/cu. ft. minimum density
    - [1] Material: Rigid extruded polystyrene insulation with a U factor of .20 at Mean Temperature of 75° F. The R value shall be based on an "Equilibrium" or design value. The 2" insulation shall have an R of 10. The 3" insulation shall have an R of 15. Foundation insulation shall extend down interior walls a distance of 24 inches minimum below finish grade.

B. Unfaced Mineral Fiber Blanket Insulation: Thermal insulation combining mineral fibers of type described herein with thermosetting resins to comply with ASTM C665, Type I (blankets without membrane facing).

- 1) Mineral Fiber Type: Fibers manufactured from glass, slug wool or rockwool.
- 2) Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50.
- 3) Application: Concealed building insulation.
- 4) R-value & Thickness:
  - a) R-19, 6" thick (in locations shown on drawings)
  - b) R-38, 12" thick ( in locations shown on drawings)

### 2.3 FOAM INSULATION SEALANT

- A. Polyurethane Foam Sealant
- B. Foam insulation sealant shall meet ASTM E-84 for flamespread and smoke density. Any desired substitution for this product shall be submitted to the Architect with published supporting specifications data.
- C. Foam seal around the perimeter of all exterior windows and door frames.
- D. Run ½" foam insulation sealant bead in the center edge of all horizontal and vertical joints of rigid wall insulation.
- E. Prepare surface and install per manufacturer's recommendations.
- F. Material shall have the following properties:
  - 1) Material Polyurethane
  - 2) Flame Spread 20

140208

- 3) Smoke 15
- 4) Conductivity @ 75 degrees F  $K=0.219$  BTU in/hr.
- 5) No VOC emissions after 30 days

G. Installer shall be a factory-certified contractor. Installation shall be in strict conformance with the manufacturer's printed instructions.

#### 2.4 VAPOR BARRIER

- A. Product: 6 mil polyethylene sheet.
- B. Vapor-retarder tape: pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

#### 2.5 OTHER MATERIALS

- A. Provide materials, not specifically described but required for a complete and proper installation of the work in this section.

### 3. PART 3 - EXECUTION

#### 3.1 INSPECTION AND PREPARATION

- A. Examine the areas and conditions under which work of this section will be installed. Verify that adjacent materials are dry and ready to receive insulation. Verify mechanical and electrical services within walls have been tested.
- B. Provide written report listing conditions detrimental to performance of work in this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION - GENERAL

- A. Comply with manufacturer's instruction for particular conditions of installation in each case.
- B. Install rigid wall insulation with tightly sealed joints to form a continuous insulation barrier.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SCOPE

- A. The work under this Section includes, but is not limited to the following: All miscellaneous items required to complete the intent of this specification is the responsibility of this contractor, whether same is specified herein, or shown on the drawings.
- B. Metal roofing, siding, and interior liner panel system, complete with gutters, downspout conductors, trim, etc..
- C. Such other items as may be required to complete the roofing system.
- D. All connection bolts, fasteners, closures, sealer and other items as may be required.
- E. All required flashings
- F. All fascia trim at rake, eave, etc. of metal roof.
- G. All seals to make roofing system water tight.

## 1.2 SUBMITTALS

- A. Provide shop drawings showing locations and sizes of all load transfer members, roof panel clip locations. Include engineering data, i.e. moment of inertia, section modulus, yield strength of steel, etc.
- B. Samples
  - a. Submit samples and color chips for all proposed finishes.

## 1.3 APPROVED MANUFACTURERS

- A. The following manufacturers of roofing systems are approved. American Building Systems, Butler Building Systems and MBCI .
  - a. Metal roofing, exterior siding, and interior liner panels are to match existing building profiles and colors.
  - b. Provide manufacturer's 20 year warranty on roof system.

## 1.4 SYSTEM DESIGN

- A. All components of the roof paneling system shall be designed in accordance with sound engineering methods and practices.
- B. Roof panels shall be designed in accordance with AISI "Specifications for the Design of Light Gauge Cold Formed Steel Structural Members," latest edition.

140208

- C. Roof paneling system shall be designed to support specified design live loads.
- D. All endwall trim and roof transition flashings shall allow the roof panel to move relative to the wall panels as the roof expands and contracts with temperature changes.
- E. The roof panel shall not be considered to be a safe work platform until completely secured to the structural system. Therefore, walk-boards or other safety equipment, as required by safety standards, shall be provided by the erecting contractor to provide worker safety during panel installation.

## 2. PART 2 - PRODUCTS

### 2.1 ROOFING AND SIDING SYSTEM

- A. Details shall be in accordance with the manufacturer's drawings.
- B. Installation shall be in accordance with the manufacturer's drawings.

### 2.2 SIDING

- A. The siding shall consist of 26 gauge galvanized steel panels.
- B. Details shall be in accordance with the manufacturer's drawings.
- C. Installation shall be in accordance with the manufacturer's drawings.

### 2.3 ROOF PANELS

- A. Panel materials shall be: 24-gauge steel. G-90 galvanized steel produced and tested in accordance with ASTM designation A-446 to meet or exceed a minimum yield point of 50,000 PSI. Coated with a G-90 weight of zinc in accordance with ASTM A-525. Paint shall be 70% Duranar/Kynar 500.
- B. Panels of maximum possible lengths shall be used to minimize end laps.
- C. Panels shall be factory prepunched at panel end to match prepunched holes in the eave structural member. Panel and splices shall be factory prepunched and prenotched. Panel and laps shall allow the roof panels to expand and contract.
- D. Ridge assembly shall be designed to allow roof panels to move lengthwise with expansion/contraction as the roof panel temperature changes. Parts shall be factory prepunched for correct field assembly.
- E. The sub-framing shall be designed to provide continuous support of the roofing panels. The system shall be capable of carrying the roof dead load and any super-imposed load as well as the code required wind and live load.
- F. Panel clips shall be the manufacturer's standard.
- G. Provide continuous ridge ventilation.

### 2.4 GUTTERS & SOFFIT PANELS

140208

- A. Gutters, flashing & downspouts shall be fabricated from 24 gauge galvanized steel, ASTM Specifications A525, G90 coating latest issue.
- B. Gutters, flashing and downspouts shall have a factory finished paint application. Paint shall be 70% Fluor/Kynar of manufacturer's standard colors. Gutters shall be supported by painted galvanized steel hangers from roof panels. Support shall be at every other standing seam (maximum).
- C. Provide gutter expansion joints spaced not more than 40'-0" O.C. cap each end of gutter and leave gap between gutter ends at each expansion joint location. Provide metal cover over expansion joint to hid expansion joint gap.
- D. Downspout conductors shall be 4" (4"x3") and securely anchored to the wall with anchors at 4'-0" O.C.
- E. Provide perforated (vented) panels formed with vertical panel edges and intermediate stiffening ribs and flush join between panels. Profile to match existing.
- F. Material: Same gauge, material & color as roof panels.
- G. Manufacturer: Obtain soffit panels from manufacturer supplying metal roof system. Install per manufacturers instructions.

## 2.5 FASCIA/CLADDING

- A. Provide fascia/cladding with shop mitered and welded corners. Include anchor plates, cleats or other attachment devices; concealed splice plates; and trim and other accessories indicated or required for complete installation, with no exposed fasteners.
  - a. 24 gauge galvanized steel.
  - b. Color to match existing building.

## 2.6 LINER PANEL

- B. Provide 29 gauge liner panel around entire interior perimeter of building. Panel shall have factory finish and include trim at corners, columns, door openings, etc..

## 2.7 CEILING LINER PANEL

- A. Provide 29 gauge liner panel under bottom cord of trusses. Panel shall have factory finish and include trim at corners.

## PART 3 - INSTALLATION

### 3.1 PANEL INSTALLATION

- A. All panels shall be positioned and aligned by matching the prepunched holes in the panel end with the prepunched holes in the eave structural member and by aligning the panel with the panel clip. (Not a crimping action).
- B. All sidelap sealant shall be factory applied. Panel end laps shall be at least 6", sealed with manufacturer's sealants and fastened together by clamping plates, forming a free

140208

floating splice not connected to roof secondary structurals. All sidelaps will be field sealed by a lock-seaming device.

### 3.2 ACCESSORIES

- A. Accessories, ventilators, gutter, conductors, fascia, etc. shall be as standard with Roof Manufacturing Company, unless otherwise noted and furnished as specified. Location of standard accessories shall be as shown on erection drawings, as furnished by roof Manufacturing Company.

### 3.3 EXECUTION

- A. Erect all components in the sequence recommended by the manufacturer.
- B. All structural members shall be erected plumb & level, braced and anchored in accordance with approved erection drawing.
- C. Erect roof, siding, and liner panels, trim, etc. in accordance with the manufacturer's instructions.

### 3.4 FABRICATION AND INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 - Specification Section, apply to work specified in this section.

## 1.2 DEFINITIONS

## A. Firestopping

- 1) Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, water and hot gases through penetrations in fire rated wall and floor assemblies.

## 1.3 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

- A. Only tested firestop systems shall be used in specification locations of fire rated construction or smoke partitions as follows:

- 1) Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), vertical service shaft walls and partitions, and smoke partitions.
- 2) Openings between structurally separate sections of wall or floors.
- 3) Gaps between the top of walls and ceilings or roof assemblies.
- 4) Expansion joints in walls and floors
- 5) Openings and penetrations in fire-rated partitions or walls containing fire doors.
- 6) Openings around structural members which penetrate floor or walls.

## 1.4 RELATED WORK OF OTHER SECTIONS

- A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:

- 1) Section 079200 - Joint Sealers
- 2) Section 092000 – Plaster and Gypsum Board
- 3) Section 260050 - Basic Electrical Materials and Methods

## 1.5 REFERENCES

- A. Test Requirements: ASTM E-814, "Standard Method of Fire Tests of Through Penetration Fire Stops".
- B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually with a midyear supplement.
  - 1) UL Fire Resistance Directory
    - a) Through-Penetration Firestop Devices (XHCR)
    - b) Fire Resistance Ratings (BXUV)
    - c) Through-Penetration Firestop Systems (XHEZ)
    - d) Fill, Voids or Cavity Material (XHHW)
    - e) Forming Materials (XHKU)
- C. Test Requirements: UL 2079, "Tests for Resistance of Building Joint Systems" (November 1994).
- D. ASTM E-84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- E. All three major building codes: ICBO, SBCCI, and BOCA
- F. NFPA 101 - Life Safety Code
- G. NFPA 70 - National Electric Code

#### 1.6 QUALITY ASSURANCE

- A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.
- B. Firestop System installation must meet requirements of ASTM E-814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
- D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
- E. For those firestop applications that exist for which no UL tested system is available through any manufacturer, a manufacturer's engineering judgement derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council.
- F. Fire-Test-Response Characteristics: UL, Intertek ETL SEMKO, or FM Global.

## 1.7 SUBMITTALS

- A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation.
- B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineer judgement must include both project name and contractor's name who will install firestop system as described in drawing.
- C. Submit material safety data sheets provided with product delivered to job-site.
- D. Product data. Unless otherwise indicates, submit the following for each type of product provided under work of this Section:
  - 1) Architectural Sealants:
    - a) Architectural Sealants:
      - [1] Submit manufacturer's product data for sealants. Indicate VOC limits of the product. Submit MSDS highlighting VOC limits.

## 1.8 INSTALLER QUALIFICATIONS

- A. Engage an experienced installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an installer engaged by the Contractor does not in itself confer qualification on the buyer.
- B. Installer shall be an FM Global-approved firestop contractor or a UL-qualified firestop contractor.

## 1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- E. Do not use damaged or expired materials.

## 1.10 PROJECT CONDITIONS

140208

- A. Do not use materials that contain flammable solvents.
- B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

## 2. PART 2 - PRODUCTS

### 2.1 FIRESTOPPING, GENERAL

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

### 2.2 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:
  - 1) Hilti Construction Chemicals, Inc., Tulsa, OK (918) 252-6901
  - 2) Tremco Sealants & Coatings, Beechwood, OH (216) 292-5000
  - 3) 3M Fire Protection Products, St. Paul, MN (612) 736-0203
  - 4) RectorSeal, Houston, TX (800) 231-3345

### 2.3 MATERIALS

- A. Use only firestop products that have been UL 1479, ASTM E-814, or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

- B. For penetrations by non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following material is acceptable:
- 1) Hilti FS 601 Elastomeric Firestop Sealant
  - 2) Hilti FS-ONE High Performance Intumescent Firestop Sealant
  - 3) 3M Fire Stop Sealant 2000
  - 4) 3M Fire Barrier CP25
  - 5) Tremco Tremstop Fyre-Sil Sealant
- C. For fire-rated construction joints and other gaps, the following material is acceptable:
- 1) Hilti FS 601 Elastomeric Firestop Sealant
  - 2) Hilti FS 604 Self-Leveling Elastomeric Firestop Sealant
  - 3) 3M Firestop Sealant 2000
  - 4) Tremco Tremstop Fyre-Sil Sealant
- D. For penetrations by combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe (closed piping systems), the following material is acceptable:
- 1) Hilti FS-ONE High Performance Intumescent Firestop Sealant
  - 2) Hilti CP 642 Firestop Jacket
  - 3) 3M Fire Barrier CP25
  - 4) 3M Fire Barrier FS-195 Wrap/Strip
  - 5) Tremco Tremstop WBM Intumescent Firestop Sealant
- E. For penetrations by combustible plastic pipe (open piping systems), the following material is acceptable:
- 1) Hilti CP 642 Firestop Jacket
  - 2) Hilti FS-ONE High Performance Intumescent Firestop Sealant
  - 3) 3M Fire Barrier PPD Plastic Pipe Device
  - 4) Tremco Fyre-Sil
- F. For large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following material is acceptable:
- 1) Hilti FS 635 Trowelable Firestop Compound
  - 2) Hilti FIREBLOCK
  - 3) 3M Firestop Foam 2001
  - 4) 3M Fire Barrier CS-195 Composite Sheet
  - 5) Tremco PS Pillow System
- G. For openings between structurally separate sections of walls and floors. Top of walls, the following material is acceptable:
- 1) Hilti FS 601 Elastomeric Firestop Sealant
  - 2) Hilti FS-ONE High Performance Intumescent Firestop Sealant
  - 3) Hilti CP672 Speed Spray
  - 4) Hilti CP606 Flexible Firestop Sealant
  - 5) 3M Fire Barrier CP25.

- 6) Rectorseal Metacaulk 1100
- H. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.
- I. Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction being penetrated.

### 3. PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
  - 1) Verify penetrations are properly sized and in suitable condition for application of materials.
  - 2) Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
  - 3) Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
  - 4) Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
  - 5) Do not proceed until unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Regulatory Requirements: Install firestop materials in accordance with published "Through-Penetration Firestop Systems" in UL's Fire Resistance Directory.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration materials.
  - 1) Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
  - 2) Consult with mechanical engineer, project manager prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to ductwork.
  - 3) Protect materials from damage on surfaces subjected to traffic.

#### 3.3 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.

**140208**

- C. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.4 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL****1.1 SECTION INCLUDES**

- A. Elastomeric and rigid joint sealants, caulking compounds, and related accessories.
- B. Provide joint sealants as a minimum in the following locations. Project specific materials and building systems may require additional joint sealants to be provided beyond the locations listed below.
  - 1) Exterior joints in vertical surfaces and nontraffic horizontal surfaces:
    - a) Cast-in-place concrete.
    - b) Control and expansion joints in unit masonry.
    - c) Perimeter joints between concrete and other dissimilar materials.
    - d) Frames of doors and windows.
    - e) Ceiling and overhead surfaces.
    - f) Exterior joints between dissimilar materials where the joining of the 2 surfaces leaves a gap between the meeting materials or components as may be dictated by the various methods of construction to form a barrier against the passage of liquids, solids, or gases.
  - 2) Exterior joints in horizontal traffic surfaces:
    - a) Cast-in-place concrete slabs.
    - b) Tile control and expansion joints.
    - c) Exterior joints between dissimilar materials where the joining of the 2 surfaces leaves a gap between the meeting materials or components as may be dictated by the various methods of construction to form a barrier against the passage of liquids, solids, or gases.
  - 3) Interior joints in vertical surfaces and horizontal nontraffic surfaces:
    - a) Exposed interior surfaces of exterior walls.
    - b) Perimeter joints of exterior openings.
    - c) Between tops of masonry walls and underside of concrete slabs and beams.
    - d) Tile control and expansion joints.

- e) Vertical control joints on exposed surfaces of unit masonry and concrete walls.
  - f) Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
  - g) Perimeter joints of toilet fixtures.
  - h) Interior joints between dissimilar materials where the joining of the 2 surfaces leaves a gap between the meeting materials or components as may be dictated by the various methods of construction to form a barrier against the passage of liquids, solids, or gases.
- 4) Interior control and expansion joints in horizontal traffic surfaces:
- a) Cast-in-place concrete.
  - b) Tile flooring.
  - c) Interior joints between dissimilar materials where the joining of the 2 surfaces leaves a gap between the meeting materials or components as may be dictated by the various methods of construction to form a barrier against the passage of liquids, solids, or gases.

## 1.2 DEFINITIONS

- A. Caulking Compound - A compound to fill a static void but not used to seal a void against moisture or gas penetration or to withstand weathering.
- B. Sealants - A material that has adhesive or cohesive properties to form a barrier against the passage of liquids, solids, or gases and withstands weathering.
- C. Primer - A compound applied to the sides of an open joint to ensure adhesion of caulking compound or sealant.
- D. Caulking - To install or apply either a caulking compound or sealant, across or into a joint, crack or crevice.
- E. (Note: The terms "Caulk" and "Caulking" as used on the drawings do not refer to "Caulking Compound" as described above.)

## 1.3 SAMPLES

- A. Submit to the Architect supporting literature of each type of sealant (including necessary primers) proposed for the project. Literature shall indicate that the proposed material meets or exceeds all specified requirements and standards.

## 1.4 WORKMANSHIP

- A. Use trained personnel to perform all cleaning, priming and caulking. Upon

**140208**

completion, all joints shall be smooth and clean and free of stains.

1.5 SUBMITTALS

- A. Product data.

1.6 WARRANTY

- A. Product shall provide a minimum 30 year performance guarantee.

**2. PART 2 - PRODUCTS**

2.1 PRIMER

- A. Sealant manufacturer shall recommend the primer to be used with the particular materials forming the joint.

2.2 CAULKING COMPOUND

- A. Oil-base caulks shall not be used on this project.

2.3 GENERAL REQUIREMENTS

- A. Primer shall be used as required by the manufacturer to obtain the best possible adhesion to the joint faces.
- B. Colors shall be as selected by the Architect.

2.4 BACKUP MATERIAL

- A. Round foam rod as recommended by the sealant manufacturer, and that is resistant to sealant and primer volatiles and tooling agents and has a service range equal to the sealant.
- B. Asphalt or bitumen impregnated backer rods are not acceptable.
- C. Backer rods shall have a diameter at least 25 percent greater than the joint width but not more than 50 percent greater.

2.5 LIST OF APPROVED MATERIALS (comply with ASTM C920)

- A. Type "A" Butyl Rubber
  - 1) Tremco "Butyl Sealant" or equal by Sonneborn "Butyl Sealant" or Pecora BC-158 or approved equal.
- B. Type "B" Polyurethane
  - 1) Pour Grade
    - a) Tremco "Vulkem 45" or equal by Sonneborn SL1, Pecora NR200 or approved equal.
  - 2) Gun Grade

- a) Tremco "Dymeric" or equal by Sonneborn NP1 or Pecora Dynatrol 1 approved equal.
- C. Type "C" Silicone
  - 1) Gun Grade
    - a) Dow Corning Corp. #790 or equal by Pecora #860, Tremco Spectrum 1 or approved equal.
- D. Backer Rod
  - 1) As recommended by the manufacturer or "Sonofoam" by Sonneborn "Mile High Foam" by backer rod, backer rod by DAP or equals.

### 3. PART 3 - INSTALLATION

#### 3.1 SEALANT SCHEDULE

- A. Type "A" (Butyl)
  - 1) Used only for interior vertical joints where no movement is anticipated. Interior general purpose
- B. Type "B" (Polyurethane)
  - 1) "Pour Grade" - For interior or exterior horizontal joints.
  - 2) "Gun Grade" - Limited to interior and exterior vertical expansion and control joints or exterior static joints. Exterior general purpose.
- C. Type "C" (Silicone)
  - 1) "Gun Grade" - Clear finish, applications.

#### 3.2 JOINT PREPARATION

- A. Remove all loose and scaled material, by mechanical means as required, and remove all foreign matter such as dirt, dust, oil grease, form release agents, moisture and lacquer. Vitreous or glazed surfaces must be sanded.

#### 3.3 PRIME

- A. Prime joints as required by the manufacturer to achieve the best possible adhesive bond between sealant and joint walls.
- B. Mask joints as required to limit primer application strictly to sealant contact surface and prevent staining of surrounding surfaces.

#### 3.4 SEALANT BACKER ROD

- A. Install backer rod without damaging the rod's skin and to a depth of approximately 50% of the width of the joint, but not less than 1/4 inch nor more than 1/2 inch. Where joint is not sufficient to allow rod installation, use polyethylene bond-breaking tape, upon approval of the Architect.
- B. Avoid stretching backer rod during installation.
- C. In horizontal joints, subjected to traffic, the backer rod or tape shall be supported on non-asphaltic expansion joint filler such as premolded urethane or neoprene.
- D. Note: Sealant Backer Rod shall not be used in joints between precast concrete panels.

### 3.5 SEALANT PREPARATION

- A. Extreme - care shall be taken to assure mixing of two component sealants according to the manufacturer's directions. Mix slowly to avoid overheating.
- B. Compound that has exceeded the manufacturers "SHELF LIFE" shall be removed from the project site.

### 3.6 SEALANT APPLICATION

- A. Apply sealant into base of joint recess, being extremely careful to avoid air pockets, until joint is completely filled. Tool all joints to a smooth surface using light solvents or pure bar soap water as recommended by the sealant manufacturer.
- B. Joints in masonry and concrete shall be tooled to smooth concave surface. Joints in horizontal traffic areas shall be tooled smooth and flat and depressed approximately 1/16 inch below top of traffic wear surface.
- C. Remove all masking tape before initial sealant set.

### 3.7 CLEAN-UP

- A. All non-porous surfaces shall be cleaned immediately with solvent moistened cloth. Clean-up porous surfaces by wire brushing or sanding after sealant has cured.
- B. All surfaces not specified or detailed to receive sealant, shall be clean and free from sealant or primer compounds or stains upon completion of the project.

### 3.8 MANUFACTURER'S RECOMMENDATIONS

- A. Manufacturer's recommendations for installation of these materials shall be followed not-with-standing these specifications.

◆ END OF SECTION ◆

## HOLLOW METAL DOORS AND FRAMES

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Hollow metal door frames, including all materials, labor, equipment, appliances, anchors and services required or necessary for their installation. Preparation for all hardware that are shown on the drawings or specified herein shall be properly installed and made fully operative. Door frames must be of a single manufacturer.

## 1.2 HARDWARE

- A. The hardware supplier will furnish approved hardware schedules, paper templates and physical hardware to the door and frame manufacturer, as required. See section 08 71 00.

## 1.3 GLAZING

- A. For doors with window vision panels, see section 08 81 00 Glass and Glazing.

## 1.4 QUALITY ASSURANCE

- A. Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical endurance level:
  - 1) Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless) or Model 3 (Stile and Rail).
- B. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical endurance level:
  - a) Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless) or Model 3 (Stile and Rail).
- C. Underwriters' Laboratories labeled fire doors and frames:
  - 1) All labeled fire door and frames shall be of a type which has been investigated and tested in accordance with UL-10B, ASTM E-152, NFPA 252.
  - 2) Underwriters' Laboratories labeled door frames shall be manufactured under the UL factory inspection program and in strict compliance to UL procedures and shall provide a degree of fire protection, heat transmission and panic loading capability indicated by the opening class.
  - 3) A physical label shall be affixed to the fire door or fire door frame by the manufacturer or at an authorized facility as evidence of compliance with procedures of the labeling agency.
  - 4) Framed label embossment shall not be permitted.

1.5 SUBMITTALS

- A. Submit for review, the hollow metal shop drawings covering complete identification of all items required for the project. Include manufacturer's names and identification of product. Include complete copies of catalog cuts and/or technical data sheets and any other data as may be required to show compliance with these specifications.
  - 1) The data on the Shop Drawings will complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to enable the Architect to review the information as required.
- B. Indicate frames configuration, anchor types and spacings, location of cutouts for hardware, reinforcement, to insure doors and frames are properly prepared to receive hardware.
- C. Indicate door elevations, internal reinforcement, closure method, and cutouts for glass lites and louvers.
- D. Submit manufacturer's installation instructions.

1.6 DELIVERY, STORAGE AND PROTECTION

- A. Storage of Frames
  - 1) Store frames under cover on 4" wood sills on floors in a manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters, which create a humidity chamber and promote rusting. Store assembled frames in a vertical position, five units maximum in a stack. Provide a ¼" space between frames to promote air circulation.

**2. PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Frame and construction equal to Steelcraft standard method and design, contour dimensions and section widths as specified or shown on the drawings.
- B. Hollow metal frames shall be manufactured by Steelcraft Manufacturing Company, Cincinnati, Ohio or equal as manufactured by the Pioneer Fireproof Door Co., Carlstadt, N.J.; Amweld, Niles, Ohio; Kewanee Manufacturing Co., Kewanee, Illinois; Republic Steel; or approved equal.

2.2 MATERIALS

- A. Doors, frames and frame components shall be manufactured from cold-rolled steel conforming to ASTM specification A1008: or hot-dipped galvanized steel having an A60 zinc coating conforming to ASTM specification A653.
  - 1) Galvanized steel shall be treated to insure proper paint adhesion.
  - 2) All component parts used in galvanized door frames shall meet the galvanized specification.

2.3 STEEL DOORS

- A. Door Type: Seamless steel doors with composite construction equal to full flush "L" series by Steelcraft Manufacturing Company.
- B. Interior Doors: ANSI/SDI-100, Grade II, Model 2 heavy duty, 1¾" thick, minimum 18 gauge cold-rolled steel with honeycomb core constructed or approved material for complete sound deadening. Prepare all doors to receive mortise hardware as specified in Section 08 71 00. Hinge reinforcements shall be a minimum of 10 gauge. Block reinforcements shall be a minimum of 12 gauge. Provide adequate reinforcements for all surface applied hardware of the proper thickness for rigid support.
- C. Exterior Doors: ANSI/SDI-100, Grade III, Model 2, extra heavy duty, 1¾" thick, minimum 16 gauge galvanized sheet steel with a commercial coating of 1.25 oz. per square foot. Top of door shall have inverted channel for weather sealing.
- D. Finish: Factory primed in accordance with ANSI A224.1 and field painted.
- E. Exterior doors shall be completely temperature insulated.
- F. Provide light cut outs with moldings and vinyl gaskets, to retain the glass, similar to Steelcraft Manufacturing standards.
- G. Doors, as scheduled, shall have steel louvers with adjustable blades and insect screens.

#### 2.4 STEEL FRAMES

- A. Interior Frames: Welded type, mitered corners 16 gauge (0.053") sheet steel for single openings up to 40" wide and double openings up to 60" wide. 14 gauge sheet steel for openings beyond these widths.
- B. Exterior Frames: Welded type 14 gauge galvanized sheet steel mitered corners.
- C. Finish: Factory primed and field painted.
- D. Provide anchors of suitable type for positive anchorage of frame to the indicated type of wall construction. Provide a minimum of three (3) anchors per jamb per height of 7'-2" and one (1) anchor for each two (2) feet of additional height or fraction thereof.
- E. Provide ALL frames with 8-gauge reinforcement plates at hinge, strike, and closer locations.
- F. Provide ALL frames with adjustable base anchors for rigid anchorage to the floor.
- G. Provide ALL frames with at least two (2) 9/32" holes for the insertion of G-J 64 rubber door silencers, furnished by this Contractor.
- H. Electrical Requirements:
  - 1) General: Make provisions for installation of electrical items arranged so that wiring can be readily removed and replaced.
  - 2) Provide all cutouts and reinforcements required for metal door frame to accept electric components.

140208

- 3) Frames with Electrical Hinges: Weld UL listed back box and mortar shield at center hinge location. Top or bottom hinge locations are not permitted.

## 2.5 FINISH

- A. All door frames and frame components shall be cleaned, phosphatized and finished with one coat of baked-on rust inhibiting prime paint in accordance with the ANSI A224.1 "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames".

## 3. PART 3 - EXECUTION

### 3.1 DOORS AND FRAMES

- A. Masonry Openings
  - 1) Miter all frames joints and internally arc weld full length of joint and grind smooth on face, allowing a minimum neat miter line on the outer surface.
- B. Drywall Partitions
  - 1) Use drywall frames with mitered interlocking corners and double return backbands and stud anchors designed to prevent frame twisting or movement. Frames shall be shop welded.
- C. Completely clean and degrease doors and frames and factory apply primer. Prior to field finish painting, doors and frames shall be thoroughly cleaned and free of oil, dirt and/or dust.
- D. The doors and frames shall be properly packaged and protected for shipment to jobsite. The Contractor shall inspect the doors and frames on arrival at jobsite to insure they are in perfect condition, and thereafter be responsible for their protection through the completion of the project.

### 3.2 ADJUSTING

- A. Final Adjustments: Check and readjust operating hardware items just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames that are warped, bowed, or otherwise unacceptable.
- B. Prime Coat Touch-Up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

### 3.3 PROTECTION

- A. General Contractor to provide protective measures required throughout the construction period to ensure that door frame units will be without damage or deterioration, other than normal weathering, at time of acceptance.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1. RELATED DOCUMENTS

- A. All of the contract documents including General and Supplementary Conditions, and Division 1 General Requirements, apply to the work of this Section.

## 1.2. SUMMARY

- A. The work of this Section includes upward-acting sectional doors.
- B. Related Sections: Other specification sections which directly relate to the work of this Section include, but are not limited to, the following:
  - 1) Section 09 91 00 - Painting; field painting
  - 2) Section 26 00 50 - Electrical; wiring

## 1.3. SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each type of sectional door. Include both published data and any specific data prepared for this project. Provide information on R Value of Door Assembly
- B. Shop Drawings: Submit shop drawings for approval prior to fabrication. Include detailed plans, elevations, details of framing members, required clearances, anchors and accessories. Include relationship with adjacent materials.

## 1.4. QUALITY ASSURANCE

- A. Manufacturer: Sectional doors shall be manufactured by a firm with a minimum of five (5) years experience in the fabrication and installation of sectional doors. Manufacturers proposed for used, which are not named in these specifications, shall submit evidence of ability to meet performance and fabrication requirements specified, and include a list of five (5) projects of similar design and complexity completed within the past five years.
- B. Installer: Installation of section doors shall be performed by the authorized representative of the manufacturer.
- C. Single-Source Responsibility: Provide doors, tracks, motors and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.
- D. Pre-Installation Conference: Schedule and convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

## 1.5. DELIVERY, STORAGE AND HANDLING

140208

- A. Deliver materials and products in labeled protective packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage from weather, excessive temperatures and construction operations.

## 2. PART 2 - PRODUCTS

### 2.1. ACCEPTABLE MANUFACTURER

- A. Provide sectional doors by Overhead Door Corporation
- B. Haas Door, Wauseon, Ohio, Raynor Garage Doors, Dixon, Illinois; Wayne Dalton Door Corporation, Mt. Hope, OH; Clopay are also approved.

### 2.2. INSULATED STEEL SECTIONAL DOORS

- A. Trade Reference: 591 Series Insulated Steel Doors by Overhead Door Corporation.
  - 1) Doors shall be 16'W x 12'H, 14'W x 14'H, and 16'W x 14'H (Alt. G-1)
- B. Sectional Door Assembly: Insulated steel door assembly with rabbeted meeting rails to form weathertight joints and provide full-width interlocking structural rigidity. Units shall have the following characteristics:
  - 1) Panel Thickness: 1 5/8"
  - 2) Exterior Surface: Ribbed
  - 3) Steel: Minimum .015" hot-dipped galvanized exterior, back cover 26 gauge steel
  - 4) Center and End Stiles: 16 gauge
  - 5) Springs: 20,000 cycles (High cycles)
  - 6) Insulation: HCFC-free Polystyrene, R-value 14.86
  - 7) Provide vision window openings in door per drawings
- C. Finish and Color: Factory-applied baked-on polyester or epoxy coating. Color to be selected by Architect from standard colors.
- D. Windload Design: ANSI/NAGDM 102 standards and as required by code
- E. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
- F. Lock: Interior mounted slide lock.
- G. Weatherstripping: EPDM rubber bulb-type on bottom section. (Header seal and jamb weatherstripping).
- H. Track: Provide track as recommended by manufacturer to suit loading required and clearances available. Slope track for jack shaft operation.
- I. Provide pusher springs on sectional door(s) for jack shaft operator.
- J. Warranty: All doors shall carry a five (5) year warranty against panel delamination; one (1) year on parts and labor.

140208

- K. Provide push button control stations to control the operation of each overhead door. Each operator shall have three (3) control buttons, open, close and stop and shall be similar to NEMA 1.
- L. Each overhead door shall be equipped with entrapment protection bottom sensing bar. This bar shall have an electric sensing edge. This sensing edge shall run the full length of the door. Wiring of sensing edge shall be by overhead door operator contractor.

### 2.3. MECHANICAL DOOR OPERATOR

- A. Motor for doors listed above Model SEL with automatic reverse during closing cycle.
  - 1) Motor - ½ HP, 115V single phase instant reversing with automatic reset thermal overload. Limited to 12 cycles/hr.
  - 2) Motor Control - Dual relay type
  - 3) Limit Switches - Adjustable linear type, synchronized with door.
  - 4) Control Circuit - 24 V three-button "Open-Close-Stop". Pre-wired to accept single button.
  - 5) Reduction - Primary is V-belt; secondary is chain and sprockets.
  - 6) Brake - Drum type. Standard on side mount.
  - 7) Mounting - Jackshaft (side mount)
  - 8) Auxiliary Limit Switch for operating light and exhaust fan.
  - 9) Provide vehicle remote control devices to control the operation of each overhead door. Provide two devices for each overhead door.

### 2.4. WARRANTY

- A. All doors shall carry a five (5) year warranty against panel delamination; one (1) year on parts and labor.

## 3. PART 3 - EXECUTION

### 3.1. PREPARATION

- A. Take field dimensions and examine conditions of substrates, supports and other conditions under which this work is to be performed. Do not exceed with work until unsatisfactory conditions are corrected.

### 3.2. INSTALLATION

- A. Strictly comply with manufacturer's installation instructions and recommendations. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.

**140208**

- B. Instruct Owner's personnel in proper operating procedures and maintenance schedule.

3.3. ADJUSTING AND CLEANING

- A. Test sectional doors for proper operation and adjust as necessary to provide operation without binding or distortion.
- B. Touch-up damaged coatings and finishes and repair minor damage. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of material or product being cleaned.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Hinges, pivots, sliding and folding door hardware, and other hanging hardware; locks, exit devices, cylinders and other latching hardware; closers, holders, self-closing hinges and other controlling hardware; and push plates, pulls, kickplates, and other door trim.

## 1.2 RELATED WORK

- A. Hollow Metal Doors and Frames – Section 08 11 13

## 1.3 QUALITY ASSURANCE

- A. The hardware number and manufacturer's list in the following specifications, and in the hardware schedule, indicate the design, quality and minimum weight acceptable.
- B. Any desired deviations from the List of Acceptable Manufacturers shall be submitted to the Architect for approval ten (10) days prior to the opening bid date, complete with supporting specifications data or physical samples as requested.
- C. Hardware for Fire Rated Openings: NFPA 80, and local requirements.
- D. Handicapped Accessibility: ANSI A117.1, and local requirements.
- E. Materials and Application: ANSI A156 series standards.

## 1.4 SUBMITTALS

- A. Door Hardware Schedule shall be submitted in the same manner as specified for Shop Drawings. Based on door hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
  - 1) Type, style, function, size and finish of each hardware item
  - 2) Name and manufacturer of each item
  - 3) Fastenings and other pertinent information
  - 4) Location of hardware set cross-referenced to Project Drawings, both on floor plans and on Door and Frame Schedule
  - 5) Explanation of all abbreviations, symbols, codes, etc. contained in schedule
  - 6) Mounting locations for hardware
  - 7) Door and frame sizes and materials

140208

- 8) Include location of manufacture of door hardware.

## 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Each item of hardware shall be wrapped and packaged to avoid scratching or marking of the finishes. Mark each item of hardware being delivered to the job site to indicate door opening, as required, to assure installation at correct opening.

## 2. PART 2 - PRODUCTS

### 2.1 DOOR HARDWARE

- A. Quality Level: Grade 1, ANSI/BHMA A156.
- B. Locksets and Latchsets: Full Mortise.
  - 1) General: The quality of each mortise lock set assembly, including cylinder and escutcheon, must be "Grade I" for both "Operation" and "Security" in accordance with ANSI A156.13.
  - 2) Unless required to match existing hardware locations or noted on drawing, center of knob will be approximately 38 inches above finish floor.
  - 3) Provide curved lip strike plate with tongue of appropriate length for type of door trim used.
  - 4) Thickness of the metal for local trim where indicated as cold forged shall be a minimum of .080" thickness. Where wrought trim is listed, thickness of metal shall be .050", both shall be exclusive of the inner knob reinforcements.
- C. Lock Cylinders: Interchangeable type.
  - 1) All cylinders shall be a minimum of six (6) pin and shall be masterkeyed or grand-masterkeyed as directed by the Architect and Owner to match the owners keying system.
- D. Keying
  - 1) Each lockset shall be furnished with four (4) keys. Locks to be keyed to change key, department sub-masters, building master, and grand master, unless directed otherwise.
  - 2) Cylinders to be set to construction master key which shall be voided by hardware supplier when directed by Architect. Test all permanent keys to insure proper operation and location.
- E. Hinges and Butts
  - 1) General: Hinge locations shall conform to the National Builders Hardware Association Standards. No pivot hinges because they are too close to the ground and collect dirt and salt. Hinges shall be as follows:
    - a) See hardware schedule.

F. Closers, Door Control, and Exit Devices

- 1) Grade 1 devices.
- 2) Surface Closers shall be of type listed in schedule and sized in accordance with manufacturers recommended size chart.
  - a) Case to be non-porous cast iron.
  - b) Covers to be non-ferrous minimum .050" thickness finish as listed.
  - c) Arms to be of forged steel and plated to match cover, hold open or fuse link as listed.
  - d) Separate key control valve adjustments for closing speed. Latching cycle and back check (delayed action control as listed)
  - e) Spring adjustment 50% minimum in all sized listed.
  - f) All closers to be mounted on interior of building. Brackets for regular or inverted mountings as listed and allow door to open maximum swing.
  - g) All mountings shall be parallel arm.

G. Hardware Finishes

- 1) See hardware schedule.

2.2 AUXILIARY MATERIALS

A. Stops

- 1) Door stops shall be provided as indicated in the schedule, in general use wall type with concealed fastenings. All stops shall have correct anchoring devices for the material to which they are attached.

B. Weatherstripping and thresholds.

- 1) Thresholds shall be provided at all exterior openings and shall be as scheduled.
- 2) All exterior frames shall be provided with adjustable weather strip, for jambs and head.
- 3) Provide door bottom seals at all exterior openings, using ICC A117.1 accessible thresholds.

2.3 ACCEPTABLE MANUFACTURERS

- A. As listed in the schedule to match existing building hardware.

2.4 HARDWARE SCHEDULE

**HARDWARE SET #1**

**Doors: 100A, 101D, 101E, 101F 101G, 101H**

All Hardware by Door Manufacturer

**HARDWARE SET #2**

**Door: 101A**

3 – Butts TA2714 4 ½" x 4 ½"	26D	McKinney
1 – Passage Set 8215 LNL	26D	Sargent
1 – Door Closer EN-351-UO	AL	Sargent
1 – Wall Stop #409	32D	Rockwood

**HARDWARE SET #3**

**Doors: 101B, 101C**

3 – Butts TA2714 4 ½" x 4 ½" NRP	26D	McKinney
1 – Panic 8913 ETL	26D	Sargent
1 – Door Closer EN-351-UO	AL	Sargent
1 – Threshold 896V	AL	National Guard
1 – Set of Weatherstrip 160S	AL	National Guard
1 – Sweep 102VA	AL	National Guard

**3. PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Install all new and/or rework existing hardware in compliance with the manufacturer's recommendations and as noted on Door Schedule and specified herein. Mortised items will be adjusted to fit flush. Do not install surface mounted items until finishes have been completed on the substrates involved. Lubricate and adjust all hardware to operate properly.
- B. Verify keying with Architect and Owner prior to setting cylinders and fabricating keys.
- C. Adjust weather stripping and hardware as required for proper operation.
- D. Adjust hardware as required for proper operation.
- E. At completion of work clean all hardware.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Transparent glass for general and special purpose applications.

## 1.2 WORK SPECIFIED ELSEWHERE

- A. Hollow Metal Doors and Frames - Section 08 11 13
- B. Glazing Accessories - Section 08 85 00

## 1.3 SUBMITTALS

- A. Provide shop drawings

## 1.4 QUALITY ASSURANCE

- A. Comply with applicable codes and regulations and with the Consumer Product Safety Commission CPSC 16 CFR 1201 and with applicable recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual."
- B. Label showing strength, grade, thickness, type and quality will be required on each piece of glass. Labels must remain on glass until it has been set and inspected. In addition to manufacturer's labels, wire glass must comply with requirements of Underwriters' Laboratories, Inc. When glass is not cut to size by the manufacturer and is furnished unlabeled from lock stock, the contractor must submit an affidavit stating the quality, thickness, type and manufacturer of glass furnished.
- C. Thermal Performance Properties
  - 1) Solar Heat Gain Coefficient: NFRC 200;  $\leq 0.40$ .

## 1.5 GUARANTEE

- A. The manufacturer of the insulating glass units shall submit three (3) copies of a ten year guarantee stating that under normal conditions the units will not develop material obstruction of vision as a result of dust or film formation on the internal glass surfaces caused by failure to the hermetic seal other than through glass breakage.

## 1.6 MANUFACTURERS

- A. Material equal to that specified below and manufactured by Pilkington Building Products, P.P.G. Industries, A.S.G. Industries, or Mississippi Plate Glass Company, will be accepted as equal.
- B. Fire Rated Glass (See 2.1.D. below): Saftifirst "Pyran Platinum F", TGP "FireLiteNT", Vetrotech Saint-Gobain "Keralite FR-F", or approved equal.

**2. PART 2 - PRODUCTS**

## 2.1 GLASS

140208

- A. Primary Glass Products: Clear float glass, ASTM C 103, Type I.
- B. Heat Treated Glass Products: Tempered glass, ASTM C 1048.
  - 1) Tempered Glass – ¼” Tempered Plate/Float clear for inner vestibule doors and all interior non-fire rated doors and windows.
- C. Sealed Insulating Glass Units: ASTM E 774, Class A.
  - 1) Insulating Glass – clear ¼” inner plate, ½” sealed air space, clear ¼” outer plate. Use on all exterior window and door units. Insulating glass to be tempered where used in windows, doors and door frames.
- D. Fire Rated Glass: ASTM E2074 & E2010. CPSC16CFR 1201 cat.II.
  - 1) Fire rated glass: ¼” fire rated impact safety glass –
    - a) Application for all interior fire rated glass.

### 3. PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Work shall be in accordance with glass manufacturers recommendation.
- B. Do not set glass until reveals have been primed and priming is dry.
- C. Protections – Protect glass from breakage. Any glass broken, chipped, abraded or cracked by the contractor, shall be removed and replaced prior to completion.
- D. Cleaning – Wash glass on both faces, not more than 4 days prior to date scheduled for inspection for completion. Wash glass by method recommended by the glass manufacturer.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Glazing compounds, setting blocks, shims, tape, splines, clips, and other accessories.
- B. Finish contractor shall provide all glazing accessories required for glazing work under their contract. See Section 08 81 00.

## 1.2 WORK SPECIFIED ELSEWHERE

- A. Hollow Metal Door and Frames - Section 08 11 13
- B. Glass Glazing - Section 08 81 00

## 1.3 SUBMITTALS

- A. Provide manufacturers information

## 1.4 MANUFACTURERS

- A. Tremco Manufacturing Co., Pecora Corporation, Dow Corning or approved equal.

**2. PART 2 - PRODUCTS**

## 2.1 GLAZING SEALANTS

- A. General
  - 1) Provide materials as recommended by the manufacturer for the required application and condition of installation in each case. Provide only compounds which are proven to be fully compatible with surfaces contacted.
- B. Silicone Rubber Glazing Sealant: Shall be silicone rubber, one part elastomeric sealant complying with FS TT-S-001543, Class A. Provide acid type for nonporous channel surfaces and provide nonacid medium-modulus type for porous channel surfaces.
- C. Preformed Butyl Rubber Glazing Sealant: Shall be tape or ribbon (coiled on release paper) of polymerized butyl or mixture of butyl and polyisobutylene, compounded with inert fillers and pigments, solvent-based with minimum of 95 percent solids with thread or fabric reinforcement, tack-free within 24 hours, paintable, nonstaining.
  - 1) Provide combination tape and encased continuous rubber shim of approximately 50 durometer hardness.
- D. Two Component Polysulfide Glazing Sealant: Shall be polysulfide 2 part elastomeric sealant, complying with FS TT-S-00227, Class A, Type 2 (nonsag). Material shall be compounded by manufacturer specifically for glazing.

## 2.2 GLAZING GASKETS

140208

- A. Polyvinyl Chloride Glazing Gaskets: Shall be extruded, flexible PVC gaskets of the profile and hardness shown or as required for watertight construction, complying with ASTM D2287.
- B. Structural Rubber Glazing Gaskets: Shall be neoprene extrusions with injection molded corner units, fabricated into frames with either integral or separate locking strips (zippers), complying with ASTM C542, black.

### 2.3 MISCELLANEOUS GLAZING MATERIALS

- A. Setting Blocks: Shall be neoprene, 70-90 durometer hardness with proven compatibility with sealants used.
- B. Spacers: Shall be neoprene, 40-50 durometer hardness with proven compatibility with sealants used.
- C. Compressible Filler Rod: Shall be closed-cell or waterproof jacketed rodstock of synthetic rubber or plastic foam with proven compatibility with sealants used. Rod shall be flexible and resilient with 5-10 PSI compression strength for 25 percent deflection.
- D. Cleaners, Primers, and Sealers: Shall be products as recommended by sealant or gasket manufacturer.

## 3. PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Glazing compounds and tapes shall be installed in strict accordance with the manufacturer's written instructions or directions.
- B. All glass shall be bedded, face puttied, secured in place - except where face glazing beads are required shall be back puttied. Apply putty uniformly, remove excess putty from glass. Secure glass in doors and interior sash with glazing beads bedded in glazing compound.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 WORK INCLUDED

- A. Shall include application of gypsum drywall panels as indicated on drawings and specified hereinafter.

## 1.2 QUALITY ASSURANCE

- A. Materials or operations specified by reference to the published specifications of a manufacturer or other published standards shall comply with the requirements of the standards listed.
  - 1) Standards include ASTM C840 and GA216.
- B. Deflection limit for gypsum board assemblies is L/240.
  - 1) Tile finishes applied to cementitious backer unit shall have deflection limits of L/360 or less.

## 1.3 SUBMITTALS

- A. Product data.

## 1.4 DELIVERY AND STORAGE OF MATERIALS

- A. Deliver materials in original unopened packages and store in an enclosed shelter providing protection from damage and exposure to the elements. Damaged or deteriorated materials shall be removed from the premises.

## 1.5 ENVIRONMENTAL CONDITIONS

- A. In cold weather and during gypsum panel application and joint finishing, temperatures within the building shall be maintained within the range of 55 degrees to 70 degrees F. Adequate ventilation shall be provided to carry off excess moisture.

## 1.6 MANUFACTURERS

- A. Materials shall be as manufactured by the National Gypsum Co., Georgia Pacific, or the Flintokote Co., and equal to the following products of the United States Gypsum Co. specified below.

**2. PART 2 - PRODUCTS**

## 2.1 GYPSUM BOARD (ASTM C - 36)

- A. Interior gypsum wall board 5/8" thick, USG Mold Tough AR Firecode Core. Mold & moisture resistant gypsum panels or equal by other listed manufacturers.

## 2.2 JOINT TREATMENT

140208

- A. General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.
- B. Toxicity/IEQ: Lime compound. All purpose joint and texturing compound containing inert fillers and natural binders. Pre-mixed compounds shall be free of antifreeze, vinyl adhesives, preservatives, biocides and other slow releasing compounds.
- C. Reinforcing Tape:
  - 1) Toxicity/IEQ: Sheetrock Joint Tape. Paper; fiberglass joint tape not permitted.
- D. Finish gypsum panels only as required for fire rated wall assembly.

### 2.3 FASTENERS

- A. GWB-54 annular ring nails and/or USG screws as recommended.

### 2.4 TRIM ACCESSORIES

- A. Comply with ASTM C1047
  - 1) Material: Metal trim, steel sheet zinc coated by hot dip or electrolytic process, or steel sheet coated with aluminum or rolled zinc.
  - 2) Types: Cornerbead, edge trim and control joints.
- B. GWB Nos. 103 Corner Bead, 200A J-Trim, 200B L-Trim, 093 Control Joint etc. as required.
- C. The use of exposed leg J-shapes is prohibited.

### 2.5 CAULKING

- A. USG Acoustical Sealant. Caulk along edges of dissimilar materials or acoustical sealant as manufactured by National Gypsum and Flintokote.

## 3. PART 3 - EXECUTION

### 3.1 GENERAL

- A. The installation shall comply with the following USG Technical Folders:
  - 1) Gypsum Drywall - Steel Frame      Folder #SA-923
  - 2) Gypsum Drywall - Wood Frame      Folder #SA-924
  - 3) Gypsum Panels & Accessories      Folder #SA-927
  - 4) Coatings      Folder #SA-933
  - 5) FiberBond Wallboard      Louisiana-Pacific Instructions
- B. Joints shall be taped and spackled to a smooth finish. For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

- 1) Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
  - 2) Embedding and First Coat: For embedding tape and first coat on joints, flanges of trim accessories, and fasteners, use setting-type taping compound.
  - 3) Fill Coat: For second coat, use drying-type, all-purpose compound.
  - 4) Finish Coat: For third coat, use drying-type, all-purpose compound.
  - 5) Skim coat: For final coat of level 5 finish, use drying-type, all-purpose compound.
  - 6) See 2.2.D. above for drywall finish required for this project.
- C. Joints between gypsum drywall and other materials shall be comprised of a J-trim with minimum ¼" sealant joint.
- D. Furnish additional blockings between the studs to support all wall mounted furnishings and equipments. i.e. caulk board, tack board, marker board, projection screen.
- E. Provide in partitions all necessary blocking and reinforcing to accept items being attached and/or built-in by other trades.
- F. Provide expansion (control) joints above all door frames. In addition, control joints shall be located not more than 30 feet apart.
- G. Partition and Soffit Framing:
- 1) Extend partition framing full height to structural supports or substrates above suspended ceilings.
  - 2) Frame door openings to comply with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
    - a) Install two studs at each jamb, unless otherwise indicated.
  - 3) Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Exterior and interior painting with opaque finishes. Painted mechanical and electrical identification. Primers, sealers, finish paints, and stains.

## 1.2 QUALITY ASSURANCE

- A. Codes and Standards: In addition to complying with pertinent codes and regulations, comply with "Standard (Type 1)" as defined by the Painting and Decorating Contractors of America in their "Modern Guide to Paint Specifications," current edition.

## 1.3 SUBMITTALS

- A. Submit a list of the products to be used by "type" as specified under 2.2 below.
  - 1) Highlight compliance with VOC (volatile organic compound) content and chemical component limits.
- B. For all submittals, number of copies shall be as specified in the up-front documents of this project manual.

## 1.4 COLOR - FINISH SAMPLES

- A. The Architect will provide a complete schedule of colors and sheens desired, in advance of commencing work. The Painting Contractor shall obtain same from the Architect together with any additional instructions as to intermixes or let-downs desired, and proceed to prepare duplicate sets of samples of treatments for all major surfaces.
- B. Samples shall each be made on material like that to be treated and the material shall be positioned, during execution of the sample to simulate the job conditions, (i.e., vertical, overhead horizontal, or below eye level horizontal). One half of the sample shall show the completed treatment, and the other half shall show the successive steps taken in producing it. When approved, samples will be so marked with one set retained by each party.
- C. Approved sample quality shall be strictly adhered to on the job site. If additional coats are required to reproduce approved quality, these shall be applied by the Contractor without additional cost to the Owner.

## 1.5 SCOPE

- A. Except as otherwise specified herein or indicated on the room finish schedule, include all necessary preparation and the complete finishing of all metal parts and surfaces, exterior and interior, that are not specified to be completely finished by others as installed. Also paint all concrete block masonry, concrete, plaster, and wall surfaces exposed to view at completion of the project, in finished areas or in areas requiring treatment for appearance or protection.

- B. In finished areas, include the finishing of all ferrous metal equipment items, piping, ductwork, and conduit in contracts for other Divisions of the Work, and furnished either bare, zinc-coated (galvanized) or in prime coat only; also similar finishing of the supports and insulated coverings from same. Inspect drawings and specifications for such contracts fully, and determine from them the exact extent of such work to be performed by other sections of the specifications.
- C. Include alcoves, recesses, and closets, not specified otherwise, for same treatments (on their respective "finish" parts) as specified or scheduled for similar corresponding parts in the space off which they are located. Include wall surfaces back of such items as open shelving, radiators, and exposed fin type heating units, for same treatment as balance of wall.

1.6 GENERAL REQUIREMENTS

- A. Ceilings, otherwise, will be painted a different color than walls unless stated.
- B. Access door and registers will be painted the same color as surfaces adjacent thereto unless otherwise stated.
- C. Metal door frames will be painted a different color than walls adjacent thereto unless otherwise stated.
- D. Exposed piping will be painted color and texture to match walls or ceilings adjacent to it unless otherwise stated.
- E. Back priming of same material as specified for front side will be required herein for all interior and exterior wood trim which is in contact with exterior masonry walls or which is located in higher-than-normal humidity areas.
- F. Each coat of paint shall be slightly darker than preceding coat unless otherwise directed. Undercoats shall be tinted similar to finish coats.
- G. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such a procedure is specifically described in manufacturer's product instructions. VOC numbers need to be confirmed by using the product MSDS sheets.

1.7 STORAGE

- A. Store materials on premises where directed. Keep storage space clean and accessible. At close of each day's work, oil or paint-soaked rags and other waste shall be placed in tightly covered metal containers or removed from the premises. Take every precaution to avoid damage by fire. In no case shall amount of materials stored exceed that permitted by local ordinances, State laws, or Fire Underwriters regulations.

1.8 SCAFFOLDING

- A. Provide, erect, and maintain all staging and scaffolding. Move when necessary at the option of the Architect to permit installation of other materials and remove from premises at completion of work.

**140208**

**1.9 PROTECTION**

- A. Provide clean drop cloths, and other protection as approved to protect floors, doors, windows and other areas from damage. If paint is splattered on unintended surfaces, clean promptly, and leave in good condition.

**1.10 USE OF PREMISES**

- A. No plumbing fixtures, open waste or vent pipe, or other pipe of any kind, shall be used to dispose of paint materials, used rags, waste, or other material.
- B. No water closets, tubs, or fixture of any kind shall be used as supports for planking. All fixtures shall be thoroughly protected from damage at all times.

**1.11 WORK NOT INCLUDED**

- A. Do not paint or otherwise finish:
  - 1) Aluminum architectural features, such as door frames, doors and windows.
  - 2) Other architectural features, such as finish hardware furnished in aluminum, bronze, brass, plated ferrous metal, stainless steel or copper unless herein specified to be painted.
  - 3) Interior ceramic tile and glazed tile.
  - 4) Prefinished doors and prefinished door frames.
  - 5) Prefinished equipment.
  - 6) Copper, stainless steel or sheet aluminum parts, unless specified to be painted herein.
  - 7) Exterior door and window sills and exposed exterior concrete.
  - 8) Caulking and glazing compounds installed in or adjacent to aluminum doors or similar features.
  - 9) Wall or ceilings of Mechanical Shafts.
  - 10) Surfaces of galvanized sheet metal ductwork that will be concealed from view.
  - 11) Areas where rubber base or ceramic tile base will be applied.

**2. PART 2 – PRODUCTS**

**2.1 PAINT MATERIALS**

- A. Paint and fillers shall be of type and brands hereinafter specified under "Types of Paint". Painting materials such as linseed oil, shellac, turpentine, etc., shall be of highest quality, and have identifying labels on containers.

- B. All paint shall be delivered to site in manufacturer's sealed containers. Each container shall be labeled by the manufacturer with manufacturer's name, type of paint, color of paint, and instructions for reducing. Thinning shall be done only in accordance with directions of manufacturer. Job mixing or job tinting may be done when approved by the Architect.
- C. Bids shall be based on the use of the specific Sherwin Williams products specified.

## 2.2 TYPES OF PAINT

- A. Basis of design is Sherwin-Williams (S.W.). Pittsburg, ICI and Benjamin Moore & Co. equivalent materials will be accepted. The kinds of paint and number of coats required on the various surfaces shall be as follows:
- B. **Type 1** Exterior Miscellaneous Metal
  - 1) First Coat: S.W. ProCryl Universal Primer, B66-310 Series
    - a) 2-4 mils dry
  - 2) Second and Third Coat: S.W. A-100 Exterior Latex Satin, A82 Series
    - a) 4 mils wet, 1.4 mils dry per coat
  - 3) Use on items of exterior metal installed under this contract, other than aluminum or prefinished metal.
- C. **Type 2** Exterior Galvanized Surfaces
  - 1) First and Second Coat: S.W. A-100 Exterior Latex Satin, A82 Series
    - a) 4 mils wet, 1.4 mils dry per coat
  - 2) Use on all exposed galvanized metal.
- D. **Type 3** Interior Metal - Semi-Gloss Finish
  - 1) First Coat: S.W. ProCryl Universal Primer, B66-310 Series - omit if metal has a shop coat of primer.
    - a) 2-4 mils dry
  - 2) Second and Third Coat: S.W. ProClassic Waterborne Acrylic Semi-Gloss, B31 Series
  - 3) 4 mils wet, 1.4 mils dry per coat
  - 4) Use on all items of miscellaneous metal including - but not limited to - electric panels, fire extinguisher cabinets, steel ladders, piping and conduit exposed to view, access doors, grilles, hollow metal door frames, hollow metal doors, and metal heating cabinets. Use on exposed metal deck, exposed structural steel.
- E. **Type 4** Interior Galvanized Metal

140208

- 1) First Coat: SW ProCryl Universal Primer, B66-310 Series
  - a) 2-4 mils dry
- 2) Second and Third Coat: SW ProGreen 200 Low VOC Flat, B30-600 Series
  - a) 4 mils wet, 1.8 mils dry per coat
- 3) Use on interior exposed galvanized metal.

### 3. PART 3 – EXECUTION

#### 3.1 PREPARATION OF SURFACES

- A. Steel and Iron – Remove grease, rust scale, and dust and touch up any chipped or abraded places on items that have been shop coated. Where steel and iron have a heavy coating of scale, it shall be removed by “Roto” scraping or sand blasting as necessary to produce a satisfactory surface for painting.
- B. Galvanized Iron – Shall be cleaned thoroughly with solvent to remove grease, residue, and corrosion products on the surface or with chemical washes used as directed by the manufacturer. All galvanized iron shall be given a special primer such as S.W. Galvanized Iron Primer. Galvanized iron which has been exposed to the weather for long periods of time and which shows rust shall be primed with a metal protective primer such as S.W. Kromik Metal Primer.
- C. Concrete Block – Before painting, all block shall be cleaned of all mortar, sand, and dirt. Any bad mortar joints or loose mortar shall be replaced and repaired before any painting is done.
- D. Wood - Sandpaper to smooth and even surface and then dust off. After primer or stain coat has been applied, thoroughly fill nail and other holes and cracks with plastic wood or putty. For natural finished work, putty shall be colored to match the wood.
- E. General – Before painting, remove hardware, accessories, plates, lighting fixtures, and similar item or provide ample protection of such items. Upon completion of each space replace above items. When necessary, disconnect radiators to permit painting of walls behind them, replace and reconnect upon completion. Remove doors if necessary to paint bottom edge. Use only skilled mechanics for removing and connecting above items. Where painted signs or numbers are applied on glass doors, the glass shall be thoroughly cleaned with soap and water prior to painting.

#### 3.2 APPLICATION

- A. Environmentally friendly paints may have a longer drying time unlike traditional paint due to the composition. Contact manufacturer for recommendations.
- B. Do not apply exterior paint in damp, rainy weather, or until surface has thoroughly dried from the effect of such weather. Do not apply varnish or paint when temperature is below 50 degrees Fahrenheit.

140208

- C. Surfaces to be stained or painted shall be clean, dry, smooth and adequately protected from dampness. Each coat of paint shall be applied in a good workmanlike manner, leaving a uniform finish and texture. Allow each coat to dry according to manufacturers written specifications before subsequent coats are applied.
- D. Finished work shall be uniform, of approved color, smooth and free from runs, sags, defective brushings, clogging, or excessive flooding. Make edges of paint adjoining other materials or colors sharp and clean without overlapping.
- E. Concrete block sealer and filler shall be airless sprayed and while still wet followed over with a Dynel roller with 3/8" pile or brushed to uniform the surface.
- F. Paint top and bottom edges of metal covered and hollow metal doors one coat.
- G. At completion, touch-up and restore finish where damaged and leave in good condition.

### 3.3 CLEAN-UP

- A. Refer to General Conditions and Supplementary General Conditions for specific requirements in cleaning up.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 WORK INCLUDED

- A. Fire Extinguishers
- B. Accessories

## 1.2 REFERENCES

- A. NFPA 10 Portable Fire Extinguishers
- B. ADA Accessibility Guidelines

## 1.3 QUALITY ASSURANCE

- A. Conform to NFPA 10 requirements for portable fire extinguishers.
- B. Provide fire extinguishers, and accessories by single manufacturer.

## 1.4 SUBMITTALS

- A. Submit brochure and project data for approval by the Architect.
- B. Submit location of manufacture of miscellaneous specialties.
- C. Submit certification that fire extinguishers are halon-free.

**2. PART 2 - PRODUCTS**

## 2.1 ACCEPTABLE MANUFACTURERS

- A. Where shown on the drawings, provide fire extinguishers, cabinets, and accessories manufactured by Larsen's.
- B. Equal by Buckeye Fire Equipment and J. L. Industries are also approved.

## 2.2 FIRE EXTINGUISHERS

- A. Dry chemical type: Larsen's model MP6, UL Classification 3A-40BC. Approved equal by Buckeye and J.L. Industries.

## 2.3 ACCESSORIES

- A. Extinguisher Brackets
  - 1) Provide brackets as scheduled.

**140208**

2.4 SCHEDULE-

<b>Room</b>	<b>Fire Extinguisher</b>	<b>Quantity</b>	<b>Cabinet/Bracket</b>
101	3A-40BC	2	Wall Bracket

3. **PART 3 - EXECUTION**

3.1 INSPECTION

- A. Verify servicing, charging and tagging of all fire extinguishers.

3.2 INSTALLATION

- A. Install the items of the section in strict accordance with the original design, approved shop drawings, and requirements of agencies having jurisdiction, as approved by the Architect, anchoring all components firmly into position.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 PLUMBING SECTIONS

- A. SECTION 22 00 00 – GENERAL PROVISIONS
- B. SECTION 22 13 16 – SANITARY WASTE AND VENT PIPING
- C. SECTION 22 13 19 – SANITARY WASTE PIPING SPECIALITIES
- D. SECTION 22 16 00 – GAS PIPING

## 1.2 SCOPE OF WORK

- A. Work under Plumbing includes all necessary work required to complete the Plumbing System as shown on drawings and as follows:
  - 1) All storm drainage and floor drains as shown on drawings.
  - 2) All gas piping, valves, fittings, hangers, sleeves, etc., required for installing the aforementioned piping.
  - 3) All excavation, bedding and backfilling required for the Plumbing work.
  - 4) All other miscellaneous items of equipment, materials, piping, etc., as hereinafter specified, as shown on drawings or as required for the proper operation of equipment and piping system and as may be required for the completion of the project.
  - 5) All test, inspections and permits.

**2. PART 2 - PRODUCTS**

## 2.1 SLEEVES

- A. Where pipes pass through exterior concrete walls below grade, set Schedule 40 galvanized steel pipe or special manufactured castings sleeves 1-1/2" larger than O.D. of pipe. Caulk both sides with oakum and lead wool or otherwise adequately waterproof openings around pipe.
- B. Sleeves for foundation walls below grade will be supplied by this contractor and installed by the General Trades Contractor. It is the responsibility of the General Trades Contractor to caulk and seal sleeves after installation.
- C. Sleeves shall be provided through all walls and floors for all piping. Sleeves shall be standard weight black steel pipe.
  - 1) Sleeves through walls shall be of a length equal to wall thickness.
  - 2) Sleeves through floors shall extend 1/4 inch above the finished floor, except in equipment rooms and other areas subject to flooding, where they shall extend 1-1/2" above the finished floor.

- 3) Voids between sleeves and pipes shall be filled with white Permagum sealing compound or fire caulk as required.

### 3. PART 3 - EXECUTION

#### 3.1 WORK SPECIFIED ELSEWHERE:

- A. This contractor is referred to the General Documents and applicable portions of Division 1 of the Specifications. The Instructions to Bidders, General Conditions, Supplemental General Conditions, Special Conditions, Addenda, Alternates, Ohio Building Codes, these Technical Specifications, together with the Contract and Proposal, comprise the Contract Documents for this contract.

#### 3.2 INTENT OF DRAWINGS AND SPECIFICATIONS:

- A. Work covered by these specifications and accompanying design drawings shall include all labor, materials, equipment, and services necessary for, and reasonably incidental to, the complete installation of the mechanical systems for the project. Any additional material, labor, or electrical modifications in using equals or approved equals is the responsibility of this contractor.
- B. Drawings are diagrammatic in nature, designed to provide the contractor with a working knowledge of systems to be installed. Omissions of minor specialties, or minor modifications to lay-out due to exigencies of construction, shall not relieve the contractor of the responsibility of furnishing and installing all materials and work required to make the systems complete and operative.
- C. The drawings indicate required size and points of termination of pipes and ducts and suggest proper routes to conform to structure, avoid obstructions and preserve clearances. However, it is not intended that drawings indicate all necessary offsets, and it shall be the work of this contractor to make the installation in such a manner as to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear without further instructions, or cost, to the Owner or Architect.
- D. The drawings shown, in general, where the pipes, ducts and equipment are to be located. This contractor shall check over all the drawings and details carefully. Location of duct work and equipment may not be changed without written approval by the Architect.
- E. Selection of equipment and fabrication of all elements including piping etc. shall meet space and service requirement of the project.
- F. Substitution of makes other than those specifically named in the specifications, and drawings, will be approved by the Architect for the following reasons only - that the materials proposed for substitution are equal to and/or superior to equipment named, in construction, efficiency and utility, and further that the equipment named in the specifications cannot be delivered to the job in time to complete the work in proper sequence to work of other trades, due to conditions beyond control of contractor. Any additional material and/or labor in using equals or approved equals is the responsibility of this contractor.
- G. To receive consideration, requests for substitutions must be accompanied by documentary proof of equality of difference in price and delivery, if any, in form of certified quotation from suppliers of both specified and proposed equipment.

- H. In case of difference in price, the Owner shall receive all benefits of the difference in cost involved in any substitution and the contract altered by change order to credit Owner with any savings so obtained.
- I. Consult all drawings, Architectural, Structural, Mechanical & Electrical. Refer any discrepancies to the Architect before bid due date, - otherwise, corrections shall be made at expense of this contractor.

### 3.3 CODES AND STANDARDS:

- A. All materials and workmanship shall meet, in minimum, applicable provisions of State and Local Codes and Regulations governing the work. Where plans or specifications call for work or materials exceeding minimum standards, the plans and/or specifications shall apply.
- B. In the event any work shown or indicated on the drawings or in the specifications requires modification, or additions, to meet applicable Codes, the Contractor shall notify the Architect and obtain clarification before proceeding with the work.
- C. Contractor shall secure and pay for all notices, local permits and inspections required under applicable Codes and Regulations, including final Certificates of Approval, and shall pay all fees for same. The Plumbing Contractor will secure the State Plumbing Permit.

### 3.4 REFERENCE SYMBOLS:

- A. Symbols for various references used herein include:

1)	A.G.A.	American Gas Association
2)	A.W.W.A.	American Water Works Association
3)	A.S.H.R.A.E.	American Soc. of Heating, Refrigeration & A.C.Eng.
4)	A.S.M.E.	American Society of Mechanical Engineers
5)	P.D.I.	Plumbing - Drainage Institute
6)	C.I.S.P.I.	Cast Iron Soil Pipe Institute
7)	S.M.A.C.N.A.	Sheet Metal & Air Conditioning Contractors National Association, Inc.
8)	N.F.P.A.	National Fire Protection Association
9)	UL	Underwriters Laboratories, Inc.
10)	NEC	National Electrical Code
11)	A.N.S.I.	American National Standards Institute
12)	O.S.H.A.	Occupational Safety and Health Act

### 3.5 CUTTING AND PATCHING

- A. Openings, chases and recesses required for the proper installation of the plumbing system shall be provided by the General Contractor in new construction during the normal course of construction, subject to timely and accurate layout of all such spaces by this contractor.
- B. Any cutting of finished work, and/or patching required due to inaccuracies or tardiness on part of this contractor in layout shall be accomplished by the General Contractor at the expense of this contractor. Cutting of existing walls for new piping shall be accomplished by this contractor. No structural members shall be cut without the prior approval of the Architect's Field Representative, any such cutting shall be done in a manner directed by the Architects Field Representative. This contractor

shall in no way alter work of other contractors or trades without authorization of the Architect.

### 3.6 PROTECTION AND CLEANING

- A. This contractor shall be completely responsible for adequate protection of all his materials and equipment during shipment, storage and on site, until final acceptance of the project by the Architect.
- B. In addition to the provisions and stipulations of the General Conditions, this contractor shall provide various types of protection as follows:
  - 1) Protect finished floors from chips and cutting oil by the use of metal chip receiving pan and an oil proof floor cover.
  - 2) Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
  - 3) Protect equipment and finished surfaces from paint drippings, insulation adhesive and sizing droppings, etc. by use of drip cloths.
  - 4) Protect existing construction where work is required to be performed in same.
- C. During the course of construction, this contractor shall maintain his materials, equipment, etc. in a neat and orderly manner and maintain the work spaces as clean as possible consistent with the conditions under which the work is to be conducted.
- D. During the course of construction, cover and otherwise protect all mechanical and plumbing equipment and insulation from damage, dirt, plaster, water, etc. This contractor shall be responsible to repair and/or replace all damaged mechanical equipment and materials.
- E. At the time of completion, this contractor shall clean thoroughly all the apparatus and equipment furnished by him.

### 3.7 EXCAVATION AND BACKFILL

- A. This contractor shall do all excavating of any material encountered as shown or as necessary for the installation of underground sewers, drains, piping and equipment in his contract. Provide and maintain bracing, shoring or sheathing necessary to support the walls of excavation. Excavating and backfilling beyond 5'-0 outside the building line will be by the General Contractor unless noted otherwise.
- B. This contractor shall bed all underground lines.
- C. Where roots of live trees encountered in excavations, they shall be carefully protected during construction.
- D. Provide and operate pumping equipment as necessary to keep trenches and other excavation free of water.
- E. After insulation and test of piping and equipment has been completed, backfill over all lines. Tamp backfill.

- F. Backfilling material for all trenches within the walls of the building and under drives and parking areas shall consist of grits or bank run sand. Backfilling materials removed from the excavation may be reused, if suitable and free from rubbish and organic matter.
- G. Exercise special care in backfilling trenches in which sewers are laid to guard against disturbing the joints. Such backfilling shall be placed evenly in 6" layers and carefully tamped under and around the pipe. Puddling with water will not be permitted until the backfill has been placed and tamped to a point 24" above the top of the pipes. Above this point backfill shall be placed and tamped in 12" layers.
- H. Remove and dispose of any material not used for backfill.
- I. Where excavation is necessary in existing pavements, the contractor for whose work the excavation is required shall pay in fees and costs of opening street or pavement and all costs of filling and repaving in accordance with requirements of an to the satisfaction of the Municipality, Utility or other owner of such paving.
- J. Where new lines are installed, exterior of the building, in paved area, this contractor shall cut pavement and excavate for the Mechanical Contractor and backfill same as soon as this contractor has completed installation of his work.
- K. Where excavation is necessary in an existing lawn, carefully remove and store sod. After backfilling trench, replace sod or apply top dressing of black dirt and seed to match existing lawn.
- L. This contractor shall excavate for all sanitary lines inside and outside of the building lines. This Contractor shall patch any paving and/or walks which are cut.

3.8 CONSTRUCTION DRAWINGS (AS BUILT DRAWINGS)

- A. The Contractor shall keep an accurate record of all deviations from contract drawings and specifications. He shall neatly and correctly enter, in colored crayon, any deviations on drawings affected and shall keep drawings available for inspection. Extra set of drawings will be furnished for this purpose.
- B. Record all changes showing:
  - 1) Size, type, capacity, etc. of any material, device or piece of equipment.
  - 2) Location of any device or piece of equipment.
  - 3) Location of any outlet or source in building service system
  - 4) Routing of any piping, conduit, sewers or other building services.
- C. These drawings shall also record the location of all concealed piping, conduit and other piping, by indication of measured dimensions to each such line from readily identifiable and accessible walls or corners of the building.
- D. These drawings shall be kept clean and undamaged and shall not be used for any purpose other than recording deviations from working drawings and exact locations of concealed work.
- E. After the project is completed, these sets of drawings shall be delivered to Architect, in good condition, as a permanent record of the installation as actually constructed.

3.9 SHOP DRAWINGS (SUBMITTALS)

- A. As soon as practicable, within 30 days after award of Contract, and before any materials, equipment or accessories are manufactured, the Contractor shall submit to the Architect for approval a minimum of five (5) copies, or sets, of shop drawings and detailed data describing all equipment he proposes to install. The equipment proposed for installation shall be in accordance with the provisions of these specifications and accompanying drawings. The submitted shop drawings shall include the names describing the equipment. The submitted shop drawings must be marked to indicate the type and/or catalog number and must be marked with the designating symbol and/or mark number used on the plans or in the specifications for each item.
- B. Approval of materials will be based on the manufacturers published ratings or certified drawings. All materials of like kind shall be one manufacturer.
- C. The Contractor shall examine all shop drawings and shall signify on the same that he has approved the equipment as acceptable according to the specifications and has approved the use of the equipment for space requirements of the project.
- D. Any equipment that requires a color selection shall have a color sample - metal - sample - submitted with the shop drawings, or provide the Architects office metal color samples for use of color selection in advance of shop drawing submittals.

3.10 TESTS AND ADJUSTMENTS

- A. This contractor shall furnish all required labor, materials and equipment and perform all tests required under applicable Codes for all mechanical systems.
- B. Where non-adjustable drive sheaves are provided with the equipment, this contractor shall be responsible for furnishing and installing the replacement sheaves required to balance the system.
- C. In the event leaks are observed, repairs or replacement shall be made and system retested.
- D. All systems shall be finally adjusted, all damaged goods replaced all repairs made, finally leaving all mechanical systems in clean complete, efficient operating order.

3.11 GUARANTEE AND WARRANTY

- A. This contractor shall guarantee all work installed by him, or his subcontractors to be free from defect in material and workmanship for a period of one year following the date of final acceptance of the work, unless a longer period is stipulated under specific headings, and he shall repair or replace - at no additional cost to the Owner - any material or equipment developing defects and shall also make good any damage caused by such defects or the correct of defects.
- B. This contractor shall submit his own and each equipment manufacturer's written certificates, warranting that each item of equipment furnished complies with all requirements of the drawings and specifications.
- C. Note that guarantee shall run from date of final acceptance of the work, not from date of installation of a device or piece of equipment. Deviations from this may occur on larger items of equipment used during the beneficial occupancy before the total

system is accepted, shall be made a matter of written record by the Architects Representative, in agreement with the authorized representative of the Owner.

3.12 WORKMANSHIP

- A. All work shall accomplished by mechanics skilled in the particular trade involved. Proper provision shall be made on all piping for expansion and contraction, using right angle loops, swing joints, or an approved type of expansion joints, whether the same as shown on drawings or not. Pipe shall be sloped to drain and installed parallel to adjacent walls. Contractor shall furnish and install all necessary valves, air vents, automatic devices and other specialties required to make the system complete whether the same is shown on the drawings or not.

3.13 VISITING THE SITE

- A. This contractor shall visit the site of the proposed work and shall familiarize himself with all conditions under which the work must be performed. He shall verify all data relative to location and size and capacity of new and/or existing utilities and determine the specific requirements of utility involved and shall include in his bid all materials and equipment required by such utility.

3.14 SUPERVISION OF WORK

- A. This contractor shall have in charge of the work, at all times during construction, a competent superintendent experienced in the work to be installed under this contract.

3.15 CONFERENCE PRIOR TO START OF WORK

- A. Immediately upon the award of Contract and before any work is started, the Contractor shall meet and confer with the Architect concerning the work under this Contract.
- B. Check with Project Architect as to time and place of meeting.

3.16 ADHERENCE TO REGULATIONS

- A. Give notices and comply with laws, ordinances, rules, regulations and orders of any public authority bearing on the work. If Contractor observes that Contract Documents are at variance with such in any respect, promptly notify Architect, in writing, necessary changes shall be adjusted by Change Order. If Contractor knowingly performs any work contrary to such without notice to Architect, he shall assume full responsibility therefore and shall bear cost attributable thereto.

3.17 RUBBISH

- A. All rubbish resulting from the work herein specified shall be removed from the premises as fast as it accumulates.
- B. On Completion of his work, this contractor shall remove from the site all tools, equipment, surplus materials, and rubbish pertaining to his own operations. Each Contractor shall pay all costs for such removal and disposition and shall perform final cleaning. Refer to contract for additional requirements.

3.18 REQUIREMENTS FOR FINAL INSPECTION

- A. All of the following items must be completed prior to final inspections. No exceptions will be made and no final payment will be made until all items are completed.
- B. Thoroughly clean all parts of the apparatus and equipment. Adjust and calibrate all controls and place system software in fully operating condition.
- C. Submit Operating Instructions, Service Manual and System Documentation, including all warranties.
- D. Complete all punch list items.
- E. Submit 'As-Built' drawings to Architect.

### 3.19 DAMAGE BY LEAKS

- A. This contractor shall be responsible for damage to the grounds, walks, roads, buildings, piping systems, electric systems and their equipment and contents, caused by leaks in the piping systems being installed or having been installed herein. He shall repair at his expense all damages so caused. All repair work shall be done as directed by the Architect.

### 3.20 EMERGENCY REPAIRS

- A. The Owner reserves the right to make emergency repairs, as required to keep equipment in operation without voiding the contractors' guarantee bond nor relieving the Contractor of his responsibilities during the bonding period.

### 3.21 INSPECTION AND FEES

- A. Tests for Plumbing Systems - Soil, waste, vent and water piping shall be tested by the Contractor and approved, before acceptance. Soil or waste piping located underground shall be tested before backfilling. Equipment required for test shall be furnished by the Contractor without additional cost to the Owner.
- B. Drainage Systems - Shall be tested as follows:
  - 1) Water Test - The entire drainage and venting system shall have all necessary openings plugged to permit the entire system to be filled with water to the level of the highest vent stack above the roof. The system shall hold this water for 30 minutes without showing leakage in piping.
  - 2) Where a portion of the system is to be tested, the test shall be conducted in the same manner, except that a vertical stack 10' above the highest horizontal line to be tested may be installed and filled with water to maintain sufficient pressure of a pump may be used to supply the required pressure. The pressure shall be maintained at 30 minutes.
- C. Air Test - If tests are made with air, a pressure of not less than 5 psig shall be applied with a force pump and maintained at least 15 minutes without leakage. A mercury-column gauge shall be used in making the air test.
- D. Final Test - The final test of the completed drainage and vent system may be either a smoke or a peppermint test. When the smoke test is employed, the smoke shall be produced by a smoke machine and a pressure equal to 1" water column shall be maintained for 15 minutes before starting inspection. When peppermint test is preferred, 20 ounces of peppermint shall be introduced into each line or stack.

Defects discovered shall be eliminated by resetting the fixture and equipment with new gaskets.

- E. Defective Work - If inspection or tests show defects, such defective work or material shall be replaced and inspection and tests repeated. Repairs or piping shall be made with new material. No caulking of screwed joints or holes will be acceptable. All tests shall meet with the approval of state and local inspections.

### 3.22 SAFETY REQUIREMENTS

- A. Contractor shall comply with OSHA requirements for physical hazards, safety equipment, fire fighting equipment and protective equipment.

### 3.23 PROHIBITED CONSTRUCTION

- A. There shall be no duct, water, waste, steam or condensate lines placed over electrical switchgear, transformers, or electric wall panels.

### 3.24 OPERATING INSTRUCTION MANUAL

- A. Submit one copy to the Architect for approval.
- B. After approval, submit three (3) copies to the Architect for delivery to the Owner.
- C. Bind the written operating instructions, shop drawings, equipment catalog cuts and manufacturer's instructions into a hardbacked binder where they can be accommodated into 8½ " x 11" size. Material to be assembled as follows:
  - 1) First Page - Title of job, school district, address, date of submittal, name and telephone number of Contractor, Subcontractors, and name of Engineer.
  - 2) Second Page - Index.
- D. First Section - A copy of each manufacturer's installation and operating instructions.
- E. Second Section - A copy of each approved shop drawing.
- F. Each section shall be identified with descriptive tabs.

### 3.25 PERSONNEL INSTRUCTION

- A. Provide a minimum of 4 hours total instruction to personnel selected by Owner for operation of building plumbing systems. This is over and above specialized systems listed elsewhere in this specification. Instructions shall include the following:
  - 1) Show location of items of equipment and explain what they do.
  - 2) Refer to operating instruction manual for record and clarity.
  - 3) Coordinate written and verbal instructions so that each is understood by personnel.

### 3.26 FIREPROOFING

**140208**

- A. This contractor shall see Section 07 84 00 Firestopping for sequencing their work with the General Contractor. Fire seal all penetrations as required with Hilti Firestop Systems or equal.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Storm piping.

## 1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

## 1.3 QUALITY ASSURANCE

- A. Follow manufacturer's requirements for installation.
- B. Comply with ANSI B31 pressure code for pressure piping.

**2. PART 2 - PRODUCTS**

## 2.1 PLUMBING PIPING

- A. Sanitary piping materials below slab
  - 1) Schedule 40 PVC with solvent joints per ASTM D2665, D2564, D2665. Cast iron hub and spigot per ASTM A74 and C 564. 2" minimum diameter

**3. PART 3 - EXECUTION**

## 3.1 ARRANGEMENT AND ALIGNMENT OF PIPING

- A. Piping shall be installed in a uniform manner parallel to walls or ceilings. All changes in direction shall be made with fittings. Horizontal piping shall be run at right angles to building lines.
- B. Buried pipe shall be firmly bedded the full length each joint with the exception where bell holes are required. Where unstable soil conditions occur under buildings, support shall be made from the underside of the structural slab by an approved type hanging device embedded in the concrete.

◆ END OF SECTION ◆

## STORM PIPING SPECIALTIES

1. **PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Floor drains.
- B. Cleanouts.

## 1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

## 1.3 QUALITY ASSURANCE

- A. Floor drains shall meet ASME A112.21.1M.
- B. Cleanouts shall meet ASME A112.36.2M.

## 1.4 MANUFACTURERS

- A. Zurn, Smith, Watts or PPI.

2. **PART 2 - PRODUCTS**

## 2.1 COMPONENTS

- A. Floor Drains: Zurn Z504 diameter top drain, Dura Coated cast iron body with bottom outlet, seepage pan and combination membrane flashing clamp and frame for heavy duty slotted grate.
- B. Cleanouts: Floor cleanout, cast iron body, spigot outlet connection, brass plug with tapered head, adjustable housing. .

3. **PART 3 - EXECUTION**

## 3.1 INSTALLATION

- A. Set floor drain lower than finished floor to allow for slope to drain. Coordinate all locations with General Contractor.
- B. Cleanout
  - 1) Interior - Provide cleanouts at each change of direction of flow in soil and waste piping greater than 45 degrees, at the base of all soil and waste risers or stacks at not more than 50 feet intervals in horizontals
  - 2) Outside - Heavy duty cleanout with round scoriated C.I. non-tilt top, adjustable to Fin. Grade. Set in 1'-0" x 1'-0" concrete pad.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Natural Gas Piping.

## 1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, performance ratings, and installation instructions.

## 1.3 QUALITY ASSURANCE

- A. Conformance to National Fuel Gas Code.
- B. Material and installation requirements shall follow NFPA 54, state and local gas company codes.
- C. Conformance to ANSI B31.

**2. PART 2 - PRODUCTS**

## 2.1 GAS PIPING

- A. Gas piping above grade and inside building shall be schedule 40 black steel piping.

## 2.2 GAS VALVES

- A. Gas valves 2 inches and smaller shall be full port all brass screwed gas service stops with lever handles and check or Gas valves 2" and smaller may be ¼ turn ball valves

**3. PART 3 - EXECUTION**

## 3.1 INSTALLATION

- A. Piping 2" inches and smaller shall have threaded joints.
- B. Provide a valve, union, and dirt leg at connection to each appliance. Lubricate all valves before putting the valves into service.
- C. Provide 1/2 inch elastomeric insulation around all piping in walls and through floors.
- D. Test all piping for 24 hours at 100 psi.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 HVAC SECTIONS

- A. SECTION 23 00 00 – GENERAL PROVISIONS
- B. SECTION 23 83 00 – RADIANT HEATING UNITS

## 1.2 SCOPE OF WORK

- A. Work under HVAC includes all necessary work required to complete the Heating & Ventilating Air Conditioning System as shown on the drawings and as herein specified and as follows:
  - 1) Installation of gas fired infrared heaters.
  - 2) All test inspections and permits.

**2. PART 2 - PRODUCTS**

## 2.1 MANUFACTURERS NAMEPLATES

- A. Each unit of equipment shall be identified by permanently attached nameplate of corrosion-resistant metal. Plates shall bear the following information.
  - 1) Manufacturers Name
  - 2) Serial and Model Numbers
  - 3) Rated Capacity
  - 4) Temperature, Pressure or Other Limitations

**3. PART 3 - EXECUTION**

## 3.1 WORK SPECIFIED ELSEWHERE:

- A. The Contractor is referred to the General Documents and applicable portions of Division 01 of the Specifications. The Instructions to Bidders, General Conditions, Supplemental General Conditions, Special Conditions, Addenda, Alternates, Ohio Building Codes, these Technical Specifications, together with the Contract and Proposal, comprise the Contract Documents for this contract.

## 3.2 INTENT OF DRAWINGS AND SPECIFICATIONS:

- A. Work covered by these specifications and accompanying design drawings shall include all labor, materials, equipment, and services necessary for, and reasonably incidental to, the complete installation of the mechanical systems for the project. Any additional material, labor, or electrical modifications in using equals or approved equals is the responsibility of this contractor.

- B. Drawings are diagrammatic in nature, designed to provide Contractor with a working knowledge of systems to be installed. Omissions of minor specialties, or minor modifications to lay-out due to exigencies of construction, shall not relieve the contractor of the responsibility of furnishing and installing all materials and work required to make the systems complete and operative.
- C. The drawings indicate required size and points of termination of pipes and ducts and suggest proper routes to conform to structure, avoid obstructions and preserve clearances. However, it is not intended that drawings indicate all necessary offsets, and it shall be the work of this Contractor to make the installation in such a manner as to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear without further instructions, or cost, to the Owner or Architect.
- D. The drawings shown, in general, where the pipes, ducts and equipment are to be located. This Contractor shall check over all the drawings and details carefully. Location of duct work and equipment may not be changed without written approval by the Architect.
- E. Selection of equipment and fabrication of all elements including piping etc. shall meet space and service requirement of the project.
- F. Substitution of makes other than those specifically named in the specifications, and drawings, will be approved by the Architect for the following reasons only - that the materials proposed for substitution are equal to and/or superior to equipment named, in construction, efficiency and utility, and further that the equipment named in the specifications cannot be delivered to the job in time to complete the work in proper sequence to work of other trades, due to conditions beyond control of contractor. Any additional material and/or labor in using equals or approved equals is the responsibility of this contractor.
- G. To receive consideration, requests for substitutions must be accompanied by documentary proof of equality of difference in price and delivery, if any, in form of certified quotation from suppliers of both specified and proposed equipment.
- H. In case of difference in price, the Owner shall receive all benefits of the difference in cost involved in any substitution and the contract altered by change order to credit Owner with any savings so obtained.
- I. Consult all drawings, Architectural, Structural, Mechanical & Electrical. Refer any discrepancies to the Architect before bid due date, - otherwise, corrections shall be made at expense of this contractor.

### 3.3 CODES AND STANDARDS:

- A. All materials and workmanship shall meet, in minimum, applicable provisions of State and Local Codes and Regulations governing the work. Where plans or specifications call for work or materials exceeding minimum standards, the plans and/or specifications shall apply.
- B. In the event any work shown or indicated on the drawings or in the specifications requires modification, or additions, to meet applicable Codes, the Contractor shall notify the Architect and obtain clarification before proceeding with the work.

- C. Contractor shall secure and pay for all notices, local permits and inspections required under applicable Codes and Regulations, including final Certificates of Approval, and shall pay all fees for same. The Plumbing Contractor will secure the State Plumbing Permit.

3.4 REFERENCE SYMBOLS:

- A. Symbols for various references used herein include:

1)	A.G.A.	American Gas Association
2)	A.W.W.A.	American Water Works Association
3)	A.S.H.R.A.E.	American Soc. of Heating, Refrigeration & A.C.Eng.
4)	A.S.M.E.	American Society of Mechanical Engineers
5)	P.D.I.	Plumbing - Drainage Institute
6)	C.I.S.P.I.	Cast Iron Soil Pipe Institute
7)	S.M.A.C.N.A.	Sheet Metal & Air Conditioning Contractors National Association, Inc.
8)	N.F.P.A.	National Fire Protection Association
9)	UL	Underwriters Laboratories, Inc.
10)	NEC	National Electrical Code
11)	A.N.S.I.	American National Standards Institute
12)	O.S.H.A.	Occupational Safety and Health Act

3.5 PROTECTION AND CLEANING

- A. This contractor shall be completely responsible for adequate protection of all his materials and equipment during shipment, storage and on site, until final acceptance of the project by the Architect.
- B. In addition to the provisions and stipulations of the General Conditions, this contractor shall provide various types of protection as follows:
  - 1) Protect finished floors from chips and cutting oil by the use of metal chip receiving pan and an oil proof floor cover.
  - 2) Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
  - 3) Protect equipment and finished surfaces from paint drippings, insulation adhesive and sizing droppings, etc. by use of drip cloths.
  - 4) Protect existing construction where work is required to be performed in same.
- C. During the course of construction, this contractor shall maintain his materials, equipment, etc. in a neat and orderly manner and maintain the work spaces as clean as possible consistent with the conditions under which the work is to be conducted.
- D. During the course of construction, cover and otherwise protect all mechanical and plumbing equipment and insulation from damage, dirt, plaster, water, etc. This contractor shall be responsible to repair and/or replace all damaged mechanical equipment and materials.

- E. At the time of completion, this contractor shall clean thoroughly all the apparatus and equipment furnished by him.
- F. All air handling equipment, blowers, etc. which are equipped with air filters shall have new filters installed at the time of the project completion.

3.6 CONSTRUCTION DRAWINGS (AS BUILT DRAWINGS)

- A. This contractor shall keep an accurate record of all deviations from contract drawings and specifications. He shall neatly and correctly enter, in colored crayon, any deviations on drawings affected and shall keep drawings available for inspection. Extra set of drawings will be furnished for this purpose.
- B. Record all changes showing:
  - 1) Size, type, capacity, etc. of any material, device or piece of equipment.
  - 2) Location of any device or piece of equipment.
  - 3) Location of any outlet or source in building service system
  - 4) Routing of any piping, conduit, ducts, sewers or other building services.
- C. These drawings shall also record the location of all concealed piping, ducts, conduit and other piping, by indication of measured dimensions to each such line from readily identifiable and accessible walls or corners of the building.
- D. These drawings shall be kept clean and undamaged and shall not be used for any purpose other than recording deviations from working drawings and exact locations of concealed work.
- E. After the project is completed, these sets of drawings shall be delivered to Architect, in good condition, as a permanent record of the installation as actually constructed.

3.7 SHOP DRAWINGS (SUBMITTALS)

- A. As soon as practicable, within 30 days after award of Contract, and before any materials, equipment or accessories are manufactured, the Contractor shall submit to the Architect for approval a minimum of five (5) copies or (1) electronic copy of shop drawings and detailed data describing all equipment he proposes to install. The equipment proposed for installation shall be in accordance with the provisions of these specifications and accompanying drawings. The submitted shop drawings shall include the names describing the equipment. The submitted shop drawings must be marked to indicate the type and/or catalog number and must be marked with the designating symbol and/or mark number used on the plans or in the specifications for each item.
- B. Approval of materials will be based on the manufacturers published ratings or certified drawings. All materials of like kind shall be one manufacturer.
- C. This contractor shall examine all shop drawings and shall signify on the same that he as approved the equipment as acceptable according to the specifications and has approved the use of the equipment for space requirements of the project.

- D. Any equipment that requires a color selection shall have a color sample - metal - sample - submitted with the shop drawings, or provide the Architects office metal color samples for use of color selection in advance of shop drawing submittals.

### 3.8 TESTS AND ADJUSTMENTS

- A. This contractor shall furnish all required labor, materials and equipment and perform all tests required under applicable Codes for all mechanical systems.
- B. Where non-adjustable drive sheaves are provided with the equipment, this contractor shall be responsible for furnishing and installing the replacement sheaves required to balance the system.
- C. In the event leaks are observed, repairs or replacement shall be made and system retested.
- D. All systems shall be finally adjusted, all damaged goods replaced all repairs made, finally leaving all mechanical systems in clean complete, efficient operating order.

### 3.9 GUARANTEE AND WARRANTY

- A. This contractor shall guarantee all work installed by him, or his subcontractors to be free from defect in material and workmanship for a period of one year following the date of final acceptance of the work, unless a longer period is stipulated under specific headings, and he shall repair or replace - at no additional cost to the Owner - any material or equipment developing defects and shall also make good any damage caused by such defects or the correct of defects.
- B. This contractor shall submit his own and each equipment manufacturer's written certificates, warranting that each item of equipment furnished complies with all requirements of the drawings and specifications.
- C. Note that guarantee shall run from date of final acceptance of the work, not from date of installation of a device or piece of equipment. Deviations from this may occur on larger items of equipment used during the beneficial occupancy before the total system is accepted, shall be made a matter of written record by the Architects Representative, in agreement with the authorized representative of the Owner.

### 3.10 WORKMANSHIP

- A. All work shall accomplished by mechanics skilled in the particular trade involved. Proper provision shall be made on all piping for expansion and contraction, using right angle loops, swing joints, or an approved type of expansion joints, whether the same as shown on drawings or not. Pipe shall be sloped to drain and installed parallel to adjacent walls. Contractor shall furnish and install all necessary valves, air vents, automatic devices and other specialties required to make the system complete whether the same is shown on the drawings or not.

### 3.11 VISITING THE SITE

- A. This contractor shall visit the site of the proposed work and shall familiarize himself with all conditions under which the work must be performed. He shall verify all data relative to location and size and capacity of new and/or existing utilities and determine the specific requirements of utility involved and shall include in his bid all materials and equipment required by such utility.

3.12 SUPERVISION OF WORK

- A. This contractor shall have in charge of the work, at all times during construction, a competent superintendent experienced in the work to be installed under this contract.

3.13 CONFERENCE PRIOR TO START OF WORK

- A. Immediately upon the award of Contract and before any work is started, the Contractor shall meet and confer with the Architect concerning the work under this Contract.
- B. Check with Project Architect as to time and place of meeting.

3.14 ADHERENCE TO REGULATIONS

- A. Give notices and comply with laws, ordinances, rules, regulations and orders of any public authority bearing on the work. If Contractor observes that Contract Documents are at variance with such in any respect, promptly notify Architect, in writing, necessary changes shall be adjusted by Change Order. If Contractor knowingly performs any work contrary to such without notice to Architect, he shall assume full responsibility therefore and shall bear cost attributable thereto.

3.15 RUBBISH

- A. All rubbish resulting from the work herein specified shall be removed from the premises as fast as it accumulates.
- B. On Completion of his work, this contractor shall remove from the site all tools, equipment, surplus materials, and rubbish pertaining to his own operations. Each Contractor shall pay all costs for such removal and disposition and shall perform final cleaning. Refer to contract for additional requirements.

3.16 REQUIREMENTS FOR FINAL INSPECTION

- A. All of the following items must be completed prior to final inspections. No exceptions will be made and no final payment will be made until all items are completed.
- B. Thoroughly clean all parts of the apparatus and equipment. Adjust and calibrate all controls and place system software in fully operating condition.
- C. Submit Operating Instructions, Service Manual and System Documentation, including all warranties.
- D. Complete all punch list items.
- E. Submit 'As-Built' drawings to Architect.

3.17 DAMAGE BY LEAKS

- A. This contractor shall be responsible for damage to the grounds, walks, roads, buildings, piping systems, electric systems and their equipment and contents, caused by leaks in the piping systems being installed or having been installed herein. He shall repair at his expense all damages so caused. All repair work shall be done as directed by the Architect.

## 140208

### 3.18 EMERGENCY REPAIRS

- A. The Owner reserves the right to make emergency repairs, as required to keep equipment in operation without voiding the contractors' guarantee bond nor relieving the Contractor of his responsibilities during the bonding period.

### 3.19 INSPECTION AND FEES

- A. Defective Work - If inspection or tests show defects, such defective work or material shall be replaced and inspection and tests repeated. Repairs or piping shall be made with new material. No caulking of screwed joints or holes will be acceptable. All tests shall meet with the approval of state and local inspections.

### 3.20 SAFETY REQUIREMENTS

- A. Contractor shall comply with OSHA requirements for physical hazards, safety equipment, fire fighting equipment and protective equipment.

### 3.21 PROHIBITED CONSTRUCTION

- A. There shall be no duct, water, waste, steam or condensate lines placed over electrical switchgear, transformers, or electric wall panels.

### 3.22 OPERATING INSTRUCTION MANUAL

- A. Submit one copy to the Architect for approval.
- B. After approval, submit three (3) copies to the Architect for delivery to the Owner.
- C. Bind the written operating instructions, shop drawings, equipment catalog cuts and manufacturer's instructions into a hardbacked binder where they can be accommodated into 8½ " x 11" size. Material to be assembled as follows:
  - 1) First Page - Title of job, school district, address, date of submittal, name and telephone number of Contractor, Subcontractors, and name of Engineer.
  - 2) Second Page - Index.
- D. First Section - A copy of each manufacturer's installation and operating instructions.
- E. Second Section - A copy of each approved shop drawing.
- F. Each section shall be identified with descriptive tabs.

### 3.23 PERSONNEL INSTRUCTION

- A. Provide instruction to personnel selected by Owner for operation of building mechanical system. This is over and above specialized systems listed elsewhere in this specification. Instructions shall include the following:
  - 1) Show location of items of equipment and explain what they do.
  - 2) Refer to operating instruction manual for record and clarity.

**140208**

- 3) Coordinate written and verbal instructions so that each is understood by personnel.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Radiant tube heaters

## 1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, capacity, accessories, and dimensions.

## 1.3 QUALITY ASSURANCE

- A. ANSI Compliance: Construct, install, and certify gas-fired radiant heaters in accordance with latest edition ANSI Z83.6, "Gas-Fired Infrared Heaters," including all current supplements.
- B. CSA Compliance: Provide CSA Seal affixed to each burner nameplate assembly. Provide CSA certification of heater design as "Vented Infrared Heater."
- C. National Fire Protection Association (NFPA) Compliance: Install gas-fired radiant system in accordance with NFPA 54, "National Fuel Gas Code" (ANSI Z223.1, Latest Edition) and NFPA 70, "2005 National Electrical Code."
- D. Temperature-Indicating and Temperature-Regulating Equipment: Construct and certify radiant heater temperature controls in accordance with Underwriters Laboratories, Inc., (UL) latest edition of UL 873, including all current supplements.

## 1.4 MANUFACTURERS

- A. Roberts Gordon, Detroit Radiant or Re-Verber-Ray.

**2. PART 2 - PRODUCTS**

## 2.1 RADIANT TUBE HEATER CONSTRUCTION

- A. The heater's control housing shall be totally enclosed with a corrosion resistant enameled steel exterior. The controls shall be easily serviceable by removing one (1) panel.
- B. The heater's combustion chamber shall be 4" O.D. 16ga. titanium alloy or aluminized steel finished with a high emissivity rated, corrosion resistant, black coating.
- C. The heater's radiant emitter tube shall be 4" O.D. 16ga. Aluminized steel finished with a high emissivity rated, corrosion resistant, black coating.
- D. The heater's combustion chamber and radiant emitter tube shall incorporate a 4" slip fit connection in which the upstream tube slides into the next tube and is held by a bolted clamp.

- E. The silicon carbide ignitor shall be readily accessible and serviceable without the use of tools.
- F. Reflectors shall be .025 polished aluminum unless noted otherwise with a multifaceted design which includes reflector end caps. Reflectors shall be rotatable from 0 to 45 degrees when required. The heater's reflector hanging system shall be designed to permit expansion while preventing noise and/ or rattles. Reflectors shall be assembled to the heater without the use of tools.
- G. The heaters shall include a downstream turbulator baffle for maximum thermal efficiency, 2' stainless steel flex connector, hanging kit, and 1/2" gas cock shut-off.
- H. Heaters shall be equipped with a sight glass allowing a visual inspection of ignitor and burner operation from the floor.
- I. The radiant tube heaters shall be designed such that, at the customer's option, outside combustion air may be supplied without the use of additional supply fans. An air intake collar shall be supplied as part of the burner control assembly to accept a 4" O.D. supply duct.
- J. Combustion chamber shall be 409 series stainless steel.

## 2.2 RADIANT TUBE HEATER BURNER CONTROLS

- A. Heaters shall be equipped with a direct silicon carbide ignition system with a one (1)-time ignition trial to sensing mode and an infinite trial after sensing mode. Power supplied to each burner shall be 120 VAC, 60 Hz. Flame sensing shall be via an independent sensing rod and circuit.
- B. The main burner shall be constructed of stainless steel.
- C. The control assembly shall be Design Certified by CSA, shall provide main burner regulation, and shall be of the redundant type.
- D. Heater controls shall include a safety differential pressure switch to monitor combustion air flow, so as to provide complete burner shutdown due to insufficient combustion air or flue blockage.
- E. The heater's control system shall be designed to shutoff the gas flow to the main burner in the event either a gas supply or power supply interruption occurs.
- F. The heater's blower motor shall be thermally protected and the blower motor's impeller shall be balanced.
- G. The heater's air flow control system shall provide a 45 second pre-purge prior to initiating burner operation.
- H. No condensation shall form as a result of combustion in the combustion chamber or radiant tubes while at operating temperatures.
- I. The heater shall incorporate moisture and corrosion resistant circuitry.

- J. Total heater shutdown shall occur in the event of circuit control lockout. An interruption of power (reset thermostat) will restart the firing sequence.

2.3 WARRANTY

- A. The supplier shall provide a manufacturer's published warranty covering the heater's stainless steel burner for a period of ten (10) years, combustion and radiant emitter tube assembly for a period of five (5) years, and all components utilized in the heater control assembly for a period of one (1) year.

**3. PART 3 - EXECUTION**

3.1 INSTALLATION

- A. This Contractor shall provide all code required safety devices.
- B. Start up and adjust gas-fired radiant heaters in accordance with Manufacturer's instructions and Gas Utility Company's requirements. Check and calibrate controls. Adjust burners for maximum efficiency.
- C. Install gas-fired radiant pipe systems as indicated, in accordance with Manufacturer's installation instructions, in compliance with applicable codes and approvals, and as shown on Drawings.
- D. Suspend heat exchangers, burners, gas piping, conduit, and reflectors from building structure as specified elsewhere, in order to provide a durable and safe installation, in accordance with Manufacturer's installation instructions, and as shown on Drawings.
- E. Do not exceed minimum clearance to combustibles outlined and printed on burner nameplate, and in Manufacturer's product data. Measure clearance distance from surface of heat exchangers.
- F. Install vent piping as indicated. Terminate where indicated with bird screen cover.
- G. Plumbing Contractor shall install gas piping in accordance with Manufacturer's installation instructions.
- H. Connection from supply line to burner unit must be made in accordance with installation instructions.
- I. Gas shut-off cock, as supplied with unit, and controls in unit must not be subjected to more than 1/2 lb. or 14 in. W.C. pressure. If high pressure testing of gas supply line is required, this test must be made with a plug in 1/2 in. branch line to each burner. Never test gas line with shut-off cock installed or burner unit connected.
- J. Mount electronic zone temperature sensors 4 ft. above finished floor

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 GENERAL REQUIREMENTS

- A. The Instructions to Bidders, General Conditions, Supplemental General Conditions, Special Conditions, Addenda, Alternates, these Technical Specifications and the Drawings, together with the Contract and Proposal, comprise the Contract Documents for the Electrical Contract.
- B. Refer to the General Requirements, as many of the General Requirements stated therein are applicable to the electrical work.

## 1.2 SCOPE OF WORK

- A. This contract shall consist of all work specified in Divisions 26 and 27 of this specification or as called for in the electrical drawings. Also included in this contract are any additional materials required by manufacturers of specified products or approved equals to complete the electrical installation. In addition, this contract includes all material and labor necessary in accordance with all applicable codes to complete the total electrical project as shown or implied by the electrical drawings and specification.
- B. This scope includes all new work.

## 1.3 SITE VISIT

- A. Each bidder shall visit the job site or sites and review the conditions to satisfy himself that these drawings and specifications are accurate. If any discrepancies are discovered, the Architect should be notified at least 72 hours prior to bid opening.

## 1.4 LAYOUT OF WORK

- A. This Contractor is responsible for laying out his work so that all equipment and devices are located in the proper location and at the proper height. All mounting heights and locations shall be as specified in this specification unless they conflict with ANSI handicap accessibility standards. In which case, ANSI standards shall govern.
- B. When laying out raceways, this Contractor shall verify that his equipment does not conflict with equipment by other Contractors, especially sanitary and storm lines. Electrical raceways shall be routed around all sanitary and stormlines.
- C. The Electrical Contractor shall inspect the architectural floor plans to verify that all new switches are located on the latch side of door openings. If there are any significant conflicts, the Architect should be notified prior to installation of such devices.

## 1.5 WORKMANSHIP

140208

- A. All work shall be done in accordance with the latest standards and practices. Work shall be performed by skilled journeyman electricians under the supervision of a competent foreman. Any work installed by an apprentice electrician or laborer shall only be done so under the supervision of a journeyman electrician.
- B. All excessive holes caused by this Contractor shall be repaired at this Contractors expense, when directed so by the Architect.
- C. Unless otherwise noted all equipment installed by this Contractor shall be new and complete with all accessories necessary to complete the installation.

#### 1.6 INSPECTION

- A. All work shall be inspected by inspection department having jurisdiction.
- B. Upon completion of the work, this Contractor shall furnish to the Owner and Architect a certification of inspection and approval from said Bureau before final payment on contract will be allowed.
- C. Permit and Plan Approval will be provided by the Architect, and paid for by the owner. Any additional permits required will be submitted and paid for the respective contractor. Re-inspection fees will be the responsibility of the electrical contractor.

## 2. PART 2 - DOCUMENTS

### 2.1 DRAWINGS & SPECIFICATIONS

- A. Electrical work for this contract can be found on the electrical drawings and Divisions 26, 27 and 28 of this specification. However, each bidder shall review the architectural, for additional work. These drawings are diagrammatical and exact location of all electrical devices shall be field verified.
- B. The Contractor shall review all addenda prior to beginning construction. Any changes called for in bidding addenda shall be implemented at no additional cost to the Owner. In addition, this Contractor shall furnish any additional items necessary to complete the project as called for in the drawings and specifications even though they may not appear on such. For example, additional junction boxes, conduit, etc. Finally, any quantities that appear in the electrical legend are to aid the bidder. The Contractor shall supply the correct quantity as shown on the drawings or called for in the specification.

### 2.2 APPROVAL DRAWINGS

- A. This Contractor shall submit approval drawings for all custom built or special purpose equipment, including but not limited to all items listed below.
- B. Manufacturers catalog cuts are acceptable for the following items:
  - √ Lighting Fixtures      √ Wiring Devices      √ panel boards
- C. Any devices that require color selection shall have approval drawings complete with color charts

- D. The Electrical Contractor shall verify, stamp and initial all shop drawings "approved".
- E. This approval shall include items such as voltage selection when the manufacturer requires this information. After the Contractor approves the shop drawings, he shall submit them to the Architect for final approval.
- F. Upon review and approval of the drawings, the Architect will retain two copies and return the remaining copies back to the Contractor.
- G. The Architect's approval of the shop drawings does not relieve the Contractor of his responsibilities if the manufacturer's drawings are not complete or deviate from the drawings and specifications. Any acceptable deviation from the original specifications and drawings must be approved by the Architect in the form of a letter.

### 2.3 AS BUILT DRAWING

- A. Contractor shall keep an accurate record of all deviations from contract drawings and specification. He shall neatly and correctly enter in colored pencil any deviation on drawings affected and shall keep drawings available for inspection. Extra set of drawings will be furnished for this purpose.
- B. At completion of job and before final approval, make any final corrections to drawings and certify to the accuracy of each print by signature thereon and deliver same to Architect.

## 3. PART 3 - LABELING AND INSTRUCTIONS

### 3.1 EQUIPMENT IDENTIFICATION

- A. Lettering shall include name of equipment, the specific unit number, and any reference to on-off or other instructions that are applicable.
- B. Name plates shall be laminated phenolic with a black surface and white core. Use 1/16" thick material for plates up to 2" x 4".
- C. Lettering shall be condensed gothic. The space between lines shall be equal to the width of the letters. Use 1/4" minimum height letters which occupy four to the inch. Increase letter size to 3/4" on largest plates.

### 3.2 OPERATING INSTRUCTION MANUAL

- A. Provide written instructions for each system listed in the Specification.
- B. Submit one copy to the Architect for approval.
- C. After approval, submit four (4) copies to the Architect for delivery to the Owner.
- D. Bind the written operating instructions, shop drawings, equipment catalog cuts and manufacturer's instructions into a hardbacked binder where they can be accommodated into 8½" x 11" size. Material to be assembled as follows:

- 1) First Page - Title of job, school district, address, date of submittal, name of Contractor and name of Engineer.
- 2) Second Page - Index.
- 3) Third Page - Introduction to First Section containing a complete written description of the system.
- 4) First Section - Written description of system contents, where actually located in building, how each part functions individually and how system works as a whole. Conclude with a list of items requiring service and either state the service needed or refer to the manufacturer's data in the binder that describes the proper service.
- 5) Second Section - A copy of each shop drawing with an index at the beginning of the section.
- 6) Third Section - A copy of each manufacturer's operating instructions with an index at the beginning of the section.
- 7) Fourth Section - A list of all equipment used on the job, Contractor's purchase order numbers, supplier's name and address.

### 3.3 PERSONNEL INSTRUCTION

- A. Provide a minimum of four (4) hours instruction to personnel selected by Owner for operation of building electrical system. This is over and above specialized systems listed elsewhere in this specification. Instructions shall include the following:
- B. Show location of items of equipment and explain what they do.
- C. Refer to operating instruction manual for record and clarity.
- D. Coordinate written and verbal instructions so that each is understood by personnel.

## 4. PART 4 - TESTING

### 4.1 TESTS

- A. Contractor shall conduct such tests and adjustments of equipment as required by Architect or necessary to verify performance requirements. Submit data taken during such tests to Architect. Contractor shall pay all professional engineering fees involved in required testing of equipment. Electrical Contractor shall megger test any or all feeders or branch circuits as required or described by the Architect.
- B. Electrical Contractor shall provide necessary electrical personnel and testing instruments as required to assist Architect in testing of installation. Cost shall be included in Contractor's bid.
- C. All signaling systems, such as fire alarm, dimming system and voice/data systems shall be checked out and tested by qualified field Representative or equipment vendor. A report shall be submitted to the Architect by Vendor Representative

140208

indicating results of such final check out and tests. Final payment will not be approved until such report is submitted.

#### 4.2 LOAD BALANCE AND ADJUSTMENT

- A. This Contractor shall furnish personnel and equipment and insure that building power, lighting, motor and appliance loads are balanced between phases of service entrances, distribution feeders and/or transformers as closely as possible.
- B. Special care shall be taken during load balance to assure that reverse rotation of motors is not caused.

#### 4.3 CLEANING AND FINISHING

- A. After all tests have been completed and approved by the Architect and Owner, this Contractor shall clean all fixtures and equipment. This shall include the removal of all stickers and marking from fixtures, cabinets, conduits and other equipment.

#### 4.4 GUARANTEE AND WARRANTY

- A. This Contractor shall guarantee his workmanship and material (Lamps excepted) for a period of one year from the date of final acceptance and leave his work in perfect order at completion. Should defects develop within the guarantee period, the Contractor shall, upon notice of same, remedy the defects and have all damages to other work or furnishing caused by the defects or the work of correcting same repaired and/or replaced at his expense, to the condition before such damage. The date of final acceptance is defined as the date of signature by the Owner on the final payment of this Contract.

### 5. PART 5 - CODES AND STANDARDS

#### 5.1 GENERAL

- A. Perform all work in accordance with the latest edition of the National Electric Code as issued by the National Fire Protection Association International, National Electrical Safety Code, Standards of the National Bureau of Fire Underwriters', and any local codes or ordinances.
- B. The Architect will provide state plan approval and building permit. Contractor shall pay for and obtain any other local permit.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Temporary lighting and power

## 1.2 QUALITY ASSURANCE

- A. NFPA 70 - National Electrical Code

- 1) All work shall be in compliance with the National Electrical Code.

- B. Underwriter's Laboratory

- 1) Materials utilized shall be UL listed.

- C. Occupational Health and Safety Association

- 1) Comply with all applicable OSHA standards.

**2. PART 2 - PRODUCTS**

## 2.1 MATERIALS

- A. Ground fault circuit breakers.

- 1) Temporary power and lighting circuits shall be protected by ground fault circuit breakers.

- B. Main panelboard with disconnect.

- 1) Provide temporary service with main disconnect in accordance with Section 01 50 00 of the specifications.

- C. Temporary lighting.

- 1) Provide temporary lighting in accordance with Section 01 50 00 of the specification.

- D. 120 volt receptacles with overcurrent protection.

- 1) Provide temporary power outlets in accordance with Section 01 50 00 of the specifications.

**3. PART 3 - EXECUTION**

## 3.1 GENERAL

- A. Electrical Contractor shall provide and maintain temporary electrical service as required to provide power and lighting for construction purposes. See Section 01 50 00 for additional information.

**140208**

- B. Provide grounding of temporary service in accordance with NEC requirements.
- C. Ground temporary branch circuit for lighting and power.
- D. No temporary wiring, fittings, receptacles, or light fixtures may be used for permanent wiring. All temporary lighting and wiring shall be removed at the completion of the project.

◆ END OF SECTION ◆

---

**POWER SYSTEM WIRE CONNECTIONS AND DEVICES****1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

A. Connectors for power systems 600V and less.

## 1.2 QUALITY ASSURANCE

A. Underwriter's Laboratory

1) All wire connectors shall be UL listed, where applicable.

B. NFPA 70 - National Electrical Code

1) All work shall be done in accordance with the NEC guidelines.

C. Torque values UL486A, ULA486B

**2. PART 2 - PRODUCTS**

## 2.1 CONNECTORS FOR POWER SYSTEMS 600V OR LESS

A. Insulated connectors.

1) Shall be equal to Minnesota Mining and Manufacturing Company Scotch Locks.

2) Similar products such as Wing-Nuts by Ideal Company or equal products by T&B Co. are approved.

B. Compression type connectors

**3. PART 3 - EXECUTION**

## 3.1 PERFORMANCES

A. Splices, taps, and other connections involving conductors of #10 AWG or smaller shall be made with insulated connectors.

B. Splices, taps, and other connections involving conductors more than #10 AWG shall be made with compression type connectors insulated with electrical tape to 150% of the insulating value of the conductor insulation.

◆ END OF SECTION ◆

---

**LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES****1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Building wire and cable for wiring systems of 600V or less

## 1.2 QUALITY ASSURANCE

- A. NFPA 70 - National Electrical Code
  - 1) All work shall be in accordance with the National Electrical Code.
- B. Underwriter's Laboratory
  - 1) Materials utilized shall be UL listed where applicable.
- C. 600V Insulating material NEMA WC

**2. PART 2 - PRODUCTS**

## 2.1 CABLE AND WIRING - 600V OR LESS

- A. All conductors shall be soft drawn copper conforming to ASTM specifications and the latest edition of the NEC.
- B. Wire size, insulation type and manufacture shall be clearly identified on the wire jacket.
- C. Wire and cable shall be rated 600V.
- D. On 120/208 volt, three phase systems, phase wires shall be black, red and blue. The neutral wire shall be white.
- E. The equipment ground shall be green or taped completely green at all accessible points.
- F. Grounding conductors larger than No. 8 may be taped with color coded tape at the following locations:
  - 1) At each terminal
  - 2) At each conduit entrance
  - 3) At 12 in. intervals in all accessible points.
- G. Utilize Type THHN Copper, 600 volt rated for lighting branch circuits and general use.
- H. Minimum size of conductors shall be No. 12. stranded.
- I. Provide #10 AWG branch conductors where distance from panel to last outlet exceeds 70 ft. for 120V and 100' for feeders or branch circuits in extremely hot locations where ambient temperatures are 90°C.

**140208**

- J. Cords for makeup connections to equipment shall be 600 volt, heat resistant, rubber insulated, portable cable with neoprene jacket type "SO" and "W" of extra flexible stranded copper.
- K. Control wiring shall be No. 14 minimum.

**3. PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Perform work in accordance with NEC requirements.
- B. Utilize recognized Industry Standard practices and equipment for pulling wire through raceways.
- C. Utilize wire ties in panelboards and cabinets to neatly organize and restrain cables.

◆ END OF SECTION ◆

---

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Basic requirements for grounding for protection of life, equipment, circuits, and systems
- B. Requirements for grounding low voltage systems and equipment.

## 1.2 QUALITY ASSURANCE

- A. NFPA 70 - National Electrical Code
  - 1) All work shall be in accordance with the National Electrical Code.
- B. UL 467
- C. Bare solid copper conductors ASTM B3.
- D. Bare stranded copper conductors ASTM B8.

**2. PART 2 - PRODUCTS**

## 2.1 MATERIALS

- A. Minimum No. 12 AWG 600V insulated copper equipment grounding conductor insulated with green colored insulation.
- B. Bare copper conductors.

**3. PART 3 - EXECUTION**

## 3.1 GENERAL

- A. Conduit is not an allowable grounding means. A continuous grounding conductor shall be required in all raceways, sized as shown on plans and in compliance with NEC requirements when not noted.
- B. Provide grounding of circuits, equipment, conduits and etc. as required by the NEC.
- C. Ground all conduit, cabinets, meters, panels, fixtures, and other exposed non-current carrying metal parts of electrical equipment in accordance with all provisions of the National Electrical Code.
- D. Use bare stranded copper for all grounding conductors. Where the potential exists, that the grounding conductor may be subject to damage, the grounding conductor shall be encased in a metallic raceway. The size of all grounding conductors shall conform to the National Electric Code, unless a larger size is shown on the drawings.
- E. All metallic conduit systems shall be electrically continuous throughout and shall be grounded at the service entrance.

**140208**

- F. All cord connected appliance frames shall be grounded at the conduit system through a grounding conductor in the cord.
- G. Install green bounding jumper between the outlet box and the receptacle grounding terminal on all receptacles.

◆ END OF SECTION ◆

---

**HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS****1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Hangers and supporting devices for electrical components

## 1.2 QUALITY ASSURANCE

- A. NFPA 70 - National Electrical Code
  - 1) All work shall be in compliance with the National Electric Code.
- B. Underwriter's Laboratory
  - 1) Materials utilized shall be UL listed, where applicable.

**2. PART 2 - PRODUCTS**

## 2.1 MATERIALS

- A. Hangers shall be individual steel ring or clevis type hangers
- B. Corrosion resistant finish in corrosive environments is required.
- C. Concrete inserts shall be rated per load for attachment to concrete
- D. Malleable iron C-clamp and retaining clip shall be utilized for attachment to steel beams
- E. Ring and turnbuckle attachment shall be utilized for steel pipe
- F. Trapeze hangers with clamps and hanger rods shall be utilized for parallel pipe runs

**3. PART 3 - EXECUTION**

## 3.1 GENERAL

- A. The electrical contractor shall supply all necessary items to support all equipment and devices provided by this contractor. All supports shall be in accordance with the NEC guidelines.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Conduit
- B. Conduit Fittings
- C. Outlet and device boxes
- D. Pull boxes and accessories

## 1.2 QUALITY ASSURANCE

- A. NFPA 70 - National Electrical Code
  - 1) All work shall be in accordance with NEC requirements.
- B. Underwriter's Laboratory
  - 1) All material shall bear U.L. Label.
- C. Rigid Metal Conduit (RMC) ANSI C80.5.
- D. Electrical Metallic Tubing (EMT) ANSI C80.3.
- E. Liquidtight Flexible Metal Conduit UL 360.
- F. Underground Polyvinyl Chloride (PVC) NEMA TC9
- G. NEMA OS 2 and UL 514A

**2. PART 2 - PRODUCTS**

## 2.1 RACEWAYS MATERIALS

- A. Rigid Metal Conduit.
  - 1) Rigid galvanized heavy wall conduit,  $\frac{3}{4}$ " minimum size.
- B. Electrical Metallic Tubing (EMT)
  - 1) Electrical Metallic Steel shall be galvanized steel,  $\frac{3}{4}$ " minimum size unless noted otherwise.
- C. Underground Polyvinyl Chloride (PVC) Schedule 40.
  - 1) Underground polyvinyl chloride (PVC) conduit shall be heavy wall Schedule 40 with glued fittings.
- D. Liquidtight Flexible Metal
  - 1) Liquidtight flexible conduit shall be watertight and equal to "Sealtite."  $\frac{1}{2}$ " minimum size.

140208

- E. Set screw or compression fittings.
  - 1) All EMT connections may be with compression type of set screw type fitting.

## 2.2 OUTLET AND DEVICE BOXES

- A. Metal outlet and device boxes
  - 1) Metal boxes shall be NEMA OS1 compliant as made by Steel City, or equal.
- B. Watertight floor box with cover suitable for intended use.
- C. Boxes shall have a minimum depth of 2 inches, unless noted otherwise.
- D. Concealed outlet boxes shall be galvanized formed steel
- E. Flush installed masonry boxes shall be raised square cut corners.
- F. Flush device boxes in drywall shall be equipped with extension rings.
- G. Exposed boxes shall be cast type FS or FSA.
- H. Outlet boxes for data/video and voice outlets shall be 4" x 4" with minimum depth of 3-1/2" and be provided with a single gang or double gang plaster frame as noted on plans.

## 2.3 PULL BOXES

- A. Galvanized construction with screw covers.
- B. Size and gauge to conform to National Electrical Code.
- C. Sufficient size to accommodate all cables and wires install in pull box.

## 2.4 FITTINGS

- A. NEMA FB 1 listed.

# 3. PART 3 - EXECUTION

## 3.1 PERFORMANCES

### A. GENERAL

- 1) Raceway installation shall comply with NECA 1.
- 2) Minimum conduit size shall be ¾ inch trade size.
- 3) Conduits shall be sealed where entering refrigerated spaced.
- 4) Minimum size of flexible conduit shall be ½ inch trade size.
- 5) Extend exposed raceways parallel and perpendicular to the surface of exposed structural members and surface contours as much as practical to provide a new appearance. Space of clamps or hangers support conduit shall not be greater than the following:

Conduit Sizes in Inches	Max Spacing of Support in Feet	
	Horizontal	Vertical
3/4"	7'	7'
1" & 1 1/4"	10'	8'
1 1/2" & 2"	10'	10'

- 6) A support shall be provided for exposed or concealed raceway as close as practical to and not exceeding 1' from an unsupported box or access fitting. In horizontal runs, a support at a box or access fitting may be omitted when the box or access fitting is independently supported and the raceway terminal is not made with a chase nipple or threadless box connector. In vertical runs, the load produced by the weight of the raceway and the enclosed conductors shall not be carried by the raceway terminal but shall be carried entirely by the conduits supports.
- 7) Maintain 6" from paralleled hot water piping and 4" from cross runs. Support conduits by Minerallac or approved galvanized pipe brackets securing to hollow masonry units with toggle bolts, concrete or brick with expansion bolts, metal surfaces with machine screws and wood construction with wood screws.
- 8) Conduits shall not be secured to other piping, duct work or other mechanical equipment except where specifically directed. Conduits will be permitted on pipe swings of other trades when so arranged with the other installing Contractor.
- 9) Paralleled conduits shall be uniformly spaced using performed channel. Slotted angle iron will be rejected. Groups of conduits to be supported by trapeze hangers at ends of hanger rods.
- 10) Allowable Conduit Usage

CIRCUIT IDENTIFICATION	ALLOWABLE TYPE CONDUIT						
	GRC	IMC	EMT	RNC	Flex	W.P.Flex	MC Cable
Underground secondary service entrance conduit	X			X			
Feeders to switchboards, panels, motors, transformers, exposed conduit	X	X	X				
Connections to interior light fixtures & transformers					X		
Connections to motors & motorized equipment, interior & exterior						X	
Underground interior feeder conduit	X	X		X			
Branch circuit wiring from light fixture to light fixture						X	X
Underground exterior branch conduit	X	X		X			
Exposed conduits	X	X	X				
Conduits in metal stud partitions			X				
Conduits buried in block walls	X	X	X				
Conduits above suspended ceilings	X	X	X				
Misc. low voltage systems (fire alarm) up to 4"C size. (EMT not allowed	X	X	X				

underground or as otherwise limited above)							
Interior above ceiling conduits 3 1/2" and larger except as otherwise permitted.	x	x	x				

3.2 ELECTRICAL METALLIC TUBING

- A. Contractor may option to use U.L. Labeled galvanized electrical metallic tubing (EMT) with a minimum trade diameter of 3/4" at the following locations only:
  - 1) Interior and exterior walls
  - 2) Above ceilings.
- B. All EMT connections may be with compression type or set screw type fitting. EMT shall be supported in accordance with NEC guidelines.

3.3 NON-METALLIC CONDUIT

- A. Raceways 3/4" diameter or larger below slabs may be PVC Schedule 40. Heavy wall, Schedule 40 PVC conduit shall have glued fittings. Raceways bends, offsets, etc. shall be field formed using approved "heat box", etc. No PVC will be permitted above the floor line.
- B. All raceways shall be separated and supported with approved spacers to provide not less than two inch (2") separation the entire length of the raceway. All fittings for 2" diameter and larger raceways shall be factory fittings.
- C. PVC conduit may be used under building slab on grade for branch feeder and branch circuits. Conduit shall be installed in drainage fill.
- D. PVC conduit may be used for exterior branch circuits.

3.4 FLEXIBLE CONDUIT

- A. Flexible Metallic Conduit shall be used for connection to motors, air handlers, lay in light fixtures, and pumps. In damp locations flexible conduit shall be water tight and equal to "sealtite." All flexible conduit shall be at least 1/2" diameter and not more than 6'-0" long.

3.5 FITTINGS

- A. All raceways, where they enter boxes, shall be secured in place with double locknuts and bushings. All bushings on conduits one and one-half inch (1 1/2") diameter and larger shall be insulating bushings.
- B. Insulation and/or grounding type bushings shall be installed on all conduits where required by NEC or specifically noted.
- C. All conduits, where crossing building expansion joints or greater than 200 feet in length, shall be provided with properly bonded expansion fittings, similar to O.Z. Mfg. Co. Type AX, weatherproof.

- D. One-hole, steel straps shall be used to fasten raceways on flat surfaces; two-hole straps shall be used for uneven surfaces or where raceways are mounted to auxiliary steel.
- E. Provide plastic bushings at the end of conduits to protect cables from damage.

### 3.6 SLEEVES, INSERTS, AND OPENINGS

- A. The Electrical Contractor shall layout his work prior to construction of new walls and floors. He shall provide and install sleeves and inserts for all conduits, pipes, or ducts which pass through concrete walls or floors. Sleeves shall be constructed of galvanized steel and shall be rigidly installed into walls and floors. Finally, provide all necessary inserts to support electrical equipment in accordance with the manufacturer's recommendations and any governing code.

### 3.7 CUTTING AND PATCHING

- A. This Contractor shall work in advance of other Contractors when possible so that cutting and patching is not required. When cutting and patching is necessary to correct improperly installed materials, it shall be done at this Contractors expense. Finally no structural members shall be cut without the expressed written consent of the Architect.

### 3.8 BOXES

- A. This contractor shall provide and install all necessary boxes required to complete the electrical installation. Any open knock outs not used shall be plugged with suitable blanking devices. All boxes shall be rigidly fastened to the building structure.
- B. Provide and install new receptacle and switch boxes and any special purposes boxes as called for on the drawings. New boxes shall include plaster rings as required.
- C. Wall switch boxes shall be mounted 4'-0" above floor level. Receptacle boxes shall be mounted 16" above floor level unless noted otherwise. All dimensions are to bottom of box.
- D. All outlet boxes upon which lighting fixtures are to be installed shall be equipped with 3/8" inch fixture studs and shall be steel boxes.
- E. All boxes shall be rigidly supported from building structure independent of the conduit system.
- F. Install pull box cabinets as required by the NEC and/or where shown on plans.
- G. No "tangle boxes" shall be used without the expressed consent of the Architect.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Panelboards

## 1.2 QUALITY ASSURANCE

- A. Panelboards UL 67 and NEMA PB-1
- C. NFPA 70 - National Electrical Code
  - 1) All work shall be in accordance with NEC requirements
- D. Underwriter's Laboratory
  - 2) All equipment shall be UL listed or bear a UL label.

**2. PART 2 – PRODUCTS**

## 2.1 PANELBOARDS

- A. The Electrical contractor shall install new panelboards as called for in this specification and on the drawings. This contractor shall supply all necessary items to complete the installation of these new panelboards.
- B. Each panelboard shall include a plastic identification tag.
- C. Cabinets shall be constructed of commercial, galvanized, code gauge sheet steel. Gutters shall be sized to conform to avoid overcrowding.
- D. Trims shall be oversized where necessary to accommodate the entrance of several large conduits and/or when necessary to avoid overcrowding.
- E. Trims shall be surface of flush type as indicated on drawings. Trims shall contain piano hinged doors and be equipped with flush chrome plated combination locks and catches, all keys alike. Deliver two (2) keys to the Owner for each panel installed.
- F. MINIMUM REQUIREMENTS
  - 1) Tin plated copper of aluminum phase and neutral bussing.
  - 2) Integral ground buss.
  - 3) Panelboards to be provided with overcurrent protective devices, enclosure suitable for use and compression type main and neutral lugs.
  - 4) Typed panelboard directory of circuits.
  - 5) Lamicoid label for branch circuits.

140208

- 6) Panel boards to be provided with circuit breaker type over current protective device with short circuit current available at terminals.
- 7) Mechanical type main and neutral lugs.
- 8) Cabinets for panelboards and distribution panels shall have NEMA 1 enclosures with sufficient gutter space to meet NEC Tables 373.6(a) and (b) requirements.
- 9) Bus bars in panelboard and distribution panel assemblies shall be adequately braced to withstand the maximum short circuit current at the point of application.
- 10) Equipment meeting all requirements of the specifications by General Electric, Siemens or Square D Company are approved.

## 2.2 BRANCH CIRCUIT PANEL BOARDS

### A. Lighting – 120/208V – 3 $\phi$ – 4 wire

- 1) New lighting panels shall be equal to Square D type NQOD. See schedule at end of this section.
- 2) Panel LP-ZA
- 3) Panel shall be rated for 100 Amps and include 30-20 amp – 1 pole circuit breakers

## 3. PART 3 - EXECUTION

### 3.1 GENERAL

- A. Install panelboards in accordance with manufacturer's recommendations and NEC requirements.
- B. Panelboards shall be securely bolted to masonry walls or metal studs.
- C. Provide arc flash hazard label on equipment per the National Electrical Code.
- D. Protect panelboards from damage by other contractors, including painting work. Paint overspray or other material shall be removed from equipment prior to final acceptance.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

1.1 SECTION INCLUDES

- A. Duplex Receptacles and Integral GFCI Receptacles
- B. Wall Switches
- C. Device Cover Plates

1.2 QUALITY ASSURANCE

- A. Duplex Receptacles and Integral GFCI Receptacles - Underwriter's Laboratory 498, NEMA WD 1.
  - 1) All receptacles shall be UL listed.
- B. Wall Switches - Underwriter's Laboratory 20, NEMA WD 1.
  - 1) All wall switches shall be UL listed.
- C. Device Cover Plates - Underwriter's Laboratory 514
  - 1) All device cover plates shall bear a UL label or be UL listed.
- D. NFPA 70 - National Electrical Code.
  - 1) All work shall be in accordance with the National Electrical Codes.

**2. PART 2 - PRODUCTS**

2.1 DUPLEX RECEPTACLES AND INTEGRAL GFCI RECEPTACLES

- A. General purpose receptacles shall be 1-pole, 3 wire, grounding, rated for 20 amp, 125 volt. Receptacles shall be specification grade, duplex, back and side wired. Color shall be brown.
- B. Receptacles designated as general use shall be of a different for those designated as complete receptacles.
- C. Ground fault protection where required shall be built into receptacle.
- D. Ground fault protection where required shall be built into receptacle. Trippins values shall conform: UL 1436 and UL 943.
- E. Receptacles shall be as made by Hubbell, Pass & Seymour, Leviton, Eagle, or Arrow Hart.
- F. Receptacles shall be:

Duplex convenience outlet	Hubbell 5362	
GFI Receptacle	Hubbell GF5362	Pass & Seymour 2091
Weather Proof Receptacle	Hubbell GF5362	Pass & Seymour 2091
Ceiling Mounted Receptacle	Hubbell 5269C	

2.2 WALL SWITCHES

- A. Wall switches shall be specification grade, 20 amp, 120/277 volt rated with ground screw.
- B. Switches shall be made by Hubbell, Pass & Seymour, Leviton, Eagle, or Arrow Hart.
- C. New switches shall be:

Single Pole	Hubbell 1221	Pass & Seymour 20AC1
Three way	Hubbell 1223	Pass & Seymour 20AC3
Four Way	Hubbell 1224	Pass & Seymour 20 AC4

2.3 WALL PLATES

- A. Stainless steel with U.S. 23D finish with matching head screws. Provide standard size cover plates for all surface mounted boxes.
- B. Configuration of plates to match devices.
- C. Weatherproof type stainless steel with U.S. 23D finish on exterior mounted.

3. PART 3 - EXECUTION

3.1 GENERAL

- A. This contractor shall provide all switches and receptacles as shown on the drawings. All switches and receptacles shall be brown in color.
- B. Location of receptacles on drawings are diagrammatical, the electrical contractor shall adjust the location as required to avoid interference with work by others.

3.2 CONVENIENCE RECEPTACLES

- A. Provide and install convenience receptacle as shown on drawings. Receptacles shall be mounted 16" above floor level or 6" above counter unless noted otherwise. All dimensions are from floor level to bottom of box.
- B. GFIC receptacles shall be mounted 48" above floor level unless noted otherwise. All convenience receptacles shall comply with current ADA and ANSI handicapped accessibility standards.

3.3 COVER PLATES

- A. Provide stainless steel cover plates for local switches, receptacles, voice/data jacks, television receptacle boxes and other devices as required.

3.4 LOCAL SWITCHES

- A. Provide and install local switches as shown on the drawings. Switches shall be mounted 4'-0" above floor level to bottom of box.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

A. Fuses

## 1.2 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code

1) All work shall be in accordance with NEC requirements.

B. Underwriter's Laboratory

1) All fuses shall be UL listed or bear UL label.

C. Cartridge Fuses: NEMA FU 1, ANSI/IEEE FU 1.

**2. PART 2 - PRODUCTS**

## 2.1 FUSES

A. Low voltage fuses shall be Class R or Class L rejection type, time delay, high interrupting, current limiting, dual element.

B. Fuses rated 0 through 600 amp for Motor Branch Circuit shall be NEMA Class "RK1" and U.L. approved for 200,000 amps RMS symmetrical interrupting capacity.

1) Fuses for other branch circuits Class J time delay.

C. Fuses shall be nonrenewable cartridge type, noninterchangeable type.

D. Low voltage fuses shall be made by Littlefuse Tracor or approved equal.

E. At the completion of the project, the electrical contractor shall supply the Owner with 3 spare fuses for each type and size installed.

**3. PART 3 - EXECUTION**

## 3.1 GENERAL

A. Furnish and install all new fuses shown on the drawings, specified, or required to complete the intended installation.

B. Verify proper size of fuses with equipment provider prior to installation.

◆ END OF SECTION ◆

---

**ENCLOSED SWITCHES AND CIRCUIT BREAKERS****1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Safety Switches
- B. Circuit Breakers

## 1.2 QUALITY ASSURANCE

- A. Safety Switches: UL 98, NEMA KS1.
- B. Molded Case Circuit Breakers: UL 489, NEMA AB1.
  - 1) Circuit breakers shall be UL listed for the panel they are installing.
- C. NFPA 70 – National Electrical Code
  - 1) All work shall comply with NEC requirements.
- D. Underwriter's Laboratory
  - 1) Safety switches shall be UL listed.

**2. PART 2 - PRODUCTS**

## 2.1 SAFETY SWITCHES

- A. Rating suitable for use.
  - 1) Switch rating size shall be as noted on plans.
- B. Totally enclosed with external operating handle and mechanical cover interlock.
  - 1) Switches shall be in NEMA 1 enclosure, unless noted otherwise.
- C. Padlockable handle in the OFF position.
- D. Fusible type switches.
  - 1) Provide properly sized fuses.
- E. Non fusible type
  - 1) Non-fused type shall be sized as required.
- F. Integral ground lug
  - 1) Provide integral ground lug
- G. NEMA 3R in weatherproof locations.

140208

- 1) All exterior safety switches shall have NEMA 3R enclosure unless noted otherwise.

H. Heavy duty type

- 1) Safety switches shall be heavy duty type.

I. Acceptable Manufacturers

- 1) Square D Company
- 2) General Electric
- 3) Siemens

2.2 PANELBOARD BREAKERS

- A. Cases for circuit breakers and switches shall be constructed of a glass-reinforced insulating material that provides high dielectric strength. Current carrying components shall be isolated from the handle. The handle position shall indicate whether the circuit breaker is OFF, ON or tripped.

B. Circuit breakers shall

- 1) Have common tripping of all poles
- 2) Have trip indicator
- 3) Be rated 10,000 ampere interrupt minimum.

C. Ground Fault Protection

- 1) Provide ground fault protection for branch circuits as noted on plans.

D. HACR Type

- 1) Provide HACR type circuit breakers for all heating, air conditioning and refrigeration loads requiring HACR breakers.

- E. Provide circuit breaker pins or clips as required for single pole breakers sharing a common neutral to comply with NEC article 210.4 requirements.

**3. PART 3 - EXECUTION**

3.1 SAFETY SWITCHES

- A. Install safety switches in accordance with manufacturers' instructions and NEC requirements.
- B. Provide any mounting hardware required to properly restrain safety switch to building structure or equipment.

3.2 CIRCUIT BREAKERS

**140208**

- A. Provide all circuit breakers shown on the drawings or specified.
- B. Install circuit breakers in panelboards in accordance with manufacturer's instruction.
- C. Circuit breakers shall be manufactured by the same company as the panelboard or switchgear in which they are being installed.
- D. Series rated circuit breaker not acceptable.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Manual Motor Starters

**2. PART 2 - PRODUCTS**

## 2.1 ACROSS-THE-LINE MANUAL CONTROLLERS

- A. Manual controllers shall have quick make or quick breaker toggle switch or push button.
- B. Controllers shall be class A type and equipped with heaters and sensors in each phase matched to name plate full-load current of motor.
- C. All manual controllers for motors ½ HP and less shall be complete with overload and pilot light and shall be furnished and installed by this contractor. Starters shall be designed for 120 volts, single phase service. Starters shall be Square D class 2510, General Electric Type CR101, Siemens SMF. All manual starters shall be flush mounted in finished areas. Provide key switches where noted on plans.

**3. PART 3 - EXECUTION**

## 3.1 GENERAL

- A. The electrical contractor shall connect power to all motors supplied by the Food Service Contractor, Mechanical Contractor, or General Contractor.

## 3.2 MOTOR STARTERS

- A. Certain equipment provided by others will contain built-in starters. This Contractor shall provide power to control panel on this equipment. Sizing of overloads for built-in equipment will be by others.
- B. Finally, proper sizing of overload heaters shall be the responsibility of this contractor. At the completion of the project this contractor shall submit a report to the Architect containing all name plate motor information along with overload sizes.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Interior lighting fixtures

## 1.2 QUALITY ASSURANCE

- A. Underwriter's Laboratory
  - 1) All fixtures shall be UL listed or bear UL label.
- B. NFPA 70 - National Electrical Code
  - 1) All work shall be in accordance with NEC requirements.
- C. Fluorescent fixtures UL 1598.
- D. Emergency lighting UL 924.
- E. Exit Signs UL 924

**2. PART 2 - PRODUCTS**

## 2.1 FLUORESCENT LIGHTING

- A. Fluorescent Industrial Fixtures
  - 1) No lenses
  - 2) 2 foot by 4 foot
  - 3) Symmetric reflectors as required
  - 4) Steel construction
- B. Labels and Miscellaneous
  - 1) Wet and damp location labels as required
  - 2) Wireguards where scheduled or noted
- C. Installation
  - 1) Chain hang troffer type fixtures from structural steel independent of grid or screw attach fixtures to grid with clips and grid support at each corner of grid.

## 2.2 EMERGENCY LIGHTING

- A. Surface Mounted Unites – Type S
  - 1) Provide and install surface mounted emergency egress lighting units as shown on drawings. Each unit shall be a dual head batter powered unit

complete with build-in batter, charger and automatic transfer relay to provide 90 minutes of emergency illumination during power failure. Unit shall be Lithonia ELM 2B series, Prescolite EDS2 or SureLite CU1. Unit shall operate on 120 volts.

### 2.3 EXIT SIGNS

- A. Furnish and install the exit signs as shown on plans. All new exit signs shall be powered as shown on plans.
  - 1) Combination Exit Sign/Emergency Egress Light
    - a) New exit signs shall be Chloride model VCLRW/VL1RHP, Lithonia model LHQMSWIR120/ELA MR24 K0606, or SureLite model APC70RWH120/277 DH/6X54WWH. Signs shall be 6" red letter with white housing and face. Provide egress lighting heads and remote heads as shown on plans. Unit shall operate on 120 volts as noted on plans and include emergency battery.

### 2.4 LINEAR FLUORESCENT BALLAST

- A. All fluorescent ballasts shall be energy efficient, electronic, high power factor ballasts approved for 120 volt service unless noted otherwise.
- B. Ballasts shall have a maximum 10 percent total harmonic distortion
- C. Ballasts shall conform to FCC Regulations
- D. Ballasts shall be for T5HO lamp type
- E. Ballasts shall have 95 percent minimum power factor.
- F. Ballasts shall be quiet type with sound rating of "A" or better.
- G. Ballasts shall have 85 percent or higher ballast factor.
- H. Ballasts shall be as made by Advance or equal by Magne Tek or Motorola.

### 2.5 FLOURESCENT LAMPS

- A. T5HO lamps shall be rapid-start low-mercury lamps, rated 54 W maximum, nominal length of 45.2 inches, 5000 initial lumens (minimum), CRI 85 (minimum), color temperature 3500K, and average rated life 20,000 hours, unless otherwise indicated.

### 2.6 LIGHT FIXTURES SUPPORT COMPONENTS

- A. ¼ inch minimum diameter thread steel rod hangers
- B. ½ inch steel tubing with swivel ball fittings and ceiling canopy.

## 3. PART 3 - EXECUTION

### 3.1 INTERIOR BUILDING FIXTURES

140208

- A. Furnish and install the new lighting fixtures, lighting equipment and components as shown on the drawings, specified or required.
- B. All fixtures and equipment shall be delivered to the project complete with suspension accessories, canopies, hickies, casings, sockets, holders, reflectors, ballasts, diffusing materials, louvers, plaster frames, recessing boxes, accessories, etc., all wired and assembled as indicated.
- C. Fixtures shall be mounted directly from the building structure without relying on the ceiling suspension system.
- D. Provide all necessary inserts, auxiliary steel, hanger, etc.
- E. Provide swivel connections for sloped ceilings for any stem hung light fixtures.
- F. FLUORESCENT FIXTURES
  - 1) Furnish and install all auxiliary supports, brackets, etc. for the mounting of fixtures and equipment. All auxiliary supports shall be Kindorf, Unistrut or B-Line structural members and not perforated strap.
  - 2) This contractor shall verify all final ceiling types and construction prior to ordering fixtures and coordinate same with suppliers and manufacturers, to insure proper accessories, flanges, trims, etc.
  - 3) Recessed fixtures mounted in lay in ceiling shall be wired to bar joist above at all four corners.
  - 4) Fixtures shall be cleaned of dirt, inside and outside. Fixtures shall not be installed until painting work of General Contract is complete or, if earlier installation is mandatory, fixtures shall be completely protected with plastic, paper, or film during painting so no paint comes in contact with fixture.

### 3.2 LAMPS

- A. Electrical contractor shall install only enough lamps to provide adequate lighting for completion of work by all trades.
- B. The remaining lamps shall be installed within 10 days prior to final inspection.
- C. At the time of final inspection, all lamps shall be functioning properly.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Exterior luminaires with lamps and ballast; and poles.

## 1.2 QUALITY ASSURANCE

- A. Underwriter's laboratory
  - 1. All fixtures shall be UL listed or bear UL label.
- B. NFPA 70 – National Electrical Code
  - 1. All work shall be in accordance with NEC requirements.
- C. Luminaires UL 1598.
- D. Solid State Lighting (LED) UL1598.

## 1.3 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

- A. Fixtures and poles shall be designed for wind load pressures conforming to the Ohio Building Code.

**2. PART 2 – PRODUCTS**

## 2.1 SOLID STATE LIGHTING (LED) LUMINAIRES

- A. Shall be listed and labeled for installation in wet location.
- B. Metal parts shall be free of burrs, sharp corners, and edges.
- C. Shall be constructed of corrosion-resistant aluminum.
- D. Shall be rigidly formed housings that provide weathertight and light tight enclosures.
- E. Shall have stainless steel exposed hardware.
- F. Doors and frames shall prevent accidental falling during relamping or ballast replacement.
- G. Shall have heat and aging-resistant resilient gasket to seal lenses to luminaire door.
- H. Shall comply with IES LM-79 and have a CRI of 75 minimum.
- I. Color Consistency shall comply with NEMA SSL3.
- J. Shall have a B50 rating of at least 50,000 hours per IES LM-80.

## 2.2 DRIVERS FOR SOLID STATE LIGHTING (LED) LUMINAIRES

**140208**

- A. Shall comply with ANSI 82.11 and be UL 935 approved.
- B. Shall have a 120 volt input rating and a 24 volt DC output rating.
- C. Shall have a power factor of .90 or higher.

**3. PART 3 – EXECUTION**

**3.1 EXTERIOR BUILDING FIXTURES**

- A. Exterior lights shall be carefully located, rigidly mounted and properly piped to avoid unsightly raceways or boxes.
- B. Furnish and install the new exterior lights as shown on the plans, including lamps, poles, brackets, timers, boxes, wiring, connections, conduit, etc. for a complete and operable installation.

◆ END OF SECTION ◆

**1. PART 1 - GENERAL**

## 1.1 SECTION INCLUDES

- A. Security system

## 1.2 QUALITY ASSURANCE

- A. NFPA - National Electrical Code

- 1. All work shall be in accordance with NEC requirements.

- B. Underwriter's Laboratory

- 1. All material shall be UL listed or bear a UL label where applicable.

- C. Latest ANSI TIA/EIA-568, 569, 606, 607 Standards and Tenth Edition (or later).

- D. BICSI Telecommunications Distribution Methods Manual (TDMM).

- E. Products – Factory Mutual approved

**2. PART 2 - PRODUCTS**

## 2.1 RACEWAYS

- A. Conduit rough-in only at exterior door contact switch locations. Extend ½" conduit to nearest accessible ceiling plenum.

## 2.2 DOOR CONTACTS

- A. Provide concealed type door contacts equal to ADT 472452 where possible. In areas where concealed type contacts cannot be installed, utilize surface-mounted contacts. Locate new door contacts at doors as shown on plans.

## 2.3 WIRING

- A. The system wiring and installation shall comply with all applicable codes and drawings, and shall be installed in accordance with the manufacturer's recommendations.

- B. All wiring shall be color-coded and labeled at each end with self-laminating, machine-printed labels.

- C. All wiring shall be installed in metallic raceways and shall comply with the latest edition of the National Electric Code (NEC).

**3. PART 3 - EXECUTION**

## 3.1 INSTALLATION

**140208**

- A. This contractor shall supply and install new security alarm equipment specified herein and wire back to existing security alarm panel.

◆ END OF SECTION ◆

---

**1. PART 1 - GENERAL****1.1 SUMMARY****A. This Section includes:**

1. Site Clearing
2. Temporary erosion and sedimentation control measures
3. Qualitative requirements for grading, excavation, embankments, and sedimentation and erosion control. Earth moving for foundations, structures, pavement, ditches, culverts, drains, and utilities.

**B. Work Included:**

1. Complete all excavation, regardless of the material encountered, and all filling required to convert the existing grade to the finished contours and elevations shown on the drawings.
2. Rough grade and finish grade the site within the limits shown on the drawings.
3. Save existing topsoil for finish grading.
4. Complete the preparation of all earth subgrades for concrete slabs, interior and exterior.

**C. Quality Control**

1. Soils engineer for testing and inspection of proofrolling and compaction operations shall be provided by Contractor.

**1.2 DISPOSAL OF DEBRIS AND EXCESS MATERIALS**

- A. Unused excavated earth shall be moved to a location on the site, as directed by the owner.
- B. Remove other debris and excess materials from the site.

**1.3 SUBSURFACE CONDITIONS**

- A. Examine, investigate, and inspect the construction site as to the nature and location of the work, and the general and local conditions at the construction site, including, without limitation, the character of surface or sub-surface conditions and obstacles to be encountered on and around the construction site; and make such additional investigation required for the planning and execution of the work.

**1.4 COMPACTION TESTS (FILL UNDER SLABS)**

- A. The standard Proctor Test (AASHTO T-180) shall be the compaction test standard for determining compaction compliance on subgrade, subbase, and base under

concrete slabs as performed by an independent testing laboratory retained by the General Contractor, and subject to approval by the Architect.

## 1.5 QUALITY ASSURANCE

- A. Requirement of Regulatory Agencies: All work shall conform to regulations, codes, safety requirements, ordinances, and laws of federal, state and local governing bodies having jurisdiction.

## 2. PART 2 - PRODUCTS

### 2.1 CLASSIFICATION OF EXCAVATION

- A. Earth Excavation - The removal and disposal of all clay, loam, sand, gravel, soft sandstone, loose stone in masses, all boulders or concrete measuring less than one third cubic yard in volume, and all material which is not classified below as rock excavation.
- B. Rock Excavation - The removal and disposal of only that rock which is not decomposed, weathered, or shattered and which requires blasting for removal. Also included is the removal and disposal of any concrete or masonry structures exceeding one-third cubic yard in volume that may be encountered in the work. If and when rock is encountered, notify the Architect for an inspection and survey of the surface, prior to excavation.
- C. It is expected that rock excavation as defined above will **not** be encountered in the work.

### 2.2 EXCAVATION AND FILL MATERIALS

- A. All aggregates shall be 100 percent crushed and natural aggregate, no slag shall be permitted.
- B. Drainage Fill: Drainage fill shall be #5, #56, or #57 in accordance with the Ohio Department of Transportation Standard Specifications. Drainage fill shall be clean and washed gravel.
- C. Aggregate used with underdrains shall be washed limestone, washed gravel, or river rock. In all cases, the aggregates shall be 100 percent crushed.
- D. Topsoil: Shall be fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter or stones larger than 1/2".
  - 1. Provide 6" minimum topsoil
- E. Sand: Clean, general purpose sand, free of organic and deleterious materials.

### 2.3 BACKFILL AND FILL MATERIALS

- A. Backfill and Fill Material: Provide soil materials for backfill and fill, free from rock or gravel larger than 2 inches, in any dimension, debris, waste, frozen material, vegetable or other deleterious matter. All materials shall be approved prior to use.
  - 1. Excavated material meeting the above requirements may be used for fill, subject to approval.

- B. Top layer of fill required under concrete floor slabs basis of design is granular material as follows:
  - Interior Slabs - 6" No. 6 Stone
  - Exterior Slabs - 6" No. 6 Stone

Unless otherwise shown and required on drawings.

- C. Where material is from an untested source, the Contractor shall submit to the Architect at least 14 days in advance of delivery, a report of exploration and other data showing compliance.

## 2.4 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory materials are not available from excavations.

- 1. Satisfactory Soils: ASTM D 2487 soil classification groups.

- B. Backfill and Fill Material: Provide soil materials for backfill and fill, free from rock or gravel larger than 2 inches, in any dimension, debris, waste, frozen material, vegetable or other deleterious matter. All materials shall be approved prior to use.

- 1. Excavated material meeting the above requirements may be used for fill, subject to approval.

- C. Engineered Fill, Granular Backfill, B-Borrow for Structural Backfill and Fill Sand; Materials shall meet the graduations contained in the table. Graduations for engineered fill, granular backfill, B-borrow for structural backfill and fill sand.

## 3. PART 3 - EXECUTION

### 3.1 LAYING OUT THE WORK

- A. The Contractor shall lay out the work on the site.

### 3.2 CLEARING, SCALPING AND GRUBBING

- A. Clear, scalp, and grub in conformance with Item 201 of O.D.O.T. (except 201 Clear, scalp.03(c)). Remove topsoil to a minimum depth of 8 inches.

- B. The work shall consist of clearing, grubbing, stripping topsoil, removal of trees and stumps, and removing and disposing of all vegetation and debris within the contract limits from all areas to be occupied by buildings, walks, or paved areas. It shall also consist of removal, wholly or in part, and satisfactory disposal of all buildings, fences, structures, sidewalks, paving, and other obstructions which are not designated to remain.

- C. Remove trees and stumps indicated on drawings and located within the contract limits as follows:

- D. Remove Stumps and Large Roots under or within five (5) feet of the building, paving, and walks (stone, asphaltic or concrete).

- E. Remove Stumps and Large Roots completely.

- F. Separate heavy roots, rocks, cinders and other debris and stockpile topsoil in locations where directed by the Owner. Strip topsoil before excavation is begun.

### 3.3 EXCAVATING - GENERAL

- A. Excavate to elevations and dimensions indicated, plus sufficient space to permit erection of forms, shoring, drain tile, waterproofing, masonry work, and inspection. The Architect shall be notified once excavations are ready for placement of concrete. The Architect or his representative shall inspect all forming prior to placement of any concrete.
- B. Excavation for footings may be cut to accurate sizes and side forms omitted, if concrete is poured in clean-cut trenches without cave-ins. However, footing drain tile must be placed alongside the footing as indicated on the drawings and tied into storm drainage system.
- C. If suitable bearing for foundation support is not encountered at the depth indicated on the drawings, the contractor shall notify the Architect and not proceed further until instructions are given and necessary inspections and measurements made for the purpose of establishing the extent of additional work.
- D. Protect bottom of excavation from frost. Do not place foundations, footings, or slabs on frozen ground. Shore and brace excavations, protect all slopes and earth banks and provide shoring if necessary to prevent cave-in. Remove shoring and piling before backfilling is completed, but not until permanent supports are in place.
- E. Control grading around buildings so ground is pitched to prevent water from running into excavated areas of the building. Furnish all pumping required to keep excavated spaces clear of water during construction.
- F. Placing of footings on earth fill is not permitted unless so indicated on drawings. Fill excess cuts under footings and foundations with concrete and fill any excess cuts under slabs with compacted granular fill (ODOT 310.02 compacted to not less than 100% of the maximum density).

### 3.4 SITE PREPARATION

- A. Prior to the addition of fill, the sub-grade shall be compacted to not less than 90% of the maximum density of at optimum moisture content  $\pm$  3%. If wet spots, spongy conditions, or ground water seepage is found, corrective measures must be taken before the placement of fill.

### 3.5 EROSION CONTROL

- A. During construction the Contractor shall take appropriate control measures (straw bales, snow fence, etc.) to minimize erosion, to comply with the latest environmental and State requirements. See drawings for additional information.

### 3.6 FORMATION OF FILL

- A. Form fills of materials placed in successive horizontal layers of not more than 8" in loose depth for the full width of cross section. The depth of lift may be increased if the Contractor can demonstrate his ability to compact a larger lift.

- B. Material entering the fill shall be free of organic matter such as leaves, grass, roots and other objectionable material.
- C. Suspend operations on earth work when satisfactory results cannot be obtained because of rain, freezing weather or other unsatisfactory conditions. Work areas to be sloped to drain at all times.
- D. Earth fill material shall be of the proper moisture content before compaction is started. Wetting or drying of the material and manipulation to secure a uniform moisture content throughout the layer is required. Should the material be too wet or too dry to permit proper compaction or rolling, all work on all portions of the work affected shall be delayed until the material has been brought to the required moisture content. The moisture content of the fill material should be no more than two (2) percentage points higher or lower than optimum unless otherwise authorized. Sprinkling shall be done with equipment that will satisfactorily distribute the water over the described area and shall be worked into the material to bring it to a uniform moisture condition.
- E. Compaction operations shall be continued until the fill is compacted to not less than 95% above foundation elevation and 100% below foundation elevation of the maximum density as determined in accordance with Standard Proctor. Any areas inaccessible to a roller shall be consolidated and compacted by mechanical tampers. Operate equipment in such manner that hardpan, cemented gravel, clay or other chunky soil material will be broken up into small particles and become incorporated with the other material in the layer. Compaction work on slopes shall be terraced.
- F. In the construction of filled areas, place starting layers in the deepest portion of the fill, and as placement progresses, additional layers shall be constructed in horizontal planes. If directed, original slopes shall be continuously, vertically benched to provide horizontal fill planes. The size of the benches shall be formed so that the base of the bench is horizontal and the back of the bench is vertical. As many benches as are necessary to bring the site to final grade shall be constructed. Filling operations shall begin on the lowest bench, with the fill being placed in horizontal eight (8) inch loose lifts unless otherwise authorized. The filling shall progress in this manner until the entire first bench has been filled, before any fill is placed on the succeeding benches. Proper drainage shall be maintained at all times during benching and filling of the benches, to insure that all water is drained away from the fill area.
- G. Repair fill damaged by inclement weather.

### 3.7 BACKFILL

- A. All backfill for utility trenches, foundation excavations, etc. within structures, driveways, walks or parking lot areas shall be placed in successive horizontal layers with each layer being compacted to at least 95% of the maximum standard Proctor dry unit weight before the next layer is added. Lift thicknesses shall not exceed 8" unless testing verifies that compaction is being achieved. Testing only at the top of a completed fill to provide verification is not acceptable. In no instance shall puddling or jetting of the backfill material be allowed as a compacting method.

### 3.8 COMPACTING

- A. Compaction equipment shall be approved equipment of such design, weight, and quantity to obtain the required density in accordance with these specifications.

### 3.9 TESTING AND INSPECTION SERVICES

- A. Testing and inspection services for fill areas shall be included and consists of the following:
  - 1. Standard Proctor Test ASTM D698 on each type of fill material used for the project and of each type of soil subgrade requiring compaction.
  - 2. At least one moisture and density test performed on each area of fill for each and every lift in each and every fill location, to confirm conformance with the requirements of these specifications and the drawings. In larger areas, testing frequency shall be at least one test per 2,500 square feet of area per lift. Any areas that do not meet the compaction specifications shall be recompacted and retested.
  - 3. Perform tests using a qualified Testing Laboratory, approved by the Architect.

### 3.10 PLACING TOPSOIL

- A. As soon as practicable, after rough grading has been completed and approved, scarify the subgrade to a depth of 3 inches and place a 6 inch layer of topsoil uniformly spread over the area. Spread topsoil previously stripped and stockpiled on the site. See drawings for approximate area to receive topsoil under this contract.

### 3.11 DRAINAGE STRUCTURES

- A. Excavate and backfill for drainage structures in accordance with Item 603 of ODOT "Pipe Culverts Sewers and Drains" (except as provided in section 3.6 of this specification) to permit the structures to be built to the lines and grades shown.

### 3.12 CLEAN-UP

- A. At the completion of the work, and at other times as directed by the Architect, the areas involved in this construction shall be cleaned-up of all undesirable plants and other vegetative growth, rubbish, stumps, stones, down timber, dead brush and snags.
- B. All such items shall be disposed of by the Contractor. After removal of large objects, the site shall be cleaned with grubbing rakes or wide spaced tooth rakes to remove all stones and other undesirable objects 2 inches in diameter and larger.
- C. Concentrations of fine stone, glass, or mortar shall be removed or deposited at least 12 inches below finished grade.

◆ END OF SECTION ◆