CITY OF OREGON, OHIO

5330 Seaman Road
Oregon, Ohio 43616-2633

Oregon Central Fire Station
2021

PROJECT MANUAL – VOLUME 2 - TECHNICAL SPECIFICATIONS

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CITY OF OREGON, OHIO

Oregon Central Fire Station
2021

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BOWSER MORNER SOIL EXPLORATION REPORT (BMI Report No. 199079-0421-8693) – PROPOSED FIRE STATION 1040 SOUTH WYNN ROAD

CONSTRUCTION PLANS

SEE ATTACHED PLANS TITLED: **New Central Fire Station for Oregon Fire Department 1040 S. Wynn Road**

Plans prepared by: BUEHRERGROUP architecture & engineering, inc.
314 Conant Street, Maumee, OH 43537

Please call the City of Oregon Department of Public Service at (419) 689-7047 if any of the above items are missing from the Bid Specifications and Drawings.

1. PART 1 - GENERAL

1.1 SUMMARY OF WORK

A The Project consists of construction for:

1. Project Location: 1040 South Wynn Road
   Oregon, Ohio 43616

2. Owner: Oregon Fire Department
   5002 Seaman Road
   Oregon, Ohio 43616

1.2 DIVISION OF THE PROJECT

A. Item 1 – General Trades Work

1) The work consists of the necessary labor, equipment, tools and materials to construct a new central fire station at 1040 South Wynn Road.

1.3 ABBREVIATIONS

A Reference to technical society's organization, bodies, or documents, is made in specifications, in accordance with the following abbreviations.

AIA	American Institute of Architects
ACI	American Concrete Institute
IEEE	Institute of Electrical Electronics Engineers
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute, Inc.
ASL	American Society of Landscape Architects
ASM	American Society of Mechanical Engineers
ASTM	American Society of Testing Materials
AWSC	American Welding Society Code
FS	Federal Specifications
NAMM	National Association of Architectural Metal Manufacturer
NFPA	National Fire Protection Association
NBS	National Bureau of Standards
NEC	National Electric Code
ODOT	Ohio Department of Transportation
SJI	Steel Joist Institute
SPR	Simplified Practice Recommendation
UL	Underwriters' Laboratories, Inc.
USGBC	United States Green Building Council

1.4 WORKER'S COMPENSATION CERTIFICATE

A Prior to entering into any Contract in whose fulfillment any employee (s) of the Contractor might be engaged at the site, the Industrial Commission of Ohio must certify that the Corporation, Partnership, or person so awarded the Contract has complied with each and every condition of the act of February 26, 1913, and of all acts amendatory or supplementary thereto, known as the Worker's Compensation Law, Section 153.08 RC., and Section 5123.01 etc. seq., R.C.

1.5 DEFINITIONS

A Definitions pertaining to sustainable development: As defined in ASTM E2114 and as specified herein.

1.6 DOCUMENTS REQUIRED PRIOR TO SIGNING CONTRACT

A Immediately upon the award of, and prior to the signing of the Contract, the successful bidder shall furnish to the Architect:

1. A Contract Cost Breakdown showing itemized labor and material amounts for the total contract price.

2. Name of Casualty Insurance Company insuring work.

3. A Worker's Compensation Certificate.

4. To support the Contract Bond, the successful bidder shall also furnish:

a) Credentials showing the Power of Attorney

b) A Certificate of Compliance issued by the Department of Insurance showing the Bonding Company is licensed to do business in the State of Ohio.

c) Financial Statement of Bonding Company

5. List of Sub Contractors & Material Suppliers

1.7 CODES AND STANDARDS

A When codes and standards are referred to, they shall be current approved copies. It shall be the duty of the supplier of any material on this work to submit evidence, when requested, that his material is in compliance with the applicable codes and standards, and the method in which the material is used in this project.

1.8 USE OF PREMISES

A The Owner will make available portions of the sites during the scheduled period of construction. Each contractor will be expected to complete the work in accordance with the project time schedule.

B During the construction period, the Contractor shall take every precaution to protect the premises from damage or unauthorized entry.

1.9 STORAGE OF MATERIALS

A Certain areas of the site will be restricted for use by the Contractors for on-site work storage of materials. The Contractors shall use such areas as designated by the Architect and/or Owner.

1.10 CLEANING UP

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

B The parking lot shall be kept free of debris and swept weekly or as may be necessary.

C If in the opinion of the Architect, neatness is not maintained, the Architect may have the area cleaned and charge the costs to the Contractor. The Architect may pro-rate the cost of clean-up to all Division Contractors if responsibility is not clear, and the Owner may withhold such charges from amounts owing to Subcontractors and pay the same directly to the persons doing such work.

D The electrical sub contractor shall clean all light fixtures and switchgear after the completion of the building.

E The General Contractor and all Sub Contractors at the completion of their branch of work, shall remove all surplus material, false work, and debris of every nature resulting from their operations and put the site in a neat and orderly condition.

1.11 WORK HOURS

A Work on this project shall be permissible from 7AM - 5PM, Monday through Friday. All weekend or after hour work shall require advance written approval of Owner. All noisy work shall be performed outside of normal operating hours and be coordinated with the owner prior to taking place.

1.12 JOB MEETING

A The Project Architect shall schedule weekly or bi-weekly job progress meeting between himself, and Contractor and major Subcontractors. The Architect shall take minutes of the meeting and distribute them.

2. PART 2 - PRODUCTS

3. PART 3 - EXECUTION

◆ END OF SECTION ◆

SECTION 01 23 00

ALTERNATES

1. PART 1 - GENERAL CONSTRUCTION NOTES

1.1 Each bidder shall submit with his bid, on the forms provided, alternate proposals stating the difference in price (additions or deductions) from the lump sum bid 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 Alternate 1 – Site Irrigation

A. This alternate consists of all associated work to furnish all material and to perform labor to install site irrigation.

2.2 Alternate 2 – Site Memorial

A. This alternate consists of all associated work to furnish all material and to perform all labor to install a site memorial.

2.3 Alternate 3 – Digital Sign

A. This alternate consists of all associated work to furnish all material and to perform all labor to install a digital sign.

2.4 Alternate 4 – Epoxy Flooring In Apparatus Bay

A. This alternate consists of all associated work to furnish all material and to perform all labor to install epoxy flooring and base in the apparatus bay.

2.5 Alternate 5 – River Rock

A. This alternate consists of all associated work to furnish all material and to perform all labor to install river rock in lieu of mulch as shown on the civil drawings.

2.6 Alternate 6 – Stainless Steel Countertop in Kitchen 117

A. This alternate consists of all associated work to furnish all material and to perform all labor to install a stainless-steel countertop in Kitchen 117.

2.7 Alternate 7 – Quartz Countertop in Kitchen 117

A. This alternate consists of all associated work to furnish all material and to perform all labor to install a quartz countertop in Kitchen 117.

2.8 Alternate 8 – Apparatus Bay Air Purifiers

A. This alternate consists of all associated work to furnish all material and to perform all labor to install engine exhaust filter system in the apparatus bay including all required devices and controls for a complete operating system. See drawing M1.1 for more detail.

2.9 Alternate 9 – Integral Blinds In Windows

A. This alternate consists of all associated work to furnish all material and to perform all labor to install integral blinds in windows.

2.10 Alternate 10 – Pergola

A. This alternate consists of all associated work to furnish all material and to perform all labor to install a pergola on the site.

2.11 Alternate 11 – Concrete Paving

A. This alternate consists of all associated work to furnish all material and to perform all labor to install concrete paving on the site as shown on the civil drawings.

2.12 Alternate 12 – Diesel Generator

A. This alternate consists of all associated work to furnish all material and to perform all labor to provide a diesel generator in lieu of natural gas generator.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 DESCRIPTION

A. 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.

B. All testing shall be divided into three (3) categories as follows:

(1) Field tests made at the project site as part of the actual construction.

(2) Factory tests made at the point of manufacture of various products which are shipped to the project site as a unit.

(3) 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 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 the Owner.

1.3 FACTORY AND CERTIFIED TESTING

A. Certified tests on materials to be incorporated into the project will be acceptable provided the following 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.

◆ END OF SECTION ◆

SECTION 01 50 00

TEMPORARY FACILITIES

1. PART 1 GENERAL

1.1 TEMPORARY LIGHT AND POWER

A. Temporary lighting should include protected incandescent lights in each area on a separate circuit from the general building lighting and be energized even though all other electrical equipment in the area is turned off.

B. No temporary wiring, fittings, receptacles, etc. shall be used for permanent wiring and shall be removed as soon as the permanent wiring is installed. All temporary wiring shall be protected against damage, the normal operation of trades, owner's personnel and visitors to the site.

C. All temporary power installations shall be in accordance with all applicable provisions of Federal, State and Local safety laws, building codes and standards.

D. The electrical contractor shall not be responsible for any special electrical service requirements on any contractors relating to temporary hoists, cranes or welding equipment.

E. Payment for Electrical Power Use

1) The Owner will pay for electric energy consumed from the existing building electrical service.

1.2 TEMPORARY PHONES

A. Provide cell phone numbers of all of the supervisors working on this project to all Owner and Associate's personnel working on this project. Each Contractor will be required to provide Emergency 24 hr contacts for the Owner and Associate Engineer.

1.3 TEMPORARY OFFICE

A. Each Contractor: Maintain a temporary office for the use of the contractor, his subcontractors, agents, and the Architect. Maintain a complete set of drawings and specifications marked up-to-date with revisions at this office at <u>all</u> times.

1.4 TEMPORARY WATER

A. The Owner will provide water at no cost to the contractors. The General Contractor shall provide a means of conveying water to meet the needs of the contractors.

1.5 TEMPORARY TOILET FACILITIES

A. At or before start of work, the 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

Engineer and the Owner. At completion of the work, the Contractor shall remove this facility to the satisfaction of the Engineer.

1.6 PARKING

A. Contractor parking arrangements will be determined at the Pre-construction meeting. All contractor employees' personal vehicles must be parked in these approved parking areas or may be subject to towing at contractor's expense.

1.7 MATERIAL STORAGE

A. Material storage arrangements will be determined at the Pre-construction meeting. It will be the contractor's responsibility to secure their stored materials. The Owner will not be responsible for any materials that may become missing or stolen.

1.8 CLEANING UP

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

B. The site shall be kept free of debris and swept weekly or as may be necessary.

C. The Contractor shall provide a dumpster for disposal of all demolition and waste material. The Owner shall have first rights to any demolition items. The dumpster shall include all temporary provisions required for protecting the existing parking lot that is to remain with no new work.

D. All contractors, at the completion of their branch of work, shall remove all surplus material, false work, and debris of every nature resulting from their operations and put the site in a neat and orderly condition.

1.9 TEMPORARY SIGNS

A. Signs or advertisements are not permitted to be displayed without Architect's approval.

◆ END OF SECTION ◆

SECTION 01 78 00

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.

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 ◆

SECTION 01 78 05

OPERATING AND MAINTENANCE DATA

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 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-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.

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. provided by other trades under separate contracts shall be installed by the General Trades Contractor.

1.2 RELATED WORK

Item	Refer To
Concrete Block	Division 4 - Masonry
Perimeter Insulation	Division 7 – Moisture Control
Earthwork	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/FL 25.

2) Minimum Local Value: FF 30/FL 22.

3) Apply trowel finish to monolithic slab surfaces that are to receive resilient flooring, carpet, or other thin finish system.

D. Trowel Finish 3 (Tr-Fn3) – Lobby and Corridor

1) The slab shall be steel troweled to a true level and finished smooth and straight to a tolerance of 1/8 inch in any 10 foot radius. High spots shall be ground level, and low spots filled in with approved leveling compounds by the Contractor responsible for Section 03 30 00 to the full approval of the wood flooring contractor.

E. Nonslip Broom Finish (NsBrm-Fn): Apply nonslip broom finish to exterior concrete stoops and mechanical slabs.

1) Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom, perpendicular to main traffic route.

F. Reference Standards:

1) ACI 315, Manual of Standard Practice for Detailing Reinforced Concrete Structures.

2) ACI 318-89, 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 Contractor. All concrete testing shall be paid for by the 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. Vapor Barrier: Premolded membrane, ASTM E96, Method B, 0 vapor transmission rate.

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. 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.

B. Steel Wire: ASTMC A82, plain, cold-drawn steel.

C. Welded Wire Fabric: ASTM A185.

1) Use 6” x 6” - W2.1 x W2.1 for 4” thick exterior concrete slabs and sidewalks and interior slabs unless noted otherwise.

2) Use 6” x 6” - W2.9 x W2.9 for 4” thick in the storm shelter room.

3) Use 4" x 4" – W4.0x W4.0 for 6" concrete slab in the apparatus bay areas and where shown on the drawings.

4) See site plans for concrete pavement design.

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 (fc = 3000 PSI min. at 28 days). (Concrete masonry bricks not acceptable.)

4) For concrete masonry bond beams use #3 bar laterally, tied to each longitudinal reinforcing bar below to hold bars apart and up from bottom. Space #3 bars at 48 inches o.co.

E. Polypropylene Fiber Reinforcement ASTM C-1116

1) All interior concrete slabs on grade and 2" topping over precast deck, shall include virgin polypropylene fibers in mix as a secondary reinforcement for crack control of the concrete and shall be used in lieu of wire mesh. The fibers shall be made of virgin (non-recycled) polypropylene, ¾ inch in length and having a denier of less than 100. The mix shall include 1½ pounds of ¾ inch polypropylene fibers per cubic yard of concrete. The fibers shall be used in strict accordance with the manufacturer's recommendations. This contractor shall take special care when pouring concrete slabs and troweling slabs to ensure good surface for installing VCT floor tile.

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.

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 or spaced a maximum distance of 20 feet apart each way when not shown on plans.

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."

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) Before using on concrete which receives additional finishes, obtain approval of the Subcontractor applying such finishes. DO NOT apply curing compounds to areas scheduled to receive Thinset ceramic tile of Thinset terrazzo or urethane floor paint. These areas must be water cured.

6) 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.

7) 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.

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	3500 P.S.I. at 28 days Normal Weight Concrete Minimum Cementitious Material Contect: ACI Minimum requirements Lightweight Concrete: Calculated Equilibrium Unit Weight: 110 lb/cu.ft, plus or minus 5 lb/cu.ft. per ASTM C567
Trench footings, footings (Class I)	RfFm-Fn SmFm-Fn, if exposed	3000 P.S.I. at 28 days Max W/C Ratio = 0.45
Foundation and retaining walls exposed to exterior (Class III)	RfFm-Fn SmFm-Fn, if exposed	4000 P.S.I. at 28 days 4.5% - 7.5% air entrainment Max W/C Ratio = 0.40
Interior formed concrete exposed to view (Class II)	SmFm-Fn	4000 P.S.I. at 28 days Max W/C Ratio = 0.50

Interior floor slabs scheduled to receive mud-set mosaic and quarry tile (Class II)	Flt-Fn	3500 P.S.I. at 28 days Mid-Range Water Reducer Required
Lean concrete fill at soft soils of over excavations (Class IV)	--	1500 P.S.I. at 28 days
Metal stair pan fill, toppings over precast deck (Class V)	--	2500 P.S.I. at 28 days #8 Aggregate (maximum)
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 Mid-Range Water Reducer Required
Exterior walks, stoops, steps, aprons, and curbs; exterior formed concrete exposed to view; exterior concrete not otherwise indicated (Class III)	NsBrm-Fn Grt-Cl-Fn	4000 P.S.I. at 28 days 4.5% - 7.5% air 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

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 ◆

SECTION 03 30 00

CAST-N PLACE CONCRETE (SITE CONCRETE ONLY)

1. PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete (site concrete only), including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1) Footings.

2) Foundation walls.

B. Related Sections:

1) Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.

2) Section 321313 "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1) ACTION SUBMITTALS

a) Product Data: For each type of product indicated.

b) Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

[1] Indicate amounts of mixing water to be withheld for later addition at Project site.

c) Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

d) Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

[1] Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

e) Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

[1] Location of construction joints is subject to approval of the Architect.

2) INFORMATIONAL SUBMITTALS

a) Qualification Data: For installer, manufacturer, testing agency.

b) Welding certificates.

c) Material Certificates: For each of the following, signed by manufacturers:

[1] Cementitious materials.

[2] Admixtures.

[3] Form materials and form-release agents.

[4] Steel reinforcement and accessories.

[5] Curing compounds.

[6] Bonding agents.

[7] Adhesives.

[8] Semirigid joint filler.

[9] Joint-filler strips.

[10] Repair materials.

d) Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

[1] Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

e) Field quality-control reports.

f) Minutes of preinstallation conference.

3) QUALITY ASSURANCE

a) Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

b) Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

[1] Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

c) Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

[1] Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

[2] Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

d) Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

e) Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

f) ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

[1] ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.

[2] ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

g) Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

h) Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

[1] Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

[a] Contractor's superintendent.

[b] Independent testing agency responsible for concrete design mixtures.

[c] Ready-mix concrete manufacturer.

[d] Concrete subcontractor.

4) DELIVERY, STORAGE, AND HANDLING

a) Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

2. PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

B. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

C. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

C. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1) Portland Cement: ASTM C 150, Type I

a) Fly Ash: ASTM C 618, Class F or C

b) Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

2) Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag cement.

B. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source.

1) Maximum Coarse-Aggregate Size: 3/4 inch nominal.

2) Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Lightweight Aggregate: ASTM C 330, 3/8-inch nominal maximum aggregate size.

E. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1) Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

2) Retarding Admixture: ASTM C 494/C 494M, Type B.

3) Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

4) High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

5) High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

6) Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1) Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a) Axim Italcementi Group, Inc.; CATEXOL CimFilm.

b) BASF Construction Chemicals - Building Systems; Confilm.

c) ChemMasters; SprayFilm.

d) Conspec by Dayton Superior; Aquafilm.

e) Dayton Superior Corporation; Sure Film (J-74).

f) Edoco by Dayton Superior; BurkeFilm.

g) Euclid Chemical Company (The), an RPM company; Eucobar.

h) Kaufman Products, Inc.; Vapor-Aid.

i) Lambert Corporation; LAMBCO Skin.

j) L&M Construction Chemicals, Inc.; E-CON.

k) Meadows, W. R., Inc.; EVAPRE.

l) Metalcrete Industries; Waterhold.

m) Nox-Crete Products Group; MONOFILM.

n) Sika Corporation; SikaFilm.

o) SpecChem, LLC; Spec Film.

p) Symons by Dayton Superior; Finishing Aid.

q) TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.

r) Unitex; PRO-FILM.

s) Vexcon Chemicals, Inc.; Certi-Vex Envio Set.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1) Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a) Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.

b) BASF Construction Chemicals - Building Systems; Kure 200.

c) ChemMasters; Safe-Cure Clear.

d) Conspec by Dayton Superior; W.B. Resin Cure.

e) Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).

f) Edoco by Dayton Superior; Res X Cure WB.

g) Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.

h) Kaufman Products, Inc.; Thinfilm 420.

i) Lambert Corporation; AQUA KURE - CLEAR.

j) L&M Construction Chemicals, Inc.; L&M Cure R.

k) Meadows, W. R., Inc.; 1100-CLEAR.

l) Nox-Crete Products Group; Resin Cure E.

m) Right Pointe; Clear Water Resin.

n) SpecChem, LLC; Spec Rez Clear.

o) Symons by Dayton Superior; Resi-Chem Clear.

p) TK Products, Division of Sierra Corporation; TK-2519 DC WB.

q) Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.

2.7 RELATED MATERIALS

A. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1) Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1) Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1) Fly Ash: 25 percent.

2) Combined Fly Ash and Pozzolan: 25 percent.

3) Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1) Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.9 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:

1) Minimum Compressive Strength: 3000 psi at 28 days.

2) Maximum Water-Cementitious Materials Ratio: 0.40.

3) Slump Limit: 4 inches, plus or minus 1 inch.

4) Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

5) Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.

2.10 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.

1) When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F , reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1) For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

2) For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.

3) Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

3. PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1) Install keyways, reglets, recesses, and the like, for easy removal.

2) Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

H. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

I. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

J. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1) Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1) Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1) When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

2) Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3) Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1) Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2) Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1) Apply to concrete surfaces not exposed to public view.

3.8 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.9 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Unformed Surfaces: Begin curing immediately after finishing concrete.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1) Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a) Water.

b) Continuous water-fog spray.

c) Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1) Steel reinforcement placement.

2) Steel reinforcement welding.

3) Verification of use of required design mixture.

4) Concrete placement, including conveying and depositing.

5) Curing procedures and maintenance of curing temperature.

6) Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1) Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

a) When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2) Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3) Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

4) Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.

5) Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

6) Coordinate the number of compression test specimens in subparagraph above with number of compressive-strength tests in first subparagraph below.

7) Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

   a) Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.

8) Strength of each concrete mixture will be satisfactory if every average of any three-consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

9) Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

10) Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

11) Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests

to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

12) Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

13) Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Masonry mortar and mixing masonry mortar.

1) Cement and lime mortar.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Unit Masonry – Section 04 20 00

B. Stone Masonry – Section 04 43 00 (Alternate G-9)

1.3 COLD WEATHER REQUIREMENTS

A. Precondition and protect mortar as follows:

1) Average daily air temperature between 40° and 32°:

a) Heat mixing water or aggregate to minimum 70° to maximum 160°F.

2) Average daily air temperature below 32°:

a) Heat mixing water and aggregate to minimum 70° to maximum 160°F.

2. PART 2 - PRODUCTS

2.1 MATERIALS

A. All cements and lime shall be fresh and undamaged when delivered at the job, and shall be stored in tight, dry sheds, with floor off the ground.

B. Portland Cement: ASTM C150, Type I, nonstaining, without air entrainment and of natural color or white, to produce the required color of mortar or grout. Mill certificate covering shipment shall be furnished if requested by Architect.

C. Hydrated Lime: ASTM C207, Type S. (Type “N”, normal hydrate, will not be acceptable.)

D. Portland Cement-Lime Mix: Packaged blend of Portland cement complying with ASTM C150, Type I or III, and hydrated lime complying with ASTM C207.

1) For pigmented mortars, use colored portland cement lime mix of formulation required to produce color indicated, or if not indicated, as selected from manufacturer's standard formulations. Pigment shall not exceed 10 percent of portland cement by weight for mineral oxides nor 2 percent for carbon black.

E. Aggregates

1) Mason's Sands: (for other than pointing mortars): Natural Sand, ASTM C-144, with modifications of sieve analysis, as follows:

a) Sand for general use: Not over 10% to pass the No. 100 sieve.

b) Sand for mortar to be used in exposed work shall be of light color and subject to approval by the Architect.

c) Sand for joints ¼" or less: 100% to pass the No. 16 sieve. Note: This sand must not contain material which might stain limestone.

2) Silica Sand (for use in pointing mortar): White or of light color, as approved; fine, pure, silica, 100% passing the No. 16 sieve, not over 40% passing the No. 50 sieve.

F. Water: Potable, clean, free of deleterious materials which would impair strength or bond.

2.2 MORTAR MIXES

A. Mortar for all brick and stone veneer shall match the existing building in color and texture.

B. Do not add admixtures including air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds, or other admixtures, unless otherwise indicated.

1) Do not use calcium chloride in mortar or grout.
2) Do not use antifreeze admixtures in mortar utilized for face brick work.
3) Mortar utilized for all exterior brick and concrete block masonry shall include water repellant admixtures, to achieve class E water permeance rating with STM E514-74.

C. Mortar for Unit Masonry : Comply with ASTM C270, Property Specification, for job mixed mortar, of types indicated below per Brick Institute of America, Technical Notes on Brick Construction; 8A, Table A1.

Location	Building Segment	Mortar Type
Exterior, above grade	loadbearing wall nonloadbearing wall parapet wall, chimney and veneer wall	S N N
Exterior, at or below grade	foundation wall, retaining wall, manholes, sewers, pavements, walks and patios	S
Interior	loadbearing wall nonloadbearing partitions	N O

3. PART 3 - EXECUTION

3.1 MIXING AND BATCHING

A. Use methods of measuring so that specific proportioning can be accurately controlled and maintained. Sand shall be measured damp and loose.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Masonry grout and mixing masonry grout.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Unit Masonry – Section 04 20 00

B. Clay Unit Masonry – Section 04 20 10

1.3 COLD WEATHER REQUIREMENTS

A. Precondition and protect grout as follows:

1) Average daily air temperature between 40° and 32°:

a) Heat mixing water or aggregate to minimum 70° to maximum 160°.

2) Average daily air temperature below 32°:

a) Heat mixing water and aggregate to minimum 70°F to maximum 160°F.

2. PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150, Type I.

B. Fine Aggregates: ASTM C404, clean, sharp, natural sand free from loam, clay lumps, or other deleterious substances.

C. Coarse Aggregates: ASTM C404, clean, uncoated, pea gravel containing no clay, mud, loam, or foreign matter. Maximum aggregate size 3/4 inch.

D. Water: Clean, potable, free of deleterious materials which should impair strength or bond.

2.2 GROUT MIXES

A. Grout mixes shall be plant mix or factory blended (dry mix with water added at the site).

B. Do not lower the freezing point of grout by use of admixtures or anti-freeze agents.

1) Do not use calcium chloride in grout.

C. Grout for Unit Masonry: Comply with ASTM C476.

1) Fine Grout: 2500 psi average compressive strength at 28 days for 6 inches and smaller hollow concrete masonry units and between 2 wythes of masonry where space is less than 2 inches in width.

2) Coarse Grout: 2500 psi average compressive strength at 28 days for 8 inches and larger hollow concrete masonry units and between 2 wythes of masonry where space is 2 inches in width or wider.

D. Grout Proportions (by volume): Comply with Table 1, ASTM C476.

1) Fine Grout: 1 part Portland cement, 0 to 1/10 part hydrated lime or lime putty, 2-1/4 to 3 parts fine aggregate.

2) Coarse Grout: 1 part Portland cement, 0 to 1/10 part hydrated lime or lime putty, 2-1/4 parts fine aggregate, 1 to 2 parts coarse aggregate.

E. Grout Slump

1) Properly proportioned grout shall have a slump of 8 to 10 inches.

3. PART 3 - EXECUTION

A. MIXING AND BATCHING

1) Use methods of measuring so that specific proportioning can be accurately controlled and maintained. Sand shall be measured damp and loose.

◆ END OF SECTION ◆

SECTION 04 05 19

MASONRY ANCHORAGE AND REINFORCING

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Masonry anchorage and reinforcement devices.
B. Continuous joint reinforcing and ties for masonry.
C. Individual metal ties for masonry
D. Anchoring devices for masonry
E. Reinforcing bars
F. Intersecting masonry wall joint reinforcing
G. Adhesive anchors bolts

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Unit Masonry – Section 04 20 00

1.3 MANUFACTURERS

A. Refer to individual product item.

1.4 SUBMITTALS

A. Submit product data for each item.

2. PART 2 - PRODUCTS

2.1 REINFORCING

A. All joint reinforcing, wire ties, anchors, adjustable ties, etc. shall be mill galvanized coating. Hot dip shall be required on exterior walls.

2.2 CONTINUOUS WIRE REINFORCING AND TIES FOR MASONRY

A. Provide welded wire units prefabricated in straight lengths of not less than 10 foot, with matching prefabricated corner ("L") and intersection ("T") units for all exterior wall corners and intersections and all interior load bearing wall corners and intersections. Standard straight reinforcing clipped and bent around corner will not be acceptable.

B. Fabricate from cold-drawn steel wire complying with ASTM A82, with deformed or embossed continuous side rods and plain cross-rods, with unit width of 1-1/2 to 2 inches less than thickness of wall or partition.

C. Wire shall be mill galvanized and in accord with the following:

1) Joint reinforcement, interior walls - ASTM A641 Class 3 (0.80 oz. per sq.ft.)

2) Wire ties or anchors in exterior walls completely embedded in mortar or grouts - ASTM A641 Class 3 (0.80 oz. per sq. ft)

3) Wire tires or anchors in exterior walls not completely embedded in mortar or grout (includes cavity walls) - ASTM A153 Class B3 (1.30 oz. per sq. ft)

4) Joint reinforcement in exterior walls on interior walls exposed to moist environments (shower, kitchen and dishwashing area) - ASTM A153 Class B3 (1.30 per sq. ft)

D. For single wythe and composite masonry, provide ladder type joint reinforcing fabricated with a minimum two 9 gauge steel side rods and 9 gauge cross rod.

1) Manufacturers

a) Dur-o-Wall, Inc. “D/A 320 Ladur” or equal by National Wire Products Co., or A.A. Wire Products Co.

E. For multi-wythe masonry, provide adjustable ladder type joint reinforcing fabricated with two 9 gauge steel side rods, 9 gauge cross rod, 3/16 inch eyes and 3/16 inch double legged pintles. Longitudinal rods shall be spaced for each face shell of CMU; eye sections shall extend into wall cavity, and pintles shall rest upon bed joints of face brick.

1) Manufacturers

a) Dur-o-Wall, Inc. “D/A 360 Ladur-Eye” or equal by National Wire Products Co., or A.A. Wire Products Co.

2.3 REINFORCING BARS

A. Reinforcing Bars

1) Where No. 3 and larger are required, they shall be deformed steel, conforming to ASTM A615, Grade 60.

2) Use #3 spacer bars at 48 inch spacing connected to longitudinal reinforcing bars in concrete masonry bond beams to hold bars in proper location.

2.4 INTERSECTING MASONRY WALL JOINT REINFORCING

A. Horizontal bed joint reinforcement for conditions where non-bearing masonry walls intersect other masonry walls at 90 degrees shall be wire mesh wall ties made of 1/2 inch mesh by 16 gauge hot dip mill-galvanized wire, 1 inch less in width than width of wall and extending 8 inches minimum into each wall or within 2 inches of opposite face of perpendicular walls.

B. The mesh shall be spaced not more than 16 in. apart vertically. When one wall is constructed first, the mesh shall be built into the wall and later embedded in the mortar joints of the second wall.

2.5 ANCHORING DEVICES FOR MASONRY

A. Rigid Anchors: Where masonry is to be rigidly anchored to structural steel beams, provide galvanized steel straps, bars or rods welded to the steel beam and extending into the mortar joint. Straps shall be not less than 14 gauge in thickness. Bars and rods shall be not less than 1/4 inch in diameter.

2.6 ADHESIVE ANCHOR BOLTS

A. In hollow CMU:

1) Adhesive anchor systems with nylon or stainless steel screen inserts. Use 1/2 inch diameter anchors with 4-1/4 inch embedment. (Minimum allowable shear 900 pounds; minimum allowable tension 250 pounds/anchor.)

B. In solid grouted CMU:

1) Adhesive anchor systems. Use 1/2 inch diameter anchors with 4-1/4 inch embedment; (minimum allowable shear 2600 pounds; minimum allowable tension 2000 pounds/anchor).

3. PART 3 - EXECUTION

3.1 LOCATION OF JOINT REINFORCEMENT

A. General

1) Install reinforcing in every second course, not to exceed 16" vertical spacing, in all interior and exterior walls. Install reinforcing in stack bonded units 8" vertical spacing.

2) Place in first and second bed joints immediately above and below wall openings.

3) Joint reinforcement at openings should extend not less than 24 inches, or to the end of the panel, whichever is the smallest.

4) Place in 2 courses immediately below the top of all load bearing walls.

5) Place in course immediately below the top of all non-load bearing walls.

6) Place galvanized mesh wall ties at all intersecting masonry walls.

7) Joint reinforcement shall be interrupted at control joints and at expansion joints.

8) Joint reinforcement is not required between openings where the relationship of distance between openings (L) and openings height (H) is not more than shown in National Concrete Masonry Association TEK 10-1, Table 1.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Manufactured clay masonry unit; concrete masonry units; both loadbearing and nonloadbearing and intended for use in unit masonry assemblies with mortar along with masonry accessories.

1) Concrete masonry units
2) Insulated concrete masonry units.
3) Brick
4) Control joint materials
5) Flashing
6) Expansion joint materials
7) Weep holes
8) Miscellaneous accessories

1.2 RELATED WORK

A. Masonry Mortar - Section 04 05 13
B. Masonry Grout - Section 04 05 16
C. Masonry Anchorage and Reinforcement - Section 04 05 19
D. Stone Masonry – 04 43 00

1.3 QUALITY ASSURANCE

A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress. When work is resumed, top surface of work shall be cleaned of all loose mortar.

1) Extend cover a minimum of 24 inches (600 mm) down both sides and hold cover securely in place.

2) Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (600 mm) down face next to unconstructed wythe and hold cover in place.

B. Cold Weather Requirements: No frozen materials or materials mixed or coated with ice or frost shall be used. Remove and replace unit masonry damaged by frost or freezing conditions. Comply with NCMA TEK 3-1A . Precondition and protect concrete masonry units as follows:

1) Average daily air temperature between 40° and 32°F:

a) Protect masonry from rain or snow for 24 hours.

2) Average daily air temperature between 32° and 25°F.

a) Provide heat sources on both sides of masonry construction.

b) Wind breaks are required for wind in excess of 15 miles per hour velocity.

c) Cover masonry completely with insulating blankets for 24 hours.

3) Average daily air temperature below 25°F

a) Provide enclosures and heat to maintain air temperature above 32°F.

b) Temperature of masonry units shall be minimum 30°F when laid.

c) Maintain masonry temperature above 32°F for 24 hours by enclosures and supplemental heat.

1.4 NOT FURNISHED, BUT INSTALLED

A. Include, but not be limited to, the building into masonry of all bolts, anchors, nailing blocks, inserts, door and window frames, vents, conduits, etc., furnished under Sections or Divisions of the Specifications. Consult other trades in advance to avoid cutting and patching.

1.5 DELIVERY, STORAGE OF MATERIALS

A. Stack all masonry units in a dry place, off the ground on a prepared plank platform. Protect stacked units by a shed roof or tarpaulin, arranged to allow for circulation of air around the units and to protect the units from weather, moisture and neglect.

B. Deliver architectural concrete masonry banded on wood pallets with exposed ground face protected by a plastic layer and top outside edges protected by a premolded edge protector. Store in single-stacks.

1.6 BUILT IN WORK

A. Set lintels in full beds of mortar. Fill solid with mortar around jambs and heads of metal door bucks and frames.

1.7 DAMAGED UNITS

A. Handle units carefully. Units with chipped edges, spalls, or other damage to their appearance which would show in the finish walls, shall not be built into the work.

1.8 MANUFACTURERS

A. Refer to individual product item.

1.9 SUBMITTALS

A. Product data. Brick sample and data.

1.10 SAMPLE PANEL

A. Lay one 4' x 6' sample brick veneer panel with limestone accent color for owner's review.

2. PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Concrete Masonry Units: ASTM C 90 and as follows:

1) Unit Compressive Strength: Provide units with minimum average net area compressive strength indicated below.

a) 1900 psi (13.1 Mpa).

2) Provide Type I, moisture controlled, normal weight for hollow concrete masonry units.

3) Provide Type 1, moisture controlled, normal weight for solid concrete masonry units.

B. Insulated Concrete Masonry Units

1) For as indicated on drawings.

2) ASTM C578 standard minimum density of 1.0 PCF for concrete masonry core insulation inserts.

3) Manufacturers

a) “Korfil” U-shaped inserts by Grace Construction Products.
b) “Polycore” by Insul Block Corp.
c) “Fabri-Core” by Fabricated Packaging Materials, Inc.
d) Or approved equal.

2.2 BRICK

A. Face Brick: ASTM C 216

1) Modular Brick to match existing building.

2) Grade and Unit Compressive Strength: Provide units with grade indicated below:

a) Grade: SW., Type FBX or FBS

3) Efflorescence: ASTM C67, “not effloresced”.

B. Manufacturers

1) Glen-Gary
1166 Spring Street
Wyomissing, PA 19610

2) Belden Brick
P.O. Box 20910
Canton, OH 44701

3) Watson Brick Company (General Shale)
PO Box 68
Watsontown, PA 17777

4) Or Approved Equal

C. Color

1) Brick #1 – Basis of Design is Watson Brick Company Sand Matt Burgundy Type 3

2) Brick #2 – Basis of Design is Belden Brick Modular Tumbleweed Velour A 11-15

3) Or approved equals

2.3 CONTROL JOINT MATERIALS

A. Performed Control Joint Gaskets

1) Material as indicated below, designed for standard sash block in CMU walls to maintain lateral stability in masonry wall.

2) Styrene Butadiene Rubber Compound: ASTM D2000, Designation M2AA-805.

B. Manufacturers

1) “Slot Seal Standard 2015-3" by Williams Products, Inc. or equal by Dur-o-Wall, Inc., Hohmann & Barnard, Inc. or approved equal.

2.4 WALL FLASHING

A. Embedded Flashing Materials

1) Provide concealed flashing built into masonry.

2) Rubber Asphalt Sheet Flashing: Manufacturer's standard composite self-adhering flashing product consisting of 32 mil thick pliable and highly adhesive rubberized asphalt compound bonded completely and integrally to 8 mil thick, high density, cross laminated polyethylene film to produce an

overall thickness of 40 mils. Provide termination mastic and accessories as recommended by membrane manufacturer.

3) Metal Flashing with Drip Edge: At bottom of wall and at locations noted on drawings, provide stainless steel flashing with angled hemmed edge. Extend back into brick joint and up exterior face of concrete block wall a minimum of 4” in one continuous piece or as recommended by wall flashing manufacturer. Install with wall rubber asphalt sheet flashing per the wall flashing manufacturer’s recommendations to provide a redundant flashing system.

4) Metal Drip Edge: Where metal flashing is not shown, provide stainless steel drip edge.

B. Manufacturers

1) “Perm-a-Barrier” by Grace Construction Products, “Dur-o-Barrier” by Dur-o-Wall, Inc. “Ererlastic MF-40" by Williams Products, Inc., or equal.

2.5 EXPANSION JOINT MATERIALS

A. Neoprene Expansion Joint Filler

1) Provide expansion joints in exterior brick masonry conforming to ASTM D-1056, Type 2, Class A, Grade 1.

B. Manufacturers

1) “Neo-Seal IV 2218-3" by Williams Products, Inc., or equal by Dur-o-Wall, Inc., Hohmann & Barnard, Inc. or approved equal.

2.6 WEEP HOLES/VENT

A. Plastic Weep Hole/Vent: One piece, flexible extrusion manufactured from ultraviolet resistant polypropylene copolymer, designed to weep moisture in masonry cavity to exterior, sized to fill head joints with outside face held back 1/8 inch (3 mm) from exterior face of masonry, in color selected from manufacturer’s standard.

B. Manufacturers

1) “Cell Vent” weep hole ventilator by Dur-o-Wall, Inc., or equal by Williams Products, Inc., Hohmann & Barnard, Inc. or approved equal.

2.7 MISCELLANEOUS ACCESSORIES

A. Cavity Protection Material: 1 inch (25 mm) thick, reticulated, nonabsorbent mesh, made from polyethylene strands and shaped to maintain drainage at weep holes without being clogged by mortar droppings. Place above all wallflashing locations.

1) Manufacturers

a) “Mortar Net” by Mortar Net USA, Ltd., “Mortar Maze” by Advanced Building Products, Inc., or equal by Dur-o-Wall, Inc., or approved equal.

B. Grout Stop

1) Fiberglass, galvanized steel, or polypropylene screen.

2) Manufacturers

a) Dur-o-Wall, Inc., National Wire Products Co., or A.A. Wire Products Co. or approved equal.

C. Caging Devices and Centering Clips

1) In hollow concrete masonry cores or brick cavities to be reinforced with vertical reinforcing steel bars and filled with grout, provide 9 gauge galvanized steel caging devices.

2) Manufacturers

a) Dur-o-Wall, Inc., National Wire Products Co., or A.A. Wire Products Co., or approved equal.

3. PART 3 - EXECUTION

3.1 LAYING CONCRETE MASONRY UNITS

A. Build wall plumb, true and level, to the thickness shown on drawings.

B. Concrete masonry units that are exposed in walls, either natural finish or painted, shall have a uniform texture reasonably close to samples approved by the Architect. They shall be free of imperfections in the surface which would impair the finished appearance.

C. Lay brick plumb, true and level, with completely filled mortar joints, to the thickness and pattern shown on drawings, where no pattern is indicated, running bond is used. Lay utility brick is a running bond. Butter the ends of brick with sufficient mortar to fill the head joints. Rock closures into place with the head joint mortar thrown against the two adjacent brick in place.

D. Do not lay masonry in freezing weather unless suitable means are provided to heat materials, protect work from cold and frost and ensure that mortar will cure without freezing.

E. Fill face shell and end joints with mortar and joints shall be squeezed tight. Slushing of mortar into joints shall not be permitted. The first course of block and all solid units shall be laid in a full bed of mortar.

F. The masonry units shall not be damaged prior to laying but shall be laid up in the dry state.

G. Bond each course of corners and break vertical joints of cut filler units at least 2 inches. Fill in with concrete brick where concrete block units cannot be used.

H. Provide recesses or openings as required for all built-in items.

I. Cut masonry units exposed with a motor-driven saw. Make all cuts required for architectural concrete masonry with a motor-driven masonry saw. Blade type as per manufacturer's recommendations.

J. Provide 1" bullnose corners for all external corners unless shown otherwise on drawings.

K. Wet brick units 2 to 4 hours before they are used; the method used shall be such as to ensure that each unit is uniformly wetted. Units shall be free from water adhering to their surfaces when they are laid in the wall. Do not wet concrete masonry units.

L. Masonry walls in location where they may be exposed to high winds during erection, shall not be built higher than 10 times their thickness unless adequately braced or until provision is made for the prompt installation of permanent bracing at the floor or roof level immediately above the story under construction. Backfill shall not be placed against foundation walls until they have been braced to withstand the horizontal pressure.

M. Where masonry bonded hollow walls, or walls of hollow masonry units are decreased in thickness, not less than one course of solid masonry shall be interposed between the wall below and the thinner wall above, or special units of construction shall be used to properly transmit the loads from the shells of the units above to the shells of those below.

N. Cut exposed brick with a motor-driven masonry saw.

O. Install flashings over the head of all doors and windows located in exterior walls.

P. Keep clean daily all masonry units during installation using brushes, rags, and burlap squares. Do not allow excess mortar lumps or smears to harden on the finished surfaces. Remove green mortar with burlap or a dry cloth. Harsh cleaning methods after walls have been erected might mar the surface appearance of the units. Do not continuously expose units to temperatures above 250°F.

3.2 JOINTS

A. Exposed to view joints on all concrete masonry units shall have concave face. Make joints uniform in width, approximately 3/8", cut flush and after initial set, tool joints compressing mortar to a concave joint. Use a tool of sufficient length (not less than 20") to produce a uniform concave joint free from waves.

3.3 SPECIAL UNITS

A. Provide and place all special concrete masonry units required or as shown on drawings, including solid units, bond beam units, lintel units, sash jamb units, plain

end units, bullnose corner units, etc. Where such units are not available they shall, where possible be cut using a power masonry saw.

B. At the tops of all walls and under joists, beams or other concentrated loads, solid blocks shall be provided unless a bond beam or other detail is shown.

C. Where noted, the top course may be filled with concrete, in which case a grout stop shall be placed in the joint below to positively hold the concrete when rodded into the core spaces. See Section 04 05 16.

D. Place all anchor bolts for wood plates, setting them in mortar, and make provisions for building-in of other details and appurtenances shown on the drawing. See Section 04 05 19.

3.4 INTERSECTING WALLS

A. For tying non-bearing walls to other walls, strip of ½" mesh galvanized hardware cloth shall be placed across the joint between the two walls. See Section 04 05 19.

B. If the joint where two masonry walls meet is to be exposed to view, the mortar shall be raked out to a depth of ¾" to receive sealant according to Section 07 92 00.

3.5 EXPANSION JOINTS

A. Locate expansion joints where indicated on elevations and floor plans as "EJ" and form a continuous break from finish grade line to top of wall. Provide for adequate lateral stability. Rake out joint ¾" to prepare for caulking and backing rod. See Section 04 05 16.

B. Contractor shall clean joint free from mortar droppings and all excess mortar prior to placing backer rod and caulking sealant. Expansion joints "EJ" having mortar in the cavity/joint will not be considered acceptable. Architect to view finished expansion joint prior to placement of sealant.

C. Location

1) Locate expansion joints where indicated on elevations and floor plans as "EJ".

2) Contractor shall clean joint free from mortar droppings and all excess mortar prior to placing backer rod and caulking sealant.

3.6 CONTROL JOINTS

A. Exterior Wall Locations

1) Locate control joints where indicated on elevations and floor plans as "EJ".

TABLE 1

CONTROL JOINT SPACING FOR MOISTURE CONTROLLER, TYPE I

CONCRETE MASONRY UNITS

Spacing of Control Joints	Vertical Spacing of Joint Reinforcement			
	None	24 inches	16 inches	8 inches
Expressed as Ratio of Panel Length to Height L/H	2	2-1/2	3	4
With Panel Length (L) not to Exceed: (Regardless of Height (H)	40 feet	45 feet	50 feet	60 feet

B. Table 1 (NCMA TEK-10-2) gives L/H ratios for walls without openings that are constructed of “Type I” moisture controlled concrete masonry units. Other locations for control joints include:

1) Changes in wall height or thickness.

2) At construction joints in foundation, in roof, and in floors.

3) At chases and recesses for piping, columns, fixtures, etc.

4) At abutment of wall and columns.

5) At return angles in “L”, “T”, and “U” shaped structures.

6) At one or both sides of wall openings

a) A control joint should be placed at one side of an opening less than 6 feet and at both jambs of openings over 6 feet wide.

C. Where concrete masonry is used as backup of other materials:

1) Extend control joints through facing if it is rigidly bonded (masonry bond).

2) Control joint need not extend through facing when bond is flexible (metal ties).

D. Provide a horizontal slip plane where reinforced lintel beam terminates at a control joint. Provide horizontal slip plane at junction of roof and load-bearing masonry terminating at a control joint.

3.7 CAULKING RECESSES

A. Outside joints around the perimeter of exterior door and window frames or other wall openings shall not be less than ¼” nor more than 3/8” wide, and cleaned out to a uniform depth of at least ¾” ready for placement of caulking.

3.8 WALL FLASHING

A. Install as per manufacturer's recommendations.

B. Install flashings at heads and sills of windows, at heads of doors and elsewhere as indicated on drawings including all masonry bearing on steel lintel or beam locations.

C. Mason is to coordinate with roofing contractor(s) and verify top of roof flashing height at all wall above roof locations to guarantee wall flashings and weep holes will be above roof flashing up wall.

D. Wall flashing at window heads and sills and at door heads will have end-dams.

E. Contractor will provide for open head joints in the bottom of first course of brick and block above all window and door lintels for weeps 2'-0" on center.

3.9 POINTING AND CLEANING

A. On completion, point up all exposed masonry, fill all holes and joints, remove loose mortar, cut out defective joints and re-point where necessary. Clean exposed masonry surfaces either painted or unpainted.

B. Prior to overall cleaning, a test area shall be cleaned. This area shall be in an inconspicuous portion of the building wall or on a portion of the sample wall.

C. After brick work is completed, and when directed by the Architect, said work shall be thoroughly cleaned by scrubbing with fiber brushes and a prepared "Sure-Klean" masonry cleaner product or application of steam. Cleaning product shall be as recommended by the manufacturer for the particular surface involved.

1) Manufacturers

a) "Sure Klean" by Prosoco, Inc.

b) "202 New Masonry Detergent" by Diedrich Technologies, Inc.

c) "Florok 700 Masonry Detergent Cleaner" by Elgene Chemical

d) Approved equal

D. Begin cleaning at top and continue down face of building. Upon completion leave masonry clean and free from mortar stains or traces of cleaning compound and with all joints pointed.

E. Do not use metal cleaning tools and brushes or abrasive powders.

F. Acid cleaning solutions may be used only with written permission of the Architect. No acid cleaning solutions shall be used on or around "architectural" concrete units.

◆ END OF SECTION ◆

SECTION 04 43 00

STONE MASONRY

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work included in this section shall include all labor and material for the furnishing and setting of all exterior Limestone Sawed Stone Banding in accordance with drawings, and specifications.

1.2 RELATED WORK

A. Masonry Mortar – Section 04 05 13
B. Masonry Anchorage and Reinforcement – Section 04 05 19
C. Unit Masonry – Section 04 20 00

1.3 QUALITY ASSURANCE

A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress. When work is resumed, top surface of work shall be cleaned of all loose mortar.

1) Extend cover a minimum of 24 inches (600 mm) down both sides and hold cover securely in place.

2) Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (600 mm) down face next to unconstructed wythe and hold cover in place.

B. Cold Weather Requirements: No frozen materials or materials mixed or coated with ice or frost shall be used. Remove and replace unit masonry damaged by frost or freezing conditions. Comply with NCMA TEK 3-1A. Precondition and protect concrete masonry units as follows:

1) Average daily air temperature between 40° and 32°F:

a) Protect masonry from rain or snow for 24 hours.

2) Average daily air temperature between 32° and 25°F.

a) Provide heat sources on both sides of masonry construction.

b) Wind breaks are required for wind in excess of 15 miles per hour velocity.

c) Cover masonry completely with insulating blankets for 24 hours.

3) Average daily air temperature below 25°F

a) Provide enclosures and heat to maintain air temperature above 32°F.

b) Temperature of masonry units shall be minimum 30°F when laid.

c) Maintain masonry temperature above 32°F for 24 hours by enclosures and supplemental heat.

1.4 DELIVERY, STORAGE OF MATERIALS

A. All Limestone shall be shipped, unloaded and stored in such a manner as to avoid excess breakage and stain. Stone shall be stored at the job on planks, pallets, or timbers, clear of soil and soil splash.

1.5 MANUFACTURERS

A. Approved Stone Suppliers

1) Northern Ohio Cut Stone
PO Box 38
Flat Rock, OH 44828
419-483-3558

2) Stone Centers of Ohio LLC
2823 Northlawn Ave.
Dayton, OH 45439
937-298-9572

3) Van Ness Stone, Inc.
PO Box 1000
Newbury, OH 44065
440-564-1111

1.6 SUBMITTALS

A. Product Data: Unless otherwise indicated, submit the following for each type of product provided under work of this section.

2. PART 2- PRODUCTS

2.1 CUT LIMESTONE – LIMESTONE BANDING, WINDOW SILLS, WINDOW HEADS, WINDOW DETAILS

A. General: The stone used as accent banding shall be a smooth face unit. The size of the limestone unit shall have a maximum bed width of 4”. Lengths of stone shall be of a manageable length for masons to set.

B. Color: Provide samples to the architect for final color selection prior to placing material order.

C. Lay smooth face limestone as indicated on drawings to match existing stone pattern and coursing.

3. PART 3 – EXECUTION

3.1 SETTING STONEWORK

A. Stone shall be set in strict accordance with approved profile and jointing pattern. Joints shall be 3/8” wide.

B. Stone shall be anchored with non-corrosive wall ties spaced not over 18” horizontally and 24” vertically.

C. Flash all stone masonry per industry standards. Where a cavity wall condition exists provide weeps similar to that of a masonry veneer wall.

3.2 MORTAR

A. Mortar shall be as specified for other masonry units.

3.3 CLEANING

A. Finished stonework shall be washed clean and free of dirt, mortar and other objectionable accumulations. Remove mortar droppings and smears as work progresses. Final cleandown shall include brushing with fibre brushes and mild soap or detergent, and rinsing with clear water. Use no acids without prior approval. Protect stonework from rundown or splash when using acid on adjacent materials.

◆ END OF SECTION ◆

SECTION 05 10 00

STRUCTURAL METAL FRAMING

1. PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. This section shall govern all structural steel, as shown on the drawings.

B. The General Requirements of this specification, Division 1 in its entirety, is part of this Section and incorporated hereby, as if fully set forth herein.

1.2 SCOPE OF WORK

A. Work included: All labor, equipment, tools, and materials required to furnish and install the structural steel work shown on the Contract Drawings and/or herein specified, including that shown on architectural, mechanical and electrical drawings or required in their specification sections.

B. Related work specified elsewhere: Carefully examine all other sections and all drawings for related work, which includes, but is not limited to:

1)	Cast-In-Place Concrete	Section 03 30 00
2)	Steel Joist Framing	Section 05 21 00
3)	Steel Decking	Section 05 31 00
4)	Pre-Fabricated Steel Roof Trusses	Section 05 41 00
5)	Metal Fabrication	Section 05 50 00
6)	Metal Building	Section 13 34 19

C. Work furnished but installed under other sections: Anchor bolts, loose bearing and base plates, loose lintels, and connection hardware to be cast into precast concrete.

D. Work affected by others: Mechanical framing, loads, openings, and structure in any way related to mechanical requirements, as shown for biding purposes only. Responsibility for coordinating the work of this Section with these requirements is solely that of the Contractor. Contractor's review of shop drawings will be taken to indicate that this coordination has been accomplished.

1.3 QUALITY ASSURANCE

A. Fabrication, detailing, workmanship, and erection procedures shall conform to the latest edition of the following reference standards:

1) "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings," by the American Institute of Steel Construction (AISC).

a) "Specification for Structural Joints Using ASTM A325 or A490 Bolts," as approved by the Research Council on Structural Connections of the Engineering Foundation.

b) "Code of Standard Practice for Steel Buildings and Bridges" (paragraph 4.2.1 specifically excluded).

2) By the American Welding Society (AWS):

a) "Structural Welding Code - Steel D1.1."

b) "Symbols for Welding and Non-Destructive Testing A2.4."

B. Any material or workmanship which is observed to be defective or inconsistent with the Contract Documents shall be corrected, modified, or replaced at the Contractor's expense.

C. Fabricator's Qualifications:

1) Minimum of five (5) years' continuous experience in the fabrication of steel for projects of similar quantity and scope.

2) Membership in the American Institute of Steel Construction.

D. Erector's Qualifications:

1) Minimum of five (5) years' continuous experience in the erection of similar steel structures.

E. Welder's Qualifications:

1) Personnel and procedures (shop and field) shall be qualified in accordance with AWS D1.1.

F. Inspection Agency's Qualifications:

1) Minimum of three (3) years' experience in similar steel inspection.

G. Material Certification:

1) Structural steel shall conform to the requirements of referenced ASTM specifications.

1.4 SUBMITTALS

A. Certification of Experience: Submit written description of personnel, projects, and equipment which document the experience and the qualifications required of the fabricator, erector, welders, and inspection agency.

B. Shop Drawings:

1) Indicate all details of shop fabrication, shop assembly and field erection, including members to be provided, cuts, copes, connections, holes, threaded fasteners, and welds for all structural steel work.

2) Indicate material specifications and finishes.

3) Indicate shop and field welds with symbols in accordance with AWS A2.4.

4) Clearly identify all details which deviate or differ from the Construction Documents.

5) Submit shop drawings in accordance with General Conditions. Unchecked or illegible shop drawings will be returned without review.

6) Shop drawings will be reviewed for general conformance to the intent of the Contract Documents. The Contractor shall be responsible for all materials, quantities and dimensions, and all construction methods and means.

C. Material Certification:

1) Submit two (2) certified copies of the mill test reports for each grade of structural steel to be furnished, certifying the chemical composition and physical properties.

2) Submit two (2) certified copies of reports on mechanical tests of high strength threaded fasteners to be furnished.

3) Submit copies of test reports with shop drawings for structural steel work.

D. Certified Welders:

1) Submit evidence of current certification of welders prior to welding work. Certification shall be in accordance with AWS standards.

1.5 PRODUCT DELIVERY AND STORAGE

A. Delivery:

1) Use care in storing, handling and delivering all material, and support same properly at all times to ensure that no piece will be bent, twisted or otherwise injured.

2) Deliver anchor bolts and other items to be embedded in cast-in-place concrete or masonry prior to the start of that work. Provide setting drawings, templates, or instructions required for the installation of such items.

3) Mark all members, assemblies, and pieces legibly with permanent marks conforming to erection drawings. Use standard system on erection drawings which identifies shop detail sheet.

a) Identify strength grade (i.e., A36 or A572 Grade 50) on each piece of structural steel using permanent mark.

B. Storage:

1) Store steel at site above ground on platforms, skids or other supports.

2) Protect steel from corrosion.

3) Store packaged materials in their original unbroken packages.

1.6 INSPECTION AND TESTING:

A. All work shall be subject to review and observation by the Architect.

1) Observed discrepancies between the work and the Contract Documents shall be corrected at no additional cost.

2. PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials furnished shall be new and of good quality, free from faults and defects, and in conformance with the Contract Documents.

B. Structural Steel Shapes, Plates, Bars, etc.:

1) F_y = 36 ksi steel: ASTM A36

C. Structural Pipe and Tubing:

1) F_y = 35 ksi pipe or round tubing:

a) ASTM A500, or ASTM A53, Grade B

2) F_y = 46 ksi square and rectangular tubing:

a) ASTM A500, Grade B

D. Anchor bolts, standard blots and nuts: ASTM A307. Provide nuts and hardened washers for anchor bolts.

E. High strength threaded fasteners: ASTM A325. Provide nuts and hardened washers. Provide bolts conforming to ASTM A490 for rigid frames.

F. Welding electrodes: Conform to requirements of AWS D1.1, using Series E70 electrodes appropriate for the materials being welded.

G. Galvanizing: Where specified herein, shall be hot-dip galvanized with a minimum zinc coating of 1.25 oz./s.f. conforming to the following ASTM standards:

1) Structural steel shapes, plates etc.: ASTM A123
2) Bolts and nuts: ASTM A153
3) Assembled steel products: ASTM A386

H. Shop Paint Primer:

1) All interior steel: Federal Specification TT-P-641, Type I.
2) Primer to be compatible with finish paint.

I. Lintels

1) Provide all loose steel angle lintels required for openings in masonry walls. Cope lintels back 1/4" for mortar cover on ends as required. Provide one angle per 4" of wall thickness as follows:

a)	Masonry Opening	0'-0" to 5'-0"
b)	Lintel Size	3½" x 3½" x 5/16"
c)	Min Bearing	6"

2.2 FABRICATION

A. Unless otherwise shown or specified, fabricate all steel in accordance with AISC Specifications and approved Shop Drawings.

B. Provide finished members true and free from bends, twists and other irregularities which could impair the strength or quality of work required.

C. Fabricate steel members with tolerance in accordance with ASTM A6, unless specifically noted otherwise. Non-conformance shall be cause for rejections.

D. Connections:

1) Unless otherwise shown or approved, bolt or weld shop connections and bolt field connections.

2) Detail all beam connections not detailed on the drawings with standard connections, using A325 bolts.

a) Detail all bolted connections as bearing type connections except the following connections, which shall be designed as "slip critical" connections:

3) All connections in direct tension.

a) In no case shall the minimum number of rows of bolts for the given beam size be less than that which is shown in Table 1, Part 4, of the Ninth Edition of the AISC "Manual of Steel construction."

b) Field connections using oversize, short-slotted, and long-slotted holes may be used with high strength bolts 5/8″ in diameter and larger at the option of the Contractor where specifically shown on the shop drawings, and subject to the approval of the Architect. If used, design, fabrication and erection procedures shall conform to "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

4) Except as otherwise shown or noted, design and detail connections in conformance with AISC Specification for the full strength of the members.

5) Locate splices in steel members only where shown on drawings and as approved by the Architect.

E. Mill ends of members in direct contact bearing, such as columns as their bases and splices.

F. Shop drill or punch holes for attachment of other work and, as detailed on the drawings, shop cut holes to accommodate installation of other work. Show all holes on shop drawings. No field cutting of holes is permitted unless specific approval in writing is obtained from the Architect.

G. Carefully check Contract Drawings for bearing plates, bracing, anchors and small members required.

H. Responsibility for errors of detailing, fabrication and for the correct fit of all structural steel members in accordance with the Contract Drawings, shall lie entirely with the subcontractor for fabrication.

I. Galvanizing

1) Galvanize all structural steel members exposed to the weather, such as platforms and bracing, window, door and wall intels, etc; and all accessories, bolts, washers, etc.

2) Galvanize all structural steel members, including accessories, bolts, washer, etc. specifically noted to be galvanized on the Contract Drawings.

3) Properly prepare items for galvanizing.

4) Drill or punch weep and drainage holes as required.

5) All galvanizing, where required, shall be done after fabrication is completed.

J. Painting - Shop Coat:

1) All steel to receive sprayed on fire proofing shall be unpainted and unprimed.

2) Fast-dry prime coat all interior steel

a) For shop and field touch-up: Con-Lux [55, red] prime coat; Glidden [5205, red] prime coat; or equal by Sherwin Williams.

3) Do not apply paint to the following:

a) Surfaces within 2″ of joints to be welded in the field.

b) Surfaces which will be encased in concrete.

c) Faying surfaces of "slip critical" joints, unless the paint is qualified for use in "slip critical" joints in accordance with the "Specification for Structural Joints Using A325 or A490 Bolts."

4) Clean steel by an approved method recommended by the Steel Structure Painting Council. Clean off loose mill scale, rust, weld slag, oil dirt, and any other substances which would impair field welding, performance of friction-type bolted connections, or adherence of paint.

5) Apply paint evenly and thoroughly to dry, clean surfaces. Work into joints and open spaces.

3. PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Prior to beginning work of this Section:

1) Verify that the installed work of other trades is complete and correct to the extent necessary for the proper execution of the work of this Section. This includes location of anchor bolts, and lines and grades of bearing areas.

2) Examine the areas and conditions under which structural steel work is to be installed, and determine if there are conditions detrimental to the proper and timely completion of the work.

B. In the event of discrepancies, immediately notify the Architect. Do not proceed with work affected by the discrepancies or unsatisfactory conditions until they have been resolved.

3.2 ERECTION

A. Erect all steel in accordance with the applicable provisions of the reference standards listed in Part I of this Section, as modified herein.

B. This structure is designed to be self-supporting and stable after the building is fully completed, for the design loads indicated. It is solely the Contractor's responsibility to determine erection procedures and sequence; and to ensure the stability of the building and its component parts, and of the adequacy of temporary or incomplete connections during erection. This includes, but is not limited to, the addition of whatever temporary bracing, guys, or tie-downs that might be necessary. Such material is not shown on the drawings. Temporary materials, if applied, shall be removed as conditions permit, and shall remain the Contractor's property.

C. It is solely the Contractor's responsibility to comply with all applicable local, state and federal safety codes and regulations governing this work.

D. Erection tolerances for steel members shall be in accordance with applicable sections of the AISC Specification and Code of Standard Practice, unless specifically noted otherwise.

E. Column bases and bearing plates shall be accurately aligned with leveling screws or steel shim plates and full grouted with non-metallic, non-shrink grout. After grouting is complete and cured, screws, if used, shall be backed off so that entire load is supported by the grout.

F. Field Assembly

1) Assemble frame accurately to the lines and elevations indicated, within the tolerances hereinbefore specified.

2) Align and assemble all members accurately before permanent connections are made.

3) Splices shall be made only where indicated on the Contract Drawings or the final Shop Drawings.

4) Ends of all milled or abutting surfaces shall have all protective coatings completely removed before such surfaces are brought into contact.

5) Permanent connection of splices of compression members shall not be made until the abutting surfaces have been brought completely into contact.

6) Weld field connections in accordance with AWS D1.1.

a) Welds which are subject to foot traffic or are exposed to view in the finished structure are exposed to view in the finished structure are to be ground smooth and flush with adjacent surfaces.

7) Bolt field connections, unless otherwise noted, in accordance with "Specifications for Structural Joints Using ASTM A325 or A490 Bolts."

a) Fully pre-tension all A325 bolted connections.

b) Tighten all fully pre-tensioned connections by the "Turn-of-Nut" method. Tighten bolts to at least the minimum tension specified in Table 4 of the "Specification for Structural Joints Using A325 or A490 Bolts."

8) Field cutting holes for mechanical trades shall not be permitted unless specific approval is obtained from the Architect in writing. Each hole size and location must be approved individually.

G. Erection bolts used in welded connections shall be tightened and left in place.

H. Clean and prepare all field welds on galvanized and prime painted surfaces for touch-up coating in accordance with AWS D1.1.

I. Touch-up paint field connections and abrasions in the shop coat with the same paint used for shop coat.

J. Touch-up paint field connections and abrasions in the galvanizing using two, 3 mil coats of ZRC cold galvanizing compound.

◆ END OF SECTION ◆

SECTION 05 50 00

METAL FABRICATION

1. PART 1 - GENERAL

1.1 RELATED WORK

A. Anchor Bolts, Sleeves and Supports required for Electrical and Mechanical Equipment, refer to – Division 21, 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 - Metal bollards shall be fabricated from schedule 40 steel pipe.

2.10 Metal Downspout Boots - Metal downspout boots shall be cast iron to receive 3" x 3" down spout. Caulk and seal downspout to metal downspout boot.

2.11 Miscellaneous Steel Trim

A. Steel angle corner guards and steel edgings.

1) Exterior trim galvanized

B. Loose bearing and leveling plates, galvanized.

C. Loose steel lintels, galvanized at exterior walls

D. Steel weld plates and angles not specified in other sections, for casting into concrete.

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 ASTMA-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 ◆

SECTION 05 51 00

METAL STAIRS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

A. Metal stairs.

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. MATERIALS AND COMPONENTS

A. Metal Surfaces, General: For fabrication of metal stair work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, roller trade names, and roughness.

B. Steel Stairs

1) Fabricate metal pan type steel stairs in accordance with commercial class NAAMM's Metal Stairs Manual to sustain a live load of not less than 100 psf addition to dead load.

C. Structural Steel Plates, Shapes and Bars: ASTM A36.

D. Steel Tubing; ASTM A500 (cold formed).

E. Rolled Steel Floor Plate: ASTM A786/A.

F. Uncoated, Hot-Rolled Steel Sheet: ASTM A1011 commercial quality, Type B, or structural quality, Grade 30, unless another grade is required by design loads.

G. Steel Bars for Grating: ASTM A36.

H. Galvanized Steel Sheet: ASTM A653, G90 coating, either commercial quality, Type B, or structural quality, Grade 33, unless another grade is required for design loads.

2.2. CONCRETE AND STONE FLOORING FILL MATERIALS

A. Concrete Materials and Properties: Comply with requirements of Section 03300 - Cast-in-Place Concrete for normal weight, ready-mixed concrete with a minimum 28 day compressive strength of 2,500 psi.

2.3. FABRICATION

A. Steel Framed Stair: Fabricate stringers of structural steel channels. Do not use plates. Construct platforms of structural steel channel headers and miscellaneous framing members.

2.4. FINISHES

A. Hot-dip galvanize item exposed to exterior or greater than 75% relative humidity.

3. PART 3 - EXECUTION

3.1. FABRICATION

A. Fabricate steel stairs using steel channel stair stringer as shown. Close open face of channel with ¼" steel closure plate as indicated on the drawings and where exposed in public stairways. Provide steel closer strip where stringer abuts walls.

B. Fabricate pan treads and landing pans from 12 gauge steel unless indicated otherwise to design as indicated on drawings.

C. Fabrication shall conform to the requirements of the National Association of Architectural Metal Manufacturer's recommendations.

3.2. PAINTING AND PROTECTIVE COATING

A. All ferrous metal shall be properly cleaned and given on 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 ◆

SECTION 06 10 00

ROUGH CARPENTRY

1. PART 1 - GENERAL

1.1 RELATED WORK

A. Finish Carpentry - Section 062000

B. Door Hardware - Section 087100

C. Painting - Section 099100

1.2 GRADING REQUIREMENTS

A. Moisture Content - Not to exceed 19 percent for lumber and kiln dried unless authorized otherwise in writing by the Owner.

B. Grade and Trade Mark - Required on each piece of lumber (or bundle, in bundled stock); recognized official marks of association under whose rules grades. Grade and trade marks not required if each shipment is accompanied by a Certificate of Inspection by Association.

C. Quality - Lumber must be sound, thoroughly seasoned, well manufactured, and free from warp that cannot be corrected in process of bridging or nailing. Dress lumber 4 sides unless specified otherwise.

1.3 TEMPORARY ENCLOSURE

A. Provide temporary wood doors and cloth, or transparent plastic covered wood window frames for exterior wall openings during drywall installation and until the building has dried out. Openings may be glazed instead of fitted with temporary closures if glass and frames are protected. Provide temporary enclosures where existing building penetrations occur.

B. Provide temporary enclosures where existing building penetrations occur.

C. Provide temporary enclosures at each addition at the location of the exit doors. See plans for size and location.

1.4 STORAGE AND PROTECTION

A. Stack lumber to ensure proper ventilation and drainage, protect lumber from the elements. Protect against dampness during and after delivery. Store under cover in a well-ventilated building and where not exposed to extreme change of temperature or humidity.

PART 2 - PRODUCTS

1.5 GRADE AND SPECIES OF WOOD

A. Western Spruce-Pine-Fir or Southern Pine, conforming to applicable requirements of American Softwood Lumber Standards PS-20-70. Other species used only with Architect's written approval.

B. The grades and/or allowable stress are shown on drawings with the minimum grades allowed as follows:

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

1.6 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.

1.7 PRESERVATIVES

A. Wood sills, plates in contact with masonry; furring strips on masonry; cant strips, nailers and blocking in contact with masonry and in connection with built-up roofing; and exterior framing 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.

1.8 CONCEALED PLYWOOD

A. Interior plywood concealed from view, A.P.A. CF-G2-WT.

1.9 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.

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.

1.10 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.

2. PART 3 - EXECUTION

2.1 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 AWPA 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.

2.2 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.

2.3 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.

2.4 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, not withstanding these specifications, shall be in accordance with the Recommended Nailing Schedule, designated as Appendix "A" of the Ohio Building Code.

2.5 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 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

1.2 SUMMARY

A. Section Includes:

1) Roof and plywood Sheathing

B. Related Requirements:

1) Section 06 10 00 – Rough Carpentry for plywood backing panels

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details

1) Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.

2) For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to project site.

3) Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For following products, from ICC-ES:

1) Preservative-treated plywood

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

2. PART 2 – PRODUCTS

2.1 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1: Use category UC2 for interior construction not in contact with the ground, Use category UC3b for exterior construction not in contact with the ground, and Use category UC4a for items in contract with the ground.

1) Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat all plywood unless otherwise indicated.

2.2 WALL SHEATHING

A. All exterior sheathing on the project is to be 5/8” Exterior Grade APA-Rated Plywood sheathing or OSB as identified within structural drawings and details.

2.3 ROOF SHEATHING

A. Plywood Roof Sheathing: Exterior, APA-Rated, Structural 1 sheathing, FRT.

1) Span Rating: Not less than 16/0

2) Nominal Thickness: 5/8”

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1) For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667

C. Power-driven Fasteners: NES NER-272

D. Wood Screws: ASME B18.6.1.

2.5 MISCELLANEOUS MATERIALS

A. Adhesives for field gluing panels to framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

3. PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1) NES NER-272 for power-driven fasteners.

2) Table 2304.9.1, “Fastening Schedule,” in ICC’s “International Building Code.”

D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence wand manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

◆ END OF SECTION ◆

SECTION 06 20 00

FINISH CARPENTRY

1. PART 1 - GENERAL

1.1 RELATED WORK

A. Rough Carpentry - Section 06 10 00

B. Casework – Section 12 30 00

C. Finish Hardware – Section 08 71 00

1.2 QUALITY ASSURANCE

A. Quality Standards: Except as otherwise shown or specified, comply with specified provisions of the Architectural Woodwork Institute (AWI) "Quality Standards."

1) Custom grade.

B. Optimum Moisture Content: Kiln-dry woodwork to an average moisture content within the following ranges or as otherwise recommended by applicable Quality Standards for the regional climatic conditions involved.

1) Exterior woodwork - 9 to 12 percent.

2) Interior woodwork - 7 percent.

1.3 STORAGE AND PROTECTION

1) Stack lumber and plywood to proper ventilation. Protection lumber and plywood from the elements. Protect millwork against dampness during and after delivery. Store under cover in a well-ventilated building and where not exposed to extreme change in temperature or humidity. Do not store or install millwork in any part of building until Interior woodwork - 7 percent.

1.4 SUBMITTALS

A. Provide shop drawings of all factory-built casework.

2. PART 2 - PRODUCTS

2.1 GENERAL

A. Pressure treatment shall use one of the following approved systems products (CCA pressure treatment is prohibited):

1) Chemical Specialties "ACQ Preserve"

2) Arch Treatment Technologies "Wolmanized Natural Select Wood"

3) Osmose Wood Preserving "NatureWood"

B. Field-applied adhesives used within the building interior shall have a VOC (volatile organic compound) content not to exceed 30 g/l for wood substrates.

2.2 INTERIOR MATERIALS

A. General: Provide materials that comply with requirements of the AWI Woodworking Standard for each type of woodwork and quality grade indicated and, where the following products are part of woodwork, with requirements of the referenced product standards, that apply to product characteristics indicated:

1) Hardboard: ANSI/AHA A135.4

2) High Pressure Laminate: NEMA LD3.

3) Medium Density Fiberboard: ANSI A208.2.

4) Particleboard: ANSI A208.1, Grade M-2 made with phenol-formaldehyde resins.

5) Softwood Plywood: PS 1.

6) Hardwood Plywood and Face Veneers: HPVA HP-1.

7) Formaldehyde Emission Levels: Comply with formaldehyde emission requirements of each voluntary standard referenced below:

a) Particleboard: NPA 8.
b) Medium Density Fiberboard: NPA 9.
c) Hardwood Plywood: HPMA FE.

2.3 INTERIOR MATERIALS

A. Standing and running trim and rails for transparent finish shall be custom grade red oak plain sawn, conforming to AWI Section 300.

1) Backout or groove backs of flat trim members and kerf backs of other wide flat members, except for members with ends exposed in finished work.

2.4 FACTORY FINISHING OF INTERIOR WOODWORK

A. Quality standard comply with AWI Section 1500.

B. General: The prefinishing of interior architectural woodwork is required to be preformed at factory as specified in this section where practical.

C. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces and similar preparations for finishing of architectural woodwork, as applicable to each unit of work.

D. Transparent Finish: Comply with requirements indicated below for grade, finish system, staining, effect, and sheen, with sheen measured on 60 degree gloss meter per ASTM D523.

1) Grade: Custom
2) AWI Finish System TR-6 - Catalyzed Polyurethane
3) Staining: Match approved sample for color
4) Effect: Open grain
5) Sheen: Semi gloss bright rubbed effect 55 - 60 degree.

2.5 MISCELLANEOUS BLOCKING AND FRAMING

A. Light Framing material in Specification Section 061000.

2.6 PLASTIC LAMINATE

A. Formica, Wilsonart or Pionite (pattern selected by Architect).

B. Substrate for plastic laminate Particle Board Grade 1-M-2, ANSI A161.1. Substrate for plastic laminate for cabinets and counter tops with sinks built in or in other high moisture are area. Particle Board Grade 2-M-2 (made with phenol-formaldehyde resins or equivalent); ANSI A208.1 or at contractors option plywood grade A.P.A. BB EXT. (Medium Density Overlay) 3/4" thick.

C. Low pressure laminate shall be equal to Herculux as supplied by Sauder Woodworking Co. Archbold, Ohio, Pionite – cabinet liner laminate or Wilsonart – cabinet liner sheet.

3. PART 3 - EXECUTION

3.1 WORK AND TRIM

A. Millwork and trim conform to design and details shown. Where practicable, work shall be finished and assembled at mill. All millwork and trim shall be finished smooth and free from machine or tool marks that will show through the finish. All nailheads shall be set to receive putty.

B. Joints tight and formed to conceal shrinkage.

C. Shop miter 4 inches or more from heel to point glued and locked. Make dowels and tenons to a driving fit. Make outside joints to exclude water and set in waterproof glue. Shop joints of interior work with waterproof glue or hot glue under pressure.

D. Trim single lengths without splicing. Running finish shall long lengths and jointed only where rigid fastenings can be made. Miter exterior and cope interior corners.

E. Counter tops requiring plastic laminate shall include surface, exposed edges and backsplashes where indicated on drawings. Apply two applications of recommended adhesive to both laminate and surface to be adhered to. Allow each application to dry to the touch before adhering laminate to surface.

3.2 CABINET WORK - GENERAL

A. See Sections 12 30 00.

◆ END OF SECTION ◆

SECTION 06 60 00

PLASTIC FABRICATIONS

1. PART 1 - GENERAL

1.1 DESCRIPTION

A. Solid surface and plastic fabrications as shown on drawings and specified herein.

1.2 RELATED SECTIONS

A. Related work specified elsewhere: Finish Carpentry Section 06 20 00

1.3 SUBMITTALS

A. SHOP DRAWINGS

1) Indicate dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.

B. SAMPLES

1) Submit minimum 6″ x 6″ (156 mm x 156 mm) samples. Indicate full range of color and pattern variation. Approved samples will be retained as a standard for work.

C. MAINTENANCE DATA

1) Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project closeout documents.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver no components to project site until areas are ready for installation. Store indoors.

B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.5 QUALITY CRITERIA

A. APPLICABLE STANDARDS: Standards of the following, as referenced herein:

1) American National Standards Institute (ANSI).

2) American Society for Testing and Materials (ASTM).

3) National Electrical Manufacturers Association (NEMA).

B. ALLOWABLE TOLERANCES

1) Variation in component size: ± 1/8″ (3mm).
2) Location of openings: ± 1/8″ (3mm) from indicated location.

1.6 WARRANTY

A. Provide manufacturer's warranty. The manufacturer warrants to the original purchaser that they shall, at their option, repair or replace, without charge, such product if it fails due to a manufacturing defect during the first 10 years after initial installation. This includes reasonable labor charges needed to repair or replace the product covered hereunder.

2. PART 2 - PRODUCTS

2.1 SOLID POLYMER FABRICATIONS

A. BASIS OF DESIGN

1) Corian Solid Surface, Price Group A-D

B. ACCEPTABLE PRODUCT

1) Wilsonart Solid Surface
2) Formica “Surell” Solid Surface
3) Hi-Macs Solid Surface

C. MATERIAL: Cast filled acrylic; not coasted, laminated or of composite construction, meeting ANSI Z124-1980, Type Six, and Fed. Spec. WW-P-541E/GEN dated August 1, 1980.

1) Material shall have minimum physical and performance properties specified.

2) Superficial damage to a depth of 0.10″ (2.5 mm) shall be repairable by sanding or polishing.

D. PERFORMANCE CHARACTERISTICS:

1) Tensile Strength: ASTM D638-84, 600psi

2) Tensile Modulus: ASTM D638-84, 1.5 X 10^6 psi

3) Elongation: ASTM D638-84, 0.4% min.

4) Hardness: Rockwell “M” Scale, 94

5) Gloss (60-degree Gardner): ANSI Z124-1980/HUD Bulletin/UM-73-84, 5-20

6) Color Stability: NEMA LD3, No Change 200 Hours

7) Wear and Clean: ANSI Z124-1980/HUD Bulletin, Passes

8) Water Absorption Weight (% Max.): ASTM D570-81, 24 Hours Long Term

a) 0.04 – 0.4 (3/4”)

b) 0.09 – 0.80 (1/4”)

9) Izod Impact: ASTM D256-84 (Method A), 0.28ft. – lbs/in of notch

10) Impact Resistance Sheets: NEMA LD3, No Fracture

a) ½ lb ball – ¼” lab – 36” drop

b) 1 lb ball – ½” slab – 36” drop

c) 2 lb ball – ¾” slab – 36” drop

11) Impact Resistance Bowls: ANSI Z124-1980/HUD Bulletin/UM-73-84, No crack or chips

12) Thermal Expansion: ASTM D696-79, 3.02 x 10^-5

13) Boiling Water Surface Resistance: NEMA LD3, No visible change

14) High Temperature Resistance (500-degrees): NEMA LD3, No change

15) Stain Resistance: ANSI Z124-1980/HUD Bulletin/UM-73-84, Passes

16) Weatherability: ASTM D1499-84, No change 1000 hours

17) Specific Gravity: ASTM D570-81, 1.8 standard colors

18) Flammability: ASTM E-84-84a

a) Flame Spread, Passes

b) Smoke Developed, Passes

c) Class I

2.2 RESTROOM COUNTERS AND SINKS

A. Provide countertops and sinks in restrooms as shown and detailed on the drawings.

B. Coordinate with plumbing contractor and casework fabricator.

2.3 WINDOW SILLS

A. ½” (13mm) thick, Solid Polymer Surfacing, adhesively joined with no exposed seams, having edge details as indicated on the architect's drawings.

2.4 JOINT ADHESIVE

A. Manufacturer's standard two-part adhesive kit to create inconspicuous, non-porous joints.

3. PART 3 - EXECUTION

3.1 FABRICATION

A. Factory fabricate components to greatest extend practicable to sizes and shapes indicated, in accordance with approved shop drawings.

B. Form joints between components using manufacturer's standard joint adhesive, without conspicuous joints.

C. Cut and finish component edges with clean, sharp returns and round all exposed edges and corners. Route radii and contours to template. Repair or reject defective and inaccurate work.

D. A certified fabricator shall be used for fabrication and/or installation, to ensure compliance with the warranty and assure a quality installation.

3.2 INSTALLATION

A. Install components plumb and level, scribed to adjacent finishes, in accordance with approved shop drawings and product installation data.

B. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Keep components and hands clean when making joints.

C. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Keep clean until Date of Substantial Completion. Replace stained components.

D. Protect surfaces from damage until Date of Substantial Completion. Replace damaged work that cannot be repaired to architect’s satisfaction.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Exterior synthetic (poly-ash) trim.

1.2 RELATED REQUIREMENTS

A. Section 07 61 00 – Sheet Metal Roofing and Wall Panels

B. Section 09 91 00 – Painting: Painting Exterior Synthetic Trim

1.3 REFERENCE STANDARDS

A. ASTM D 570 – Standard Test Method for Water Absorption of Plastics

B. ASTM D 1761 – Standard Test Methods for Mechanical Fasteners in Wood.

C. ASTM D 6341 – Standard Test Method for Determination of the Linear Coefficient of Thermal Expansion of Plastic Lumber and Plastic Lumber Shapes between -30 and 140 degrees F (-34.4 and 60 degrees C)

D. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

E. AWPA E1 – Standard Method for Laboratory Evaluation to Determine Resistance to Subterranean Termites.

F. AWPA E10 – Standard Method of Testing Wood Preservatives by Laboratory Soil-Block Cultures.

1.4 SUBMITTALS

A. Product Data: Submit Manufacturers product data, including installation instructions.

B. Samples: Submit manufacturer’s sample colors of exterior synthetic trim.

C. Manufacturer’s Certification: Submit manufacturer’s certification that materials comply with specified requirements and are suitable for intended application.

D. Warranty Documentation: Submit manufacturer’s standard warranty.

1.5 DELIVERTY, STORAGE, AND HANDLING

A. Sore and handle materials in accordance with manufacturer’s instructions.

B. Keep materials in protective covering until installation.

C. Store materials in clean, dry area.

D. Store exterior synthetic trim on flat, level surface.

E. Keep exterior synthetic trim covered and free of dirt and debris.

F. Protect materials and finish during storage, handling, and installation to prevent damage.

1.6 WARRANTY

A. Warranty Period for Exterior Synthetic Trim: 20-year limited warranty.

1) No decay due to rot.

2) No excess swelling from moisture.

3) Resist termite damage.

2. PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Boral Composites Inc. (200 Mansell Court East, Suite 305, Roswell, Georgia 30076. Toll Free 888-926-7259. www.BoralTruExterior.com. info@TruExterior.com.) or approved equal by CertainTeed or JamesHardie.

2.2 EXTERIOR SYNTHETIC TRIM

A. Exterior Synthetic (Poly-Ash) Trim: Boral TruExterior Trim.

B. Composition:
1) Post-Industrial recycled content: Minimum 70 percent, by weight.
2) Post-Consumer recycled content: Minimum 2 percent, by weight
3) Pigments and Dyes.

C. Physical Properties:
1) Density, ASTM C 1185: 40 to 50 pcf.
2) Water Absorption, ASTM D 570: Less than 1.5 perfect
3) Fungi Rot, AWPA E10:
a) White Rot: Negligible loss.
b) Brown Rot: Negligible loss.
4) Termite Resistance, AWPA E1: Greater than 9.0, with 10 being impervious.

D. Mechanical Properties:
1) Flexural Strength, ASTM C 1185: Greater than 1,600 psi.
2) Nail Withdrawal, ASTM D 1761: Greater than 40 lbf/in.

E. Thermal Properties:

1) Coefficient of Linear Expansion, ASTM D 6341, Typical: 1.40E-05 in/in/degree F, tested at minus 30 to 140 degrees F.
2) Flame spread, ASTM E 84: Between 25 and 29
3) Smoke Developed, ASTMC E84: Less than 450

F. Trim sizes: See architectural details
1) Manufacturing Tolerances:
a) Width: Plus or minus 1/16 inch.
b) Thickness: Plus or minus 1/16 inch.
c) Length: Plus 2 inches, minus 0 inch.
d) Edge Cut: Plus or minus 2 degrees.
2) Exposed Texture: Smooth

2.3 FINISHES

A. Primer:
1) Acrylic Based.
2) Low VOC
3) Factory applied on all sides
B. Paint all cut edges to match factory applied color. Refer to specification 09 91 00 for additional information.

2.4 FASTENERS

A. Type: Screws
1) Size: Per manuf. Recommendations (16 ga, Min.)
2) Finish: Stainless Steel

3. PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive exterior synthetic trim.

B. Notify Architect of conditions that would aversely affect installation or subsequent use.

C. Do not begin installation until unacceptable conditions are corrected.

3.2 INSTALLTION

A. Install exterior synthetic trim in accordance with manufacturer's instructions at locations indicated on the Drawings.

B. Do not install exterior synthetic trim in structural or load-bearing applications.

C. Install exterior synthetic trim plumb, level, and square.

D. Install exterior synthetic trim with flush, tight joints.

E. Install fasteners.

1) Maximum of 24 inches on center.

2) Within 2 inches of end of boards.

F. Fill nail and screw holes with acrylic caulk, wood filler, or auto body filler.

G. Repair minor damages to exterior synthetic trim in accordance with Manufacturer's instructions and as approved by Architect.

H. Remove and replace damaged exterior synthetic trim that cannot be successfully repaired as determined by Architect.

I. Painting:

1) Apply top coat to exterior synthetic trim over factory-applied primer:

a) Within 150 days of installing trim.

b) As specified in Section 09 91 00

3.3 PROTECTION

A. Protect installed exterior synthetic trim to ensure that, except for normal weathering, trim will be without damage or deterioration at time of Substantial Completion.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SCOPE

A. Apply exterior dampproofing to outside face of new foundation walls.

B. Apply to portions of existing foundation wall as noted on floor plan and details.

C. This Contractor shall provide any patching of dampproofing as a result of penetration through the foundation walls.

1.2 SUBMITTALS

A. Product data. Unless otherwise indicated, submit the following for each type of

1.3 MANUFACTURER

A. The Sonneborn Division of Contech, Inc.

B. Equal Product by A.C. Horn, Euclid Chemical Co. and W.R. Meadows Company are acceptable.

2. PART 2 - PRODUCT

2.1 MASTIC DAMPPROOFING

A. Sonneborn "Hydrocide Mastic" heavy bodied, non-sag coating, reinforced with fibers for trowel application, solvent based, for use only on dry surfaces.

3. PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate preparations affecting performance of bentonite waterproofing.

1) Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Verify that substrate is complete and that all work that will penetrate waterproofing is complete and rigidly installed. Verify locations of waterproofing termination.

3.2 PREPARATION

A. Coordinate work in the vicinity of waterproofing to ensure proper conditions for installing the waterproofing system and to prevent damage to the waterproofing after installation.

B. Remove fins and loose material from surface to be waterproofed or dampproofed. Surface must be dry when dampproofing is applied. Caulk with plastic cement

around all pipe, anchors and other items that penetrate waterproofing or dampproofing.

3.3 APPLICATION

A. Apply mastic as a filler for all defects (honeycombing, etc) and tie holes.

B. Dampproofing coating shall be one (1) coat, apply with a trowel in accordance with manufacturers printed instructions.

3.4 PROTECTION

A. Protect waterproofing from damage and wetting before and during subsequent construction operations. Repair punctures and cuts according to manufacturer's written instructions.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Organic and inorganic insulation applied for thermal protection in walls and ceilings; under concrete slabs on grade; and at perimeter of foundations.

B. Vapor retarders integral with insulation.

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.

B. For vinyl faced roof insulation see specification section 13 34 19 Metal Building.

C. For vinyl faced exterior wall insulation see specification section 13 34 19 Metal Building.

D. For block core insulation. See specification section 04 20 00. All Korfill insulation in masonry walls where noted on drawings shall be C shaped inserts.

1.3 SUBMITTALS

A. Product Data: Submit product literature and installation instructions for specified insulation.

B. Submit manufacturers literature on products to be used giving data such as fire rating. R or K value density, burning characteristics etc.

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 MATERIALS

A. Owens Corning “Foamular 250” Extruded Polystyrene Board Insulation: Rigid, cellular polystyrene thermal insulation formed from polystyrene base resin by an extrusion process using hydrochlorofluorcarbons as blowing agents to comply with ASTM C578 Type IV, minimum density of 1.6 lb/cu ft and with other requirements indicated below:

1) Provide foundation perimeter insulation and floor insulation positioned as shown on drawings.

a) 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. Foundation insulation shall extend down 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) Application. Between metal studs in exterior walls and to form a continuous thermal barrier as required and as shown on drawings.

2) Mineral Fiber Type: Fibers manufactured from glass.

3) Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50.

4) Thickness as shown on drawings.

C. Unfaced Sound Attenuation Batt Insulation: Insulation combining mineral fibers of type described below with thermosetting resins to comply with ASTM C665, Type 1 (blankets without membrane facing).

1) Mineral Fiber Type: Fibers manufactured from glass.

2) Application: Stud walls between rooms, above ceilings where shown on reflected ceiling plan, on top of all acoustic suspended ceiling clouds, and as shown on drawings. (2 pcf density).

3) Thickness as shown on drawings.

2.2 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. Seal gaps between rigid insulation, brick and block at louver penetrations where foam sealant is capable of sealing gap.

E. All penetrations of exterior walls (louvers, etc.) shall have all voids foam sealed.

F. Prepare surface and install per manufacturer's recommendations.

G. Material shall have the following properties:

1)	Material	Polyurethane
2)	Flame Spread	20
3)	Smoke	15
4)	Conductivity @ 75 degrees F K=0.219 BTU in/hr.	

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

2.3 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. Perimeter insulation shall be bonded to face of foundation walls using bonding method as recommended by manufacturer.

C. Install rigid wall insulation with tightly sealed joints to form a continuous insulation barrier.

D. Provide insulation support straps to secure insulation in place wherever stud walls do not have sheathing on one side or both sides, and anywhere else they are needed to keep the integrity of the thermal barrier in place.

◆ END OF SECTION ◆

SECTION 07 25 00

WEATHER BARRIERS

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Weather barrier membrane

B. Seam Tape

C. Flashing

D. Fasteners

1.2 REFERENCES

A. ASTM International

1) ASTM C920; Standard Specification for Elastomeric Joint Sealants

2) ASTM C1193; Standard Guide for Use of Joint Sealants

3) ASTM D882; Test Method for Tensile Properties of Thin Plastic Sheeting

4) ASTM D1117; Standard Guide for Evaluating Non-woven Fabrics

5) ASTM E84; Test Method for Surface Burning Characteristics of Building Materials

6) ASTM E96; Test Method for Water Vapor Transmission of Materials

7) ASTM E1677; Specification for Air Retarder Material or System for Framed Building Walls

8) ASTM E2178; Test Method for Air Permeance of Building Materials

9) ASTM E2357; Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

B. AATCC – American Association of Textile Chemists and Colorists

1) Test Method 127 Water Resistance: Hydrostatic Pressure Test

C. TAPPI

1) Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area)

2) Test Method T-460; Air Resistance (Gurley Hill Method)

1.3 QUALITY ASSURANCE

A. Qualifications

1) Installer shall have experience with installation of weather barrier assemblies under similar conditions.

2) Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.

3) Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store weather barrier materials as recommended by weather barrier manufacturer.

1.5 SCHEDULING

A. Review requirements for sequencing of installation of weather barrier assembly with installation of windows, doors, louvers and flashings to provide a weather-tight barrier assembly.

2. PART 2 – PRODUCTS

2.1 MANUFACTURER

A. DuPont; 4417 Lancaster Pike, Chestnut Run Plaza 728, Wilmington, DE 19805; 1-800-44-TYVEK (8-9835); http://www.construction.tyvek.com, Mar-Flex Waterproofing & Building Systems, Carlisle, Ohio (800) 498-1411, www.mar-flex.com or approved equal.

2.2 MATERIALS

A. Basis of Design: spunbonded polyolefin, non-woven, non-perforated, weather barrier is based upon DuPont™ Tyvek® CommercialWrap® and related assembly components.

1) Air Penetration: 0.001 cfm/ft^2 at 75 Pa, when tested in accordance with ASTM E2178. Type I per ASTM E1677. ≤0.04 cfm/ft^2 at 75 Pa, when tested in accordance with ASTM E2357.

2) Water Vapor Transmission: 28 perms, when tested in accordance with ASTM E96, Method B.

3) Water Penetration Resistance: Minimum 280 cm when tested in accordance with AATCC Test Method 127.

4) Basis Weight: Minimum 2.7 oz/yd^2, when tested in accordance with

TAPPI Test Method T-410.

5) Air Resistance: Air infiltration at >1500 seconds, when tested in accordance with TAPPI Test Method T-460.

6) Tensile Strength: Minimum 38/35 lbs/in., when tested in accordance with ASTM D882, Method A.

7) Tear Resistance: 12/10 lbs., when tested in accordance with ASTM D1117.

8) Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84. Flame Spread: 10, Smoke Developed: 10.

2.3 ACCESSORIES

A. Seam Tape: As recommended by the weather barrier manufacturer.

B. Fasteners: As recommended by the weather barrier manufacturer.

C. Sealants

1) Products: Sealants recommended by the weather barrier manufacturer.

D. Adhesives:

1) Provide adhesive recommended by weather barrier manufacturer.

E. Primers:

1) Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.

F. Flashing

1) Flexible membrane flashing materials for window openings and penetrations recommended by manufacturer.

3. PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.2 INSTALLATION – WEATHER BARRIER

A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations.

B. Install weather barrier prior to installation of windows and doors.

C. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.

D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.

E. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.

F. Window and Door Openings: Extend weather barrier completely over openings.

G. Overlap weather barrier

1) Exterior corners: minimum 12 inches.

2) Seams: minimum 6 inches.

H. Weather Barrier Attachment:

1) Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 12-18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.

3.3 SEAMING

A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.

B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.4 OPENING PREPARATION (as per manufacturers recommendations)

A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.

B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.5 PROTECTION

A. Protect installed weather barrier from damage.

◆ END OF SECTION ◆

1. PART 1 – GENERAL

1.1 Description

A. General:

1) For soffits around entry area, at canopies and as indicated on drawings.

2) Completely coordinate with work of all other trades.

3) Although such work is not specifically indicated, furnish and install supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

4) See Division 1 for General Requirements.

B. Related work specified elsewhere:

1) Structural metal framing: Section 05 10 00.

2) Sheet Metal Flashing and Trim: Section 07 62 00.

1.2 QUALITY ASSURANCE

A. Applicable standards:

1) SMACNA: “Architectural Sheet Metal Manual”, Sheet Metal and Air Conditioning Contractors National Association, Inc.

2) AISC: “Steel Construction Manual”, American Institute of Steel Construction.

3) AISI: “Cold Form Steel Design Manual”, American Iron and Steel Institute.

4) Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic

coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755A.

a) Zinc-Coated (galvanized) Steel Sheet: ASTM A 653/A coating designation; structural quality.

b) Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A, Class AZ50

or AZ55 coating designation, grade 40 (class AZM150 or AZM165 coating designation, grade 275); structural quality.

B. Manufacturer’s qualifications:

1) Manufacturer has a minimum of three years experience in manufacturing metal panel systems of this nature. Panels specified in this section shall be produced in a factory environment (not job site roll formed) with fixed-base roll forming equipment assuring the highest level of quality control. A letter from the manufacturer certifying compliance will accompany the product material submittals.

1.3 SUBMITTALS

A. Shop drawings:

1) Submit complete shop drawings and erection details approved by the general contractor to the architect for review. Do not proceed with manufacture prior to review of shop drawings. Do not use drawings prepared by the architect for shop or erection drawings.

2) Shop drawings show methods of erection, plans of soffit panels, sections and details, anticipated loads, flashings, sealants, interfaces with materials not supplied and proposed identification of component parts and their finishes.

B. Samples:

1) Submit color chips options for color selection.

2) Submit two 3 inch x 5 inch color chip samples in color selected by the architect.

C. Warranty(s):

1) Metal panel manufacturer, upon final acceptance for project, furnish a warranty

2) Covering panel finish against cracking, checking, blistering, peeling, flaking, chipping, chalking and fading for a period of twenty (20) years for soffit panels (premium fluorocarbon coating.

3) Submit specimen copies of finish warranties.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery:

1) Deliver metal panels to job site properly packaged to provide protection against transportation damage.

B. Handling:

1) Exercise extreme care in unloading, storing and erecting metal panels to prevent bending, warping, twisting and surface damage.

C. Storage:

1) Store all material and accessories above ground on well skidded platforms. Store under waterproof covering. Provide proper ventilation of metal panels to prevent condensation build-up between each panel. Do not store panels in contact with other materials that might cause staining, denting or other surface damage.

2. PART 2 - PRODUCTS

Architectural panel for soffits

2.1 MATERIALS

A. Metal soffit profile:

1) 1 ½" x 12" wide panel

B. Metal panel style:

1) Vertical leg with female side joint sealant, concealed fastener, panel, utilizing male and female side lap connection continuously engaged full length of panel resulting in a flush appearance on exposed side.

C. Gauge:

1) 22 gauge for soffits

D. Substrate:

1) Galvalume steel sheet, minimum yield of 50,000 PSI

E. Texture:

1) Embossed

F. Finish:

1) Premium fluorocarbon coating (20 year warranty).

G. Color:

1) Selected from metal panel manufacturer's standard offering.

H. Acceptable manufacturer:

1) MBCI, Artisan Soffit Panel - Houston, TX - (281) 445-8555,

2) McElroy Metal, FW Panel Soffit Panel, Marshall, MI (1-800-950-6534)

3) Atas International, Inc. Design Soffit Panels (1-800-468-1441)

4) Berridge Manufacuturing Co., FW-12 Panel (1-800-488-7415)

5) Dimensional Metals Inc. is an approved manufacturer as long as they abide by all specifications and project requirements.

2.2 MISCELLANEOUS MATERIALS

A. Fasteners:

1) All self-tapping/self-drilling fasteners, bolts, nuts, self-locking rivets and other suitable fasteners shall be designed to withstand specified design loads.

a) Use long life fasteners for all interior and exterior applications.

b) Provide fasteners with a factory applied coating in a color to match metal panel to attach adjacent trim.

B. Provide perforated continuous vent strips with insect screens at locations shown on drawings.

2.3 FABRICATION

A. Material shall be in-line tension leveled prior to roll forming panel profile.

B. Where possible, roll form panels in continuous lengths, full length of detailed runs.

C. Soffit panels shall be in full sections without splices where possible.

D. Fabricate trim/flashing and accessories to detailed profiles.

E. Fabricate trim/flashing from same material as panel.

3. PART 3 – EXECUTION

3.1 SURFACE CONDITIONS

A. Examination:

1) Inspect installed work of other trades and verify that such work is complete to a point where this work may continue.

2) Verify that installation may be made in accordance with approved shop drawings and manufacturer's instructions. This specifically includes verifying that secondary structural members are installed to meet building code requirements.

B. Discrepancies:

1) In event of discrepancy, notify the architect.

2) Do not proceed with installation until discrepancies have been resolved.

3.2 INSTALLATION

A. Install metal panels so they are without waves, warps, buckles, fastening stresses or distortion.

B. Install metal panels in accordance with manufacturer's instructions and shop drawings.

C. Provide concealed anchors at all panel attachment locations.

D. Install panels plumb, level and straight with joints parallel, conforming to design as indicated.

3.3 CLEANING, PROTECTION

A. Dispose of excess materials and remove debris from site.

B. Clean work in accordance with manufacturer's recommendations.

C. Protect work against damage until final acceptance. Replace or repair to the satisfaction of the architect, any work that becomes damaged prior to final acceptance.

D. Touch up minor scratches and abrasions with touch up paint supplied by the metal panel manufacturer.

E. Do not allow panels or trim to come in contact with dissimilar metals such as **copper, lead or graphite**. Water run-off from these materials is also prohibited.

◆ END OF SECTION ◆

SECTION 07 42 43

COMPOSITE WALL PANELS

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. SterraCore aluminum-faced composite panels, attachments and sealants.

B. To be used at canopy at entrance.

1.2 RELATED SECTIONS

A. Section 05 10 00 – Structural Metal Framing.

B. Section 06 10 00 – Rough Carpentry.

C. Section 07 20 00 – Thermal Protection.

D. Section 07 60 00 – Flashing and Sheet Metal.

E. Section 07 92 00 – Joint Sealants.

F. Section 08 41 13 – Aluminum Framed Store Fronts

G. Section 09 20 00 – Plaster and Gypsum Board.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM) B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

B. American Society for Testing and Materials (ASTM) C481 - Laboratory Aging of Sandwich Constructions.

C. American Society for Testing and Materials (ASTM) E72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.

D. American Society for Testing and Materials (ASTM) E84 - Surface Burning Characteristics of Building Materials.

E. American Society for Testing and Materials (ASTM) E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors.

F. American Society for Testing and Materials (ASTM) E289 - Linear Thermal Expansion of Rigid Solids with Interferometry.

G. American Society for Testing and Materials (ASTM) E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors.

H. American Society for Testing and Materials (ASTM) E331 - Water Penetration for Exterior Windows, Curtain Walls, and Doors.

I. American Society for Testing and Materials (ASTM) D1781 - Climbing Drum Peel for Adhesives.

J. American Society for Testing and Materials (ASTM) - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

K. American Architectural Manufacturers Association (AAMA) 501 – Water Penetration using Dynamic Pressure.

L. American Architectural Manufacturers Association (AAMA) 605.2 - Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.

M. American Architectural Manufacturers Association (AAMA) TIR-a11 - Maximum Allowable Deflection of Framing Systems for Building Cladding Components at Design Wind Loads.

1.4 SYSTEM DESCRIPTION

A. Design Requirements:

1) Expansion and Contraction: Design system to accommodate movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects when subjected to temperature and humidity ranges reasonably anticipated.

2) Barrier System: Wall panel assembly shall be designed in accordance with manufacturer's guidelines to be sealed at all panel joints, intersections, dissimilar material abutments, and cutouts, thus providing a weathertight barrier system.

3) Windload: Wall panel assembly shall be designed to withstand a positive and negative windload pressure acting inward and outward normal to the plane of the wall to meet the requirements of the latest adopted Local Building Code.

4) Design system to accommodate tolerances of structure.

B. Performance Requirements:

1) Submit test data witnessed by an independent testing agency for the following requirements:

a) Structural tests for wind loads by "Chamber Method" in compliance with ASTM E72.

[1] Standard test design loading: 20 psf (960 Pa) positive and negative wind load.

[2] Design panel system to withstand code imposed design

loads and a deflection limit of L/180 shall apply to positive load pressures only.

[3] Design panel system to withstand code imposed design loads and a deflection limit of L/175 shall apply to positive load pressures only.

b) Air Infiltration: 0.06 cfm per square foot (32 lps per square meter) air leakage under a static pressure of 1.56 psf (7.65 kg per square meter) when tested in accordance with ASTM E283.

c) Water Penetration: No uncontrolled water penetration through the standard vertical panel and sealed joints at a static pressure of 6.24 psf (30.5 kg per square meter) when tested in accordance with ASTM E331.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Manufacturer's data sheets on each product to be used, including:

1) Preparation instructions and recommendations.

2) Storage and handling requirements and recommendations.

3) Installation methods.

C. Shop Drawings: Submit shop drawings showing layout, flashings, drainage, ventilation, vapor barriers, vapor retarders, profiles and product components, including anchorage, accessories, finish colors, patterns and textures.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 3 inches (76 mm) by 5 inches (128 mm) representing actual product, color, and patterns.

F. Submit manufacturer's warranty meeting the requirements of this section

G. Quality Assurance Submittals: Submit the following:

1) Test reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

2) Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria, and physical requirements.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer capable of providing field service

representation during construction, approving acceptable installer and approving application method.

B. Installer Qualifications:

1) Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

2) Panel Installer shall assume responsibility for all components of the exterior panel system including, but not limited to attachment to sub-construction, panel to panel joinery, panel to dissimilar material joinery, and joint seal associated with the panel system.

C. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store panels horizontally, off-the-ground, in manufacturer's unopened packaging until ready for installation.

B. Examine delivered materials upon receipt to insure that no damage has occurred during shipment. Store metal-faced composite wall panels horizontally, covered with a suitable weather tight and ventilated covering. Store metal-faced composite wall panels to ensure dryness, with a positive slope for drainage of water. Do not store metal-faced composite wall panels in contact with other materials that might cause staining, denting, or other surface damage. DO NOT allow storage space to exceed 120 degrees F (49 degrees C).

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

D. Materials to be packaged to protect against transportation damage. Examine materials upon receipt to insure that no damage has occurred during shipment.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. Finish Warranty: Commencing on Date of Substantial Completion.

1) Provide 30-year written warranty with PVDF fluoropolymer finish color coated metal finish covering color fading, chalking, and film integrity.

2) Chalking, fading or erosion of finish measured by the following tests:

a) Finish coating shall not chalk in excess of 8 numerical ratings

when measured in accordance with ASTM D659.

b) Finish coating shall not change color or fade in excess of 8 NBS units as determined by ASTM D2244.

B. Material and Installation Warranty: Commencing on Date of Substantial Completion.

1) When installed as directed by ATAS International, panels covered by this warranty are warranted not to delaminate (separate) at any ATAS produced glue line for a period of five years.

2. PRODUCTS

2.1 MANUFACTURERS - Basis of Design: ATAS International, SterraCore Metal Composite Panel. Provide bases of design product, or comparable approved by Architect prior to bid.

A. Acceptable Manufacturer:

1) ATAS International, Inc. – SterraCore Metal Composite Panel; 6612 Snowdrift Road; Allentown, PA 18106. Ph: 1800-468-1441; www.atas.com

2) Citadel Architectural Products, Inc. – Sinocore Metal Composite Panel; 3131-A North Franklin Road; Indianapolis, IN 46226 Ph: (800) 446-8828; www.citadelap.com; info@citadelap.com

3) Alpolic Metal Composite Materials – Alpolic PE Metal Composite Panel; 401 Volvo Parkway; Chesapeake, VA 23320. Ph; 800-422-7270; alpolic-americas.com

4) Omegalite Panels from Lamintors, Inc. is an approved manufacture as long as they can meet or exceed the specifications and can match the existing color as called out in the drawings.

5) Larson by Alucoil is an approved manufacture as long as they can meet or exceed the specifications and can match the existing color as called out in the drawings.

B. Substitutions:

1) Not permitted without approval of the architect 10 days prior to bid.

2) Items being submitted for consideration must be of the same function and meet the performance requirements set forth in this section.

2.2 STERRACORE ALUMINUM-FACED COMPOSITE PANELS

A. SterraCore Composite Panels as provided through ATAS International.

1) Panel Construction: Finished aluminum sheet over a corrugated

polyallomer (CPA) core with backer sheet.

2) Panel Facing: Smooth face, minimum 0.032 inch thick, ASTM B209 aluminum sheet.

3) Panel Backing: Random painted aluminum sheet, minimum 0.013 inch (0.33 mm) thick, ASTM B209 aluminum sheet.

4) Panel Thickness: 6 mm (1/4 inch)

5) Fire Test Performance: ASTM E84: Class A.

6) Bond Test Performance: ASTM C481-A Cyclic Aging: Pass.

7) Finish: Kynar 500 - PVDF fluoropolymer paint system meeting AAMA 2605.

8) Finish Colors: Manufacturers Standard

B. Aluminum Composite Panel Installation System:

1) Clip & Seal System.

2) One-Piece Tight fit Extrusions

2.3 ACCESSORIES

A. Manufacturer's Sealants and Accessories: Provide manufacturer's recommended sealants and accessories for product installation.

B. Flashing: Fabricate flashing materials from 0.030 inch (0.76 mm) minimum thickness aluminum sheet painted to match the adjacent curtain wall/panel system where exposed. Provide a 12 inch (305 mm) wide lap strap under the flashing at abutted conditions and seal lapped surfaces with a full bed of non-hardening sealant.

2.4 FABRICATION

A. Panels shall be fabricated and finished as required to provide material construction and performance as specified and as required by manufacturer to comply with warranty provisions.

1) Tolerances: Length and Width: plus or minus 1/16 inch (1.6mm). Squareness (Diagonals): equal within 1/8 inch (3.2mm).

3. EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Examine substrates, areas, and conditions, with substrate installer present, for compliance with requirements for structural soundness, installation tolerances,

metal panel supports, and other conditions affecting performance of work.

1) Examine primary and secondary wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances listed below.

a) 1/4 inch (6 mm) in any 20 feet (6 m) length vertically or horizontally.

b) 1/2 inch (12 mm) in any building elevation.

2) Examine solid wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required.

3) For the record, prepare written report, endorsed by panel installer and substrate installer, listing remedy for conditions detrimental to performance of work.

C. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before metal panel installation.

D. Proceed with installation only after all unsatisfactory conditions have been corrected.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION

A. Comply with manufacturer's installation guides including product technical bulletins, product catalog installation instructions, and product carton instructions for installation type selected.

B. Work shall be done and completed in a thorough and workmanlike manner by mechanics skilled in their various trades.

C. Caulk Installation:

1) Use only approved sealants as described in ATAS International’s Installation Guidelines.

2) The sealant manufacturer’s instructions shall be followed in preparing and installing sealants.

3) Joints to receive sealant shall be clean, dry and free from dust, grit and contaminants.

4) The sealant shall completely fill the glazing pockets.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

3.4 CLEANING AND PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction.

B. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

C. Protect installed products until completion of project.

D. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

1. PART 1 - GENERAL

1.1 RELATED WORK

A. Sealants and Caulking - Section 07 92 00

1.2 SECTION INCLUDES

A. Shop and field formed accessories and trim such as fascia, gutters, downspouts, gravel stops, reglets and counter flashing.

1.3 PERFORMANCE REQUIREMENTS

A. High performance edge details must be selected from manufacturers who certify performance to meet design requirements, based upon testing of such products using the test methodologies RE-1, RE-2, and/or RE-3 as referenced by the SPRI "Wind Design Guide for Use with Low Slope Roofing" (April 1994). Other designs may be used, provided they are tested and certified to meet wind resistance and termination tests established for the projects building height, ground roughness factor, local wind speeds, and geographic location.

B. Uplift requirements shall match requirements specified for adjacent membrane roofing.

C. Wind resistance calculation will be designed specifically for the current project.

D. All exterior sheet metal and metal roofing shall come from the same manufacturer and supplier so the color and appearance matches.

1.4 SUBMITTALS

A. Samples

1) Submit samples and color chips for all proposed finishes.

1.5 QUALITY ASSURANCE

A. Mock-Up: Provide a mock-up for evaluation of construction techniques and application workmanship.

1) Mock-up shall include the eave/cornice flashing as detailed on drawings.

2) Finish areas designated by Architect

3) Do not proceed with remaining work until workmanship and color are approved by Architect.

4) Rework Mock-Up area as required to produce acceptable work.

2. PART 2 - PRODUCTS

2.1 MATERIALS

A. G90 galvanized steel sheet of thickness indicated on drawings, or specified hereint.

B. Elastic cement shall be a mixture of asphalt and synthetic fibers and conforming to ASTM SS-C-153.

2.2 GUTTERS AND DOWNSPOUTS

A. Gutters and Downspouts: Manufacture or fabricate gutter complete with end pieces, outlet tubes, and other accessories as required. Furnish flat-stock gutter spacers and gutter brackets from same material as gutters, of size recommended by SMACNA, but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.

B. Gutters & downspouts shall be fabricated from galvanized steel, ASTM Specifications A525, G90 coating latest issue.

C. Gutters 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. Gutter support brackets shall be spaced at 2'-8" O.C.

D. 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.

E. Downspout conductors shall be 3" (3" x 3") styled to match existing (see roof plan for locations). Securely anchor the 3" conductor to the masonry wall with anchors at 4'-0" O.C.

2.3 FASCIA

A. Provide fascia 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.

1) Galvanized steel, 22 gauge.

2) Fascia shall have a factory finished paint application. Paint shall be 70% Fluor/Kynar of manufacturer's standard colors.

2.4 REGLETS

A. General: Provide reglets of type, material, and profile indicated, compatible with flashing. Form to securely interlock with counterflashing.

B. Masonry Type: Provide with offset top flange for embedment in saw cut masonry joint to match slope of roof.

1) Galvanized Steel Sheet: 0.028 inch (0.55 mm) thick.

C. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing.

D. Counterflashing Wind Resistant Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing's lower edge.

2.5 COUNTERFLASHING

A. Provide counterflashing fabricated from the same metal as reglets and compatible with reglet system installed.

B. Provide counterflashing fabricated from the following metal in thickness indicated:

1) Painted, metallic-coated steel sheet: 0.028 inch.

2.6 FINISHES

A. Finishes

1) Fluoropolymer, 70 percent Kynar 500, 2 coat system, complying with AAMA 605.2. Color to be chosen from manufacturer's eight (8) standard colors.

3. **PART 3 - EXECUTION**

3.1 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 ◆

SECTION 07 72 00

ROOF ACCESSORIES

1. PART 1 - GENERAL

1.1 WORK RELATED ELSEWHERE

1.2 SCOPE

A. Install roof curbs as shown on plans and as required by mechanical units.

1.3 SUBMITTALS

A. Provide shop drawings.

2. PART 2 - PRODUCTS

2.1 ROOF CURBS

A. Roof curbs for mechanical equipment area supplied by the Mechanical Contractor and installed by General Contractor. See drawings.

3. PART 3 - EXECUTION

3.1 Installation shall be in accordance with manufacturer's instructions. Manufacturer shall guarantee against defects in material or workmanship for a period of five years.

◆ END OF SECTION ◆

SECTION 07 84 00

FIRESTOPPING

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” (July 1983).

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 (September 7, 1994).

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.

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

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

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) Equal product by Tremco

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) 3M Fire Barrier CP25.

5) Equal product by Tremco

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 effect 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.

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 ◆

SECTION 07 92 00

JOINT SEALANTS

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

1.5 SUBMITTALS

A. Product data. Unless otherwise indicates, submit the following for each type of product provided under work of this Section:

[1] 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 ½ 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 premoulded 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 ◆

SECTION 08 11 13

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 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:

1) Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless) or Model 3 (Stile and Rail).

C. Storm Shelter Doors: Provide doors compliant with the ICC 500 standards and hardware requirements for storm shelters. See drawing 10.1.

1.4 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.

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 ensure 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 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.

2.2 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. Storm Shelter Doors: Compliant with ICC 500 standards. 12-gauge vertical steel stiffeners, 12-gauge full perimeter channel along door edges, 7-gauge hinge reinforcements, 12-gauge reinforced lock boxed. 7-guage closer reinforcement and an addition al 14-guage skin attached to door with ¼"x1 ¼" self tapping screws with hexagon washer heads spaced at 6" on center along perimeter and 12" on center in the field.

E. Finish: Factory primed in accordance with ANSI A224.1 and field painted.

F. Exterior doors shall be completely temperature insulated.

G. Provide light cut outs with moldings and vinyl gaskets, to retain the glass, similar to Steelcraft Manufacturing standards.

H. Doors, as scheduled, shall have steel louvers with adjustable blades and insect screens.

2.3 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. Finish: Factory primed and field painted.

C. 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.

D. Provide ALL frames with 8-gauge reinforcement plates at hinge, strike, and closer locations.

E. Provide ALL frames with adjustable base anchors for rigid anchorage to the floor.

F. 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.

G. Reinforce storm door frames to be compliant with ICC 500 standards.

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.

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.

2.4 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 frame 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 ensure 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. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work specified in this section.

1.2 DESCRIPTION OF WORK

A. The extent of each type of door and frame is shown on the drawings and in schedules.

B. The following types of doors and frames are required:

1) Aluminum frames for entrances
2) Aluminum medium stile doors and panels

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. For Joint Sealants, see Section 07 92 00

1.4 SYSTEM PERFORMANCE

A. Provide door assemblies that have been designed and fabricated to comply with requirements for system performance characteristics listed below, as demonstrated by testing manufacturer's corresponding stock systems according to test methods designated.

B. Thermal Transmission (Exterior Doors) "U"-value of not more than 0.09 (BTU/Hr. x sf x degrees F) per AAMA 1503.01.

1.5 QUALITY ASSURANCE

A. Standards: Comply with the requirements and recommendations inapplicable specifications and standards by NAAMM, AAMA, and AA, including the terminology definitions, and specifically including the "Entrance Manual" by NAAMM except to the extent more stringent requirements are indicated.

B. The manufacturer, and/or his representative shall visit this project and instruct the installers in the proper installation of the door and Frame assemblies.

C. Field Measurement: Take field measurements prior to fabrication of doors and frames to ensure proper fitting of assemblies and show recorded measurements on final shop drawings. Successful bidders are expected to field verify all dimensions, sizes, quantities and the material required to complete this project. Failure to do so will not relieve the successful contractor from the necessity of furnishing any and all materials that may be required, without any additional costs to the Owner.

Coordinate fabrication schedule with construction progress as directed by Contractor, and avoid delays of the work.

1.6 SUBMITTALS

A. Product Data: Submit door manufacturer's product data, specifications and instructions for each type of door and frame.

1) Include details of core, stile and rail constructions including trim for lights and similar components.

2) Include details of finish hardware mounting.

3) Include samples of each Aluminum and finish as required of the alloys to be used on this project. Where normal color and texture variations are expected, include two or more units in each sample as required to show the range of such variation.

4) Architect reserves the right to require samples of typical fabricated section, showing joints, exposed fastenings (if any), quality of workmanship, hardware and accessory items, before fabrication of the work proceeds.

B. Submit shop drawings for the fabrication and installation of the doors and Frames and associated components of the work. Include wall elevations at ½″ scale and half-sized detail sections of every typical composite member. Show anchors, joint system, expansion provisions, and other components not included in the manufacturers' standard data. Include glazing details.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. All materials supplied shall be delivered to the job site in their original unopened packages, with labels intact. Materials shall be inspected for damage, and the manufacturer shall be advised at once of any discrepancies. Unsatisfactory materials are not to be used.

B. All materials supplied shall be packaged in individual corrugated cartons. Doors shall be "floated" within cartons, with no portion of the door having contact with the outer shell of the container.

1.8 SPECIAL PROJECT WARRANTY

A. Provide a written warranty signed by Manufacturer, Installer and Contractor agreeing to replace at no cost to the Owner, any doors, frames, or hardware that fail in materials or workmanship, within the time period of acceptance as indicated below. Failure of materials or workmanship includes excessive deflection, faulty operation of entrances, deterioration of finish, or construction in excess of normal weathering and defects in hardware, weather stripping and other components of the work.

B. Minimum Time Period of Warranty: Two years for substantial completion.

1.9 ACCEPTABLE MANUFACTURERS DOORS AND FRAMES

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following or approved equal:

1) Kawneer 500 wide style door with 3½″ mid rail. Equal by PPG and Tubelite.

2) MS-400-F 4″ styles with 8″ top, bottom and mid-rails. Fluted #10 Patten Aluminum Doors - Cross Aluminum Products, Dowagiac, Michigan.

3) Capitol Aluminum "Heavy Duty" aluminum door with minimum 4 ½″ mid rail; Bellevue, Ohio.

4) Tube lite, Reed City, Michigan wide style door.

B. Electronic Lock Requirements

1) Verify with electronic door lock hardware supplier the minimum vertical style width for installation of the electric lock.

2. PART 2 - PRODUCTS

2.1 MATERIALS AND ACCESSORIES

A. Aluminum Members: Provide alloy and temper as recommended by manufacturer for strength, corrosion resistance, and application of required finish and control of color; ASTM 221 for extrusions, ASTM B 209 for sheet/plate, with a minimum wall thickness of 0.125″.

B. Fasteners: provide aluminum, non-magnetic stainless steel or other non-corrosive metal fasteners, guaranteed by the manufacturer to be compatible with the doors, frames, stops, panels, hardware, anchors, and other items being fastened. For exposed fasteners (if any), provide Phillips head flat screws with finish matching the time to be fastened.

1) Do not use exposed fasteners, except where unavoidable for the assembly of units, or unavoidable for the fastening of hardware. provide only concealed screws in glazing stops.

C. Reinforcement and Brackets: Manufacturer's standard formed or fabricated steel units of shapes, plates, or bars, with 2.0 ounce hot-dip zinc coating, complying with ASTM A123, applied after fabrication.

D. Anchor Devices: Lead shield or toothed steel, drill-in, expansion bolt anchors, or Tapcon style anchors shall be used.

E. Bituminous Coating: Cold applied asphalt mastic complying with SSPC-PS 12, compounded for 30-mil thickness per coat.

F. Sealants and Gaskets: provide sealants and gaskets in the fabrication, assembly, and installation of the work which are recommended by the manufacturer to remain permanently elastic, non-shrinking, non-migrating and weatherproof.

G. Glazing Gaskets: For glazing factory-installed glass, and for gaskets which are factory-installed glass, and for gaskets which are factory-installed in "Captive" assembly of glazing stops, provide manufacturer's standard stripping of molded neoprene, complying with ASTM D 2000 (Designation 2BC415 to 3 BC620), or molded PBC complying with ASTM C 509, Grade 4.

H. Provide maximum recycled-content feasible for aluminum doors and frames.

2.2 FABRICATION

A. Sizes and Profiles: The required sizes for door and frame units and profiles requirements are shown on the drawings.

1) The details shown are based upon standard details by one or more manufacturers. It is intended that details by other manufacturers will be accepted, provided they comply with size requirements, and with minimum/maximum profile requirements as shown.

B. Door shall be modified in width for continuous gear hinge installation.

C. Complete the cutting, fitting, forming, drilling and grinding of all metal work prior to the cleaning, finishing, treatment and application for coatings. Remove burrs from cut edges, and ease edges and corners to a radius of approximately 1/64″.

D. No Welding of joints will be accepted.

E. Conceal fasteners, whenever possible, except as otherwise noted.

F. Maintain continuity of line and accurate relation of planes and angles. Provide secure attachments and support at mechanical joints, with hairline fit at contacting members.

G. Reinforce the work as necessary for performance requirements and for support to the structure. Separate dissimilar metals with bituminous paint or preformed separators which will prevent corrosion. Separate metal surfaces at moving joints with non-metallic separators to prevent "Freeze-up" of joints.

2.3 STANDARD ALUMINUM DOORS

A. QUALITY ASSURANCE

1) Drawings and specifications are based upon the Series 350 doors as manufactured by the Kawneer Company, Inc.

2) Structural Resistance to corner racking shall be tested by the Dual Moment Load test as follows:

a) Test section consists of a standard top door corner assembly. Side rail section shall be 24″ long and top rail section shall be 12″ long.

b) Anchor "top rail" positively to test bench so that corner protrudes 3″ beyond bench edge.

c) Anchor a lever arm positively to "Side rail" at a point 19″ from inside edge of "top rail." Attach weight support pad at a point 19″ from inner edge of "side rail."

d) Test section shall withstand a load of 500 pounds on the lever arm before reaching the point of failure, which shall be considered a rotation of the lever arm in excess of 45 degrees. See Section 1.9 of this specification for other approved manufacturers.

3) Air infiltration: (Applies to single acting offset pivot or butt hung entrances).

4) Air infiltration shall be tested in accordance with ASTME E 283, at a pressure differential of 1.567 P.S.F. (75 Pa). A single 3′0″ x 7′0″ entrance door and frame shall not exceed .50 CFM per linear foot of perimeter crack. A pair of 6′-0″ x 7′-0″ entrance doors and frame shall not exceed 1.0 CFM per linear foot of perimeter crack.

B. MATERIALS

1) Extrusions shall be 6063-T5 alloy and temper (ASTM B 221 alloy G.S. 10A-T5). Fasteners, where exposed, shall be aluminum, stainless steel or plated steel in accordance with ASTM A 164. Perimeter anchors shall be aluminum or steel, providing the steel is properly isolated from the aluminum. Glazing gaskets shall be EPDM elastomeric extrusions. Major portions of the door stiles shall be .125″ (3.2) nominal in thickness and glazing molding shall be .050″ (1.2) thick.

C. FABRICATION

1) See drawings for elevations for doors and rail and stile sizes.

Vertical Stile	4½″ Min
Top Rail	4½″ Min
Mid Rail	3½″ Min
Bottom Rail	10″ Min

1) Corner construction shall consist of both sigma deep penetration and sigma fillet welds and mechanical fastening. Interior glazing stops shall be square snap-in type with neoprene bulb type glazing. Square stops on exterior side shall be lock-in tamper proof type. No exposed screws shall be required to secure stops.

2) The door weathering on a single acting offset pivot or butt hung door and frame (single or pairs) shall be a thermoplastic elastomer weathering seal in a tubular shape with a semi-rigid polymeric backing. OPTIONAL - The door bottom rail will be weathered with an EPDM blade gasket sweep strip applied with concealed fasteners.

3) The door weathering on a double acting, center pivoted door and frame (single or pairs) shall be pile cloth. OPTIONAL - The door bottom rail will be weathered with an EPDM blade gasket sweep strip applied with concealed fasteners.

4) The meeting stiles on pairs of doors shall be equipped with an adjustable astragal weatherstrip.

2.4 ALUMINUM FRAMING SYSTEMS

A. TUBULAR FRAMING

1) Aluminum framing system shall be 4½″ x 2″ flush glazed and shall not be less than .125″ in wall thickness. type 6063-T5 aluminum alloy shall be used. Pile weatherstripping shall be used in all principal frame member stops.

2) All framing systems shall utilize a screw spline system for concealed fasteners. No welds or glues are acceptable.

3) All framing members in contact with the door shall be reinforced and premachined for hardware per manufacturer's standards, be approved hardware schedule and this Specification.

4) Anchors of a suitable type shall be used to fasten framing system to wall materials. A minimum of five anchors shall be used on all jamb and perimeter frame members up to 7′-4″. Additional anchors are required over 7′-4″. Please check this Specification for conditions which call for other anchoring conditions.

5) Framing systems shall come from the manufacturer in a knock-down condition and be assembled at the job site.

2.5 GLAZING

A. Provide glazing system for doors and frames to receive lights. Design system for replacements or glass, but for non-removal of glass from the exterior. Glazing shall be 1″ insulating glass for exterior doors only and ¼” tempered glass for interior vestibule doors. See section 08 81 00.

1) Provide manufacturer's standard "flush glazing" system of recessed channels and captive glazing gaskets.

2) Provide anchorage and alignment brackets for concealed support of assembly from the building structure. Allow for thermal expansion on exterior units.

3) Glass to be factory installed in doors.

2.6 SOLID PANEL DOORS

A. The door panel shall consist of a solid core composition material with 0.40" #10 pattern fluted aluminum sheet laminated to both sides of it, yielding a panel of overall thickness not less than 7/8". Aluminum sheet to match the finish on the door.

2.7 ALUMINUM FINISHES

A. Preparation: Prior to fabrication of doors and frames, prepare the aluminum surfaces for finishing in accordance with the aluminum producer's recommendations, and the standards of the finisher or processor. Process all components of each assembly simultaneously to attain complete uniformity of color.

B. All exposed framing surfaces shall be free of scratches and other serious blemishes. Aluminum moldings shall be given a caustic etch followed by an anodic oxide treatment to obtain an Architectural Class I Color Anodic Coating conforming with Aluminum Association Standard anodized color finish as selected by Architect.

C. Finishes: Door and frame components shall be furnished with a finish custom anodized color. Submit color sample to architect for approval.

2.8 FINISH HARDWARE

A. Reinforce, cut, drill, and tap doors and frames as required to receive hardware, except to not drill and tap for surface mounted closers and holders, which are to be applied at the job site. Comply with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.

2.9 TEMPLATES

A. All necessary templates for accurate setting and fitting of finish hardware shall be furnished to Manufacturer in ample time to facilitate the manufacture of items for the project.

2.10 HARDWARE SETS

A. All doors shall be equipped with hardware of the types listed in section 08 71 00. The Contractor is referred to the schedule and plans for the total number of each set required. Sets shall be supplied by door hardware vendor.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's recommendations and specifications for the installation of the doors and frames.

B. Set units plumb, level and true to line, without warp or rack of doors or frames. Anchor securely in place. Separate aluminum and other corrodible metal surfaces, form sources of corrosion or electrolytic action at points of contact with other materials, with bituminous coating, or other means as approved by Architect. All joints between framing and the building structure shall be sealed in order to secure a watertight installation.

C. Set thresholds in a bed of compound and backseal with appropriate sealant. Thresholds in more than one piece shall meet at mullion centers and be notched out on back side.

D. Clean surfaces promptly after installation of doors and frames, exercising care to avoid damage to the protective coating (if any). Remove excess glazing and sealant compounds, dirt and other substances.

E. After installation, the General Contractor shall provide protective treatment and other precautions required through the remainder of the construction period, to ensure that the doors and frames will be without damage or deterioration (other then normal weathering) at the time of acceptance. The General Contractor shall be responsible for final cleaning.

F. Provide Owner with all adjustment tools and instruction sheets. Arrange an in service session to Owner at Owner's convenience. provide a minimum two-year written warranty on all labor related to this section. Any workmanship which is defective or deficient shall be corrected to the Owner's satisfaction and at not additional cost to the Owner.

◆ END OF SECTION ◆

SECTION 08 14 00

WOOD DOORS

1. PART 1 - GENERAL

1.1 RELATED WORK

A. Hollow Metal Frames - Section 08 13 00
B. Finish Hardware - Section 08 71 00
C. Glass Glazing – Section 08 81 00
D. Painting - Section 09 91 00

1.2 SUBMITTALS

A. Submit the following:

1) Catalog data for each type of wood door, including details of core and edge construction, trim for openings, and finishing specifications for doors to receive factory finish.

2) Color and finish samples of factory finished doors for approval.

3) Shop drawings indicating location, size, and hand of each door, elevation of each kind of door, details of construction, location and extend of hardware blocking, fire ratings, requirements for factory finishing and other pertinent data.

4) Warrant as specified.

1.3 QUALITY ASSURANCE

A. Quality Standards: Comply with the following standards:

1) WDMA I.S. 1-A

B. Manufacturer: Obtain all doors from a single manufacturer.

1.4 STORAGE & HANDLING

A. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with requirements of referenced standards and recommendations of NWWDA pamphlet “How to Store, Handle, Finish, Install, and Maintain Wood Door”, as well as with manufacturer’s instructions.

B. Identify each door with individual opening numbers which correlate with designation system used on shop drawings for door, frames, and hardware, using temporary, removable or concealed markings.

C. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during remainder of construction period to comply with the following requirements applicable to project’s geographical location:

1) Referenced AWI quality standard including Section 100-S-3 “Moisture Content”

D. Stack doors inside, protected from elements, in a manner to provide adequate ventilation and prevent warpage. Do not store or install in any part of the building until concrete, masonry and plaster work is dry.

E. (Follow AWI 1300-G8 paragraph A standards in addition to above).

1.5 MANUFACTURERS

1) Mohawk
2) Algoma
3) Marshfield Door System
4) Eggers
5) Oshkosh Door Company is an approved manufacturer as long as they abide by all specifications and project requirements. Note wood doors are 5ply.

1.6 WARRANTY

A. Manufacturer’s lifetime warranty to include the following:

1) Replacement
2) Machining for all hardware
3) Rehanging
4) Refinishing

1.7 COORDINATION

A. General Contractor shall be solely responsible for proper machining for hardware.

2. **PART 2 - PRODUCTS**

2.1 WOOD FLUSH DOORS

A. General Requirements

1) Quality Standards: WDMA 1.S.1-A Performance Grade: Extra Heavy Duty

2) Grade: Custom grade with “A” faces.

3) Cut: Plain sliced or rotary cut.

4) Match between Veneer Leaves: Book or slip match.

5) Assembly of Veneer Leaves on Door Faces: Running match.

6) The moisture content of all wood components shall average from 6 to 8 percent and shall be at equilibrium with the same relative humidity condition at the time of door fabrication.

7) Door cores shall be free of urea-formaldehyde.

B. 5 Ply Construction

1) Faces: For all wood doors in the addition and renovation space, door color and wood species to match existing door color and species. Provide sample of material to Architect prior to purchase of material.

2) Cross Bands: Cross bands shall be thoroughly oven-dried hardwoods, 1/16" minimum thickness extending the full width of the door and laid with the grain at right angles to the face veneers.

C. Core Construction

1) Particle board: Shall meet or exceed the requirements of Grade "1-L-1" as described in the latest edition of ANSI-A208.1 "Mat-formed Wood Particle board." Provide blocking for the acceptance of all hardware. Thru-bolt attachment of hardware is not permitted.

D. Stiles (Vertical Edge Bands)

1) Doors with hardwood veneer faces shall have 1-3/8" wide 2-ply stiles made from thoroughly kiln-dried hardwood lumber. 1-3/8" stiles shall have mill option hardwood on the inner ply with outer ply compatible or matching to the face veneers. Stiles shall be laminated to the core with Type 11 glue.

E. Rails (Horizontal Edge Bands)

1) Rails shall be thoroughly kiln-dried hardwood lumber, minimum 1-3/8" wide. Rails shall be laminated to core with Type 11 glue.

F. Adhesive

1) 5-ply doors shall be laminated by hot press method with Type I glue.

G. Pre-machining

1) Prefit door to provide maximum clearance of 1/8" at sides and top and 3/4" at bottom unless otherwise specified. Prepare doors for hardware in accordance with approved hardware schedule. All premachined doors shall be identified with opening number.

H. Field Finishing

1) Follow WDMA Standards for field finishing.

2) Paint or Stain finish to be selected by architect.

I. Prefinishing (Contractor's option)

1) Interior doors shall be factory finished on all six sides and shall be equal to WDMA TR4 conversion varnish or TR-6 catalyzed polyurethane custom grade. All prefinished doors shall be individually poly-bagged. Poly-bags to be opaque to provide maximum protection from sunlight. Doors shall be finished per section 099100 if this option is not selected.

2) Paint or Stain finish to be selected by architect.

J. Carpentry

1) All lights and louvers shall be prepared in accordance with ANSI/NWMA Industry Standard I.S. I-80 Series.

K. Electrical Requirements:

1) General: Make provisions for installation of electrical items specified elsewhere; arrange so that wiring can be readily removed and replaced.

2) Doors with Electrical Hinges:

a) General: Provide with metal conduit raceway to permit wiring from electrical hinge to other electric door hardware.

b) Hinge and Pivot Location: Center or intermediate as applicable; top or bottom not permitted.

3. PART 3 - EXECUTION

3.1 INSPECTION

A. Examine door frames, after their installation, and doors, prior to their hanging, as follows:

1) Verify that frames comply with indicted requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.

2) Verify that doors are free of defects that could cause their rejection.

3.2 INSTALLATION

A. Condition doors to average prevailing humidity in installation area prior to hanging.

B. Manufacturer’s Instructions: Install wood doors to comply with manufacturer’s instructions and of referenced AWI standard and as indicated.

C. Job Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below. Machine doors for hardware. Seal cut surfaces after fitting and machining.

1) Fitting Clearances: For doors provide clearances of 1/8” at jambs and heads; 1/16” per leaf at meeting stiles for pairs of doors; and 1/8” from bottom of door to top of decorative floor finish or covering.

a) For undercut doors, provide clearances complying with NFPA 80.

2) Bevel doors 1/8” in 2” at lock edges

D. Prefit Doors: Fit to frames and machine for hardware to whatever extent not previously worked at factory as required for fit and uniform clearance at each edge.

3.3 APPLICATION OF HARDWARE

A. Receive, store, and be responsible for finished hardware and properly tag, index, and file all keys in key cabinet or as directed. Apply hardware manufacturer's instructions, fit accurately, securely, and adjust carefully. Use care not to injure work when applying hardware. When necessary, remove and replace doors that they may have bottoms painted.

B. Location of hardware in connection with doors as follows, unless otherwise shown.

1) Center Door Knobs 38 inches above finished floor

2) Center Door Pulls 40 inches above finished floor

3) Center Push Plates 45 inches above finished floor

4) Center Cylinder Deadlocks 52 inches above finished floor

5) Center Single Push Bars 48 inches above finished floor

6) Locate Upper Edge of Top Hinge 5 inches below head of frame

7) Locate Lower Edge of Bottom Hinge 10 inches above finished floor

8) Space Center Hinges equal distance between top and bottom hinges.

C. Cover door knobs and pulls with heavy cloth until painting is completed. Prior to completion of building, examine all doors, sash and other movable parts, adjust as required and leave hardware in good working order.

3.4 ADJUST AND CLEAN

A. Operation: Rehang or replace doors which do not swing or operate freely, as directed by Architect.

B. Finished Doors: Refinish or replace doors damaged during installation, as directed by Architect.

C. Institute protective measures as recommended and accepted by door manufacturer to assure that wood doors will be without damage or deterioration at time of final acceptance.

◆ END OF SECTION ◆

SECTION 08 36 00

SECTIONAL DOORS

1. PART 1 - GENERAL

1.1. RELATED DOCUMENTS

A. All of the contract documents 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 05 50 00 – Metal Fabrication

2) Section 09 91 00 – Paints and Stains

3) Section 26 00 50 – Electrical General Provisions

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

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, Wayne Dalton Door Corporation, Mt. Hope, OH; Clopay are also approved.

C. Operators: Liftmaster or equal by Overhead Door Corp. or equal by other door manufacturers.

2.2. STEEL INSULATED SECTIONAL DOORS (type F and H)

A. Insulated Steel Sectional Overhead Doors: 592 Series Thermacore Insulated Steel Doors by Overhead Door Corporation.

1) Type H doors shall be 14' w x 14' h

2) Type F doors shall be 8' w x 8' h

B. Door Assembly: Metal/foam/metal sandwich panel construction, with PVC thermal break and weather-tight ship-lap design meeting joints.

1) Panel Thickness: 1 3/4 inches.

2) Exterior Surface: Ribbed.

3) Exterior Steel: .015 inch, hot-dipped galvanized exterior. Back cover 26 gauge steel.

4) Center and End Stiles: 16 gauge with thermal break.

5) High cycle spring: 20,000 cycles

6) Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.

7) Thermal Values: R-value of 14.86

8) Air Infiltration: 0.08 cfm at 15 mph: 0.08 cfm at 25 mph.

9) Intermediate Reinforcing: Shall be 18-gauge steel back-up plates, inserted prior to foaming, to provide reinforcing for attachment of various hardware, and pre-drilled for proper positioning.

10) Manual Operations: Chain hoist.

C. Finish and Color: Factory-applied baked-on polyester or epoxy coating on both sides of metal. Color to match adjacent metal siding. To be selected by Architect from standard colors.

D. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.

E. Lock: No lock.

F. Weatherstripping: EPDM rubber bulb-type on bottom section. (Header seal and jamb weatherstripping).

G. Track: Provide track as recommended by manufacturer to suite loading required and clearances available.

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

I. 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.

J. 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.

K. Windows

1) For Type H doors only, one section of door to be aluminum full view section with ½" insulated glass unites.

L. Structural Performance: Exterior sectional doors shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1) Wind Loads: Uniform pressure (velocity pressure) of 20 lbf/sq. ft. (960 Pa), acting inward and outward.

2) Deflection limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components. Deflection of door in horizontal position (open) shall not exceed 1/120 of the door width.

M. Windborne-Debris-Impact-Resistance Performance: Provide glazed sectional doors that pass large-missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and ASTM E 1996.

2.3 FULL VIEW ALUMINUM DOOR (type L and M)

A. Full view aluminum doors: CA-320i commercial aluminum door by Haas Door or approved equal.

1) Type L doors shall be 10’ w x 10’ h

2) Type M doors shall be 14w ’x 14’h

B. Door Assembly: Sectional door formed with hinged sections and fabricated according to DASMA 102 unless indicated otherwise.

1) Sections: shall be 1.75” (44.5mm) thick tubular aluminum framework with .125 (3.18mm) wall thickness wherever hardware attaches. Vertical stiles and horizontal rails shall be joined with internal steel thru-bolts. Horizontal meeting rails shall have tongue and groove joints.

2) Door panels: shall be .050 smooth painted aluminum sheet with insulated core, set in a continuous vinyl gasket and held in place by inside aluminum snap-in glazing bead. Type M door only. See elevations on drawings.

3) Glass Panels: ½” panels shall be set in a continuous vinyl gasket and held in place by inside aluminum snap-in glazing bead.

4) Top and bottom rails: 6”

5) End Stiles: shall be integral extruded aluminum framework.

6) Intermediate Reinforcing: to be integral extruded aluminum framework, to provide reinforcing for attachment of various hardware.

7) Bottom Section: The bottom section has a flexible vinyl astragal that has been designed for all-weather protection.

8) Windows:

a) Glazing ½” (13mm) insulated tempered glass glazing.

9) Solid panels: Clear anodized, ½” thick, aluminum faced insulated panels.

10) Locking: No lock

11) Weatherstripping: Provide complete perimeter seals. Provide top seal, flexible jamb seal and U shaped bottom seal.

12) Tracks: Vertical tracks minimum 0.061 inch (1.55mm) galvanized steel tapered and mounted for wedge type closing. Horizontal tracks minimum

0.075 inch (1.91mm) galvanized steel, reinforced with minimum 0.0897 inch (2.28 mm) galvanized steel angles as required.

a) Track width: 3” (75mm)

b) Provide high lift / pitched tracks with 15 inches (381 mm) radius track as indicated.

13) Spring counterbalance: Torsion spring counterbalance mechanism sized to weight of the door, with helically would, oil tempered torsion spring mounted on a steel shaft; cable drum of die cast aluminum with high strength galvanized aircraft cable with minimum 8 to 1 safety factor

a) High Cycle Spring: 100,000 cycles.

C. Counter balance system

1) Counterbalance is factory calibrated to match site conditions.

2) Springs: to be helical torsion type made from oil tempered wire.

3) Assembly: torsion springs to be mounted on a coupled solid steel shaft or continuous heavy wall tubular steel shaft depending on door size and mode of operation. Cable drums are die cast aluminum, and cables are high strength galvanized aircraft quality with minimum 8 to 1 safety factor.

D. Hardware

1) Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.

E. Tracks

1) Vertical Tracks: to be minimum of 16 gauge galvanized steel, tapered and mounted for wedge type mounting. Bracket is standard.

2) Horizontal Tracks: to be minimum 16 gauge galvanized steel, reinforced with minimum 13 gauge galvanized steel angles as required for 3 inch track.

F. Hinges: Heavy duty galvanized steel hinges, of not less than 0.0747 inch thick uncoated steel, at each end stile and at each intermediate stile, per manufacture’s written recommendation of door size

1) Attach hinge to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible.

2) Use double-end hinges.

G. Rollers: Heavy duty rollers, with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track.

1) Double Hinges: Extend roller shaft through both hinges.

2) Roller Tires: 3 inch diameter high cycle roller tires for 3 inch track. Tire material to be case-hardened steel.

H. Aluminum finish: Manufactures standard Clear Anodized.

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

J. 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.

K. 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.

L. Structural Performance: Exterior sectional doors shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1) Wind Loads: Uniform pressure (velocity pressure) of 20 lbf/sq. ft. (960 Pa), acting inward and outward.

2) Deflection limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components. Deflection of door in horizontal position (open) shall not exceed 1/120 of the door width.

M. Windborne-Debris-Impact-Resistance Performance: Provide glazed sectional doors that pass large-missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and ASTM E 1996.

2.4. MECHANICAL DOOR OPERATOR

A. General: Provide electric door operator provided by door manufacturer for door with operational life specified complete with electric motor and factory pre-wired motor controls, starter, gear-reduction unit, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation. Comply with NFPA 70. Motor for doors listed above Model SEL with automatic reverse during closing cycle.

B. Disconnect Device: Provide hand-operated disconnect or mechanism for emergency manual operation while disconnecting motor, without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include

interlock device to automatically prevent motor from operating when emergency operator is engaged.

C. Design operator so motor may be removed without disturbing limit switch adjustment and without affecting emergency auxiliary operator.

D. Provide control equipment complying with NEMA ICS1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V, AC or DC.

1) Interior Units: surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure, located in Apparatus Bays.

2) Interior Units: recessed (flush) mounting, with general purpose NEMA PBC-3, Type 1 rated enclosure for remote control stations located in Watch Room Controls).

a) Denco Door Products, Part #38WS, momentary contact, fits in standard electrical box. Incudes stainless steel wall plate for water splash applications.

3) Remote Units: Radio control set with two (2) transmitters per door. (24 total)

a) Liftmaster Radio Transmitter #813LM.

E. Adjustable Limit Switches: Interlocked with mortor controls and set to automatically stop door at fully opened and fully closed positions.

F. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motor, complying with NEMA MG 1, with overload protection and emergency chain hoist with electric interlock, sized to start, accelerate, and operate door in either direction, from any position, at not less than 2/3 fps (0.2 m/s) factor.

1) Type: Mechanical

2) Type: Hoist

3) HP: Minimum 3/4hp (559W)

4) Manufacturer: Liftmaster, Heavy Industrial Duty Gear-reduced Operator, Model HG with Logic 5.0.

5) Power Characteristics. 208V three phase.

6) Service Factor: NEMA 1 for motor. Photo eyes and push buttons to be NEMA 4.

7) Coordinate wiring requirements and electrical characteristic of motors with buildings electrical system.

G. Mortor Control and Enclosure: LiftMaster Logic 5.0 motor control shall be UL-approved microprocessor solid-state type and shall include the capability to select

one of 7 wiring types; additional features shall include a maintenance alert diagnostic system, programmable Timer-to-Close with timer defeat input, mid-stop programming capabilities and a maximum run timer to provide motor overrun protection; motor control shall be housed in a NEMA 1 enclosure integral to the operator and shall conform to ANSI/NEMA ICS 6.

H. Radio Receiver: LiftMaster Logic 5.0 on-board, 3-channel receiver with standard external antenna; equipped to accept Security+ 2.0 Rolling Code Technology remote controls and trinary DIP switch remote controls, with memory up to (30) 3-button remote controls (or 90 single-button remote controls) plus 30 wireless keypads, or an unlimited number of trinary DIP switch remote controls. Tri-band frequency (310/315/390 MHz) sends multiple radio signals to bypass radio interference.

1) Internet Connectivity: MyQ Technology.

2) 902 to 928 MHz.

3) 50-channel FHSS (Frequency Hopping Spread Spectrum).

4) LiftMaster 828LM Internet Gateway enables monitoring and control of door operators and lighting controls via Internet-enabled smartphone, tablet or computer.

5) Provides two-way communication between commercial door operator and MyQ Accessories to enable remote open, close and monitoring of commercial door.

I. Remote Control Station: Provide momentary contact, 3-button control station with push - button controls labeled "Open", "Close" and “Stop”.

1) With maintenance alert indicator to signal intervals for routine door and operator maintenance.

J. Door Drive: 5OB40 door sprocket and #50 output chain with emergency disconnect for manual door operation.

K. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensors able to protect full width of door opening. Activation of sensor immediately stops and reverses downward door travel.

1) Photo-electric control: Provide each motorized door with dual photo-electric devices that will stop and reverse the downward door travel if the light beam is broken or blocked. Devices shall be:

a) NEMA Type 4 rated.

b) Provide LiftMaster dual sided photo-eyes model CPS-OPEN4 at each Overhead Bay Door Opening mounted to meet code requirements.

c) Provide LiftMaster Light Curtains LC-36A in lieu of second set of photo-electric eyes at each Overhead Bay Door opening for additional apparatus detection.

1) Provide interface device or appropriate accessory card.

M. Limit Switches. Provide adjustable switches, interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

N. Radio Controls: Provide 3 button radio transmitter to provide remote open, close, stop functionality.

1. Provide external antenna(s) and coaxial wiring to receiver to enhance radio control reception.

2. External antennas to be mounted to the underside of exterior soffits at overhang of roof.

O. Red/Green: Provide door position indicator lights (RGL24LY) to signal door full open position to assure safe exiting on the responding apparatus doors. Provide TLS1CARD.

2.5 SINAGE

A. Provide code required safety warning signage by door operator manufacture. Locate adjacent to openings.

2.6. 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 EXAMINATION

A. Do not begin installation until openings have been properly prepared.

B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

C. Verify electric power is available and of correct characteristics.

D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.2 INSTALLATION

A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.

B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.

C. Anchor assembly to wall construction and building framing without distortion or stress.

D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

E. Fit and align door assembly including hardware.

F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.3 CLEANING AND ADJUSTING

A. Adjust door assembly to smooth operation and in full contact with weather stripping.

B. Clean doors, frames and glass.

C. Remove temporary labels and visible markings.

3.4 PROTECTION

A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

B. Protect installed products until completion of project.

C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

3.5 STARTUP SERVICES

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturers written instructions.

C. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owners' maintenance personnel to adjust, operate, and maintain sectional doors.

3.7 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of aluminum sectional overhead door Installer. Include quarterly preventive door and operator maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for door operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Perform maintenance, including emergency callback service, during normal working hours.

2. Include 24-hour-per-day, seven-day-per-week, emergency callback service.

◆ END OF SECTION ◆

SECTION 08 41 13

ALUMINUM FRAMED STOREFRONTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including Instructions to Bidders, General and Supplementary Conditions and Division 1 Specification Sections, apply to the Work of this Section.

1.2 SUMMARY

A. Section includes:

1. Aluminum-framed storefronts (exterior) Door 100A.

2. Aluminum-framed storefronts (interior) Door 100B.

3. Aluminum-framed storefronts interior and exterior as shown on drawings.

1.3 SYSTEM DESCRIPTION

A. Aluminum-framed storefront system includes tubular aluminum sections with supplementary internal support framing, aluminum and glass entrances, shop fabricated, factory finished, glass and glazing, related flashings, anchorage and attachment devices.

B. System Assembly: Site assembled.

C. System should match in profile and finish aluminum curtain wall, aluminum windows, and aluminum door frames.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design glazed aluminum curtain walls, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. System Design: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall, including building corners.

1. Windloads: As calculated in accordance with applicable code, as measured in accordance with ASTM E330.

C. Deflection: Limit mullion deflection to 1/175 for spans under 13’-6” and 1/240 plus 1/4 inch for spans over 13’-6” of span; with full recovery of glazing materials.

D. System Assembly: Accommodate without damage to components or deterioration of seals, movement within system, movement between system and peripheral construction, dynamic loading and release of loads, deflection of structural support framing.

E. Air Infiltration: Limit air leakage through assembly to the following when measured in accordance with ASTM E283.

1. Storefront Framing: 0.06 cfm/sq ft of wall area, measured with 6.24 psf differential pressure.

2. Single Doors: 0.50 cfm per linear foot of crack, measured with 1.57 psf differential pressure.

F. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass.

G. Condensation Resistance Factor (CRF): Measured in accordance with AAMA 1503.1.

1. Storefront Framing: Minimum 50.

H. Water Leakage: Measured in accordance with ASTM E331.

1. Storefront Framing: None, when tested with 8.0 psf differential pressure.

2. Thermal Transmittance (u-FACTOR): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall be no more than:

a. Glass to Exterior: 0.47 BTU/hr/ft^2/°F

b. Glass to Center: 0.44 BTU/hr/ft^2/°F

c. Glass to Interior: 0.41 BTU/hr/ft^2/°F

I. Expansion / Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components and anchorage.

J. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.

1.5 SUBMITTALS

A. Shop Drawings:

1. Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details.

2. Provide Manufacturer’s calculations identifying mullions meet windload requirements.

3. Indicate locations to receive colored framing components.

B. Product Data:

1. Submit installation instructions, component dimensions; describe components within assembly, anchorage and fasteners, glass and infill, and internal drainage details.

C. Samples:

1. Submit color chips for color selection by architect.

D. Design Data:

1. Indicate framing member structural and physical characteristics and dimensional limitations.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

F. Professional Seal: Provide seal and signature on manual and computer calculations of Professional Engineer responsible for submittal.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with AAMA SFM-1 and AAMA - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

B. Accessibility Requirements: Conform to ICC A117.1.

1.7 QUALIFICATIONS

A. Manufacturer and Installer: Company specializing in manufacturing aluminum glazing systems with minimum five years documented experience.

1.8 PRE-INSTALLATION MEETING

A. Convene minimum one week prior to commencing Work of this section.

1.9 DELIVERY, STORAGE, AND PROTECTION

A. Handle Products of this section in accordance with AAMA - Curtain Wall Manual #10.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Install sealants and glazing material when ambient temperatures over a 48 hour period after installation are within manufacturer’s requirements.

1.11 COORDINATION

A. Coordinate the Work with installation of firestopping, air barrier, vapor retarder, automatic entrance doors, and components or materials.

1.12 WARRANTY

A. Special Warranty: Manufacturer and Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.

b. Noise or vibration created by wind and thermal and structural movements.

c. Deterioration of metals, and other materials beyond normal weathering.

d. Water penetration through fixed glazing and framing areas.

e. Failure of operating components.

2. Warranty Period: 10 years from date of Substantial Completion.

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.

b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.

c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 20 years from date of Substantial Completion.

A. Glass Warranty: As specified in Section 08 81 00.

PART 2 PRODUCTS

2.1 ALUMINUM-FRAMED STOREFRONTS (EXTERIOR)

A. Manufacturers:

1. Kawneer North America; Trifab VG 451T Framing. Basis of Design.

2. EFCO Corp.; System 433 Triple Set Framing.

3. Vistawall; 3000 Multiplane Framing.

4. Tubelite; 14000 I/O Series Framing.

B. Product Description:

1. Frames: 2 x 4-1/2 inch nominal dimension; thermally broken with interior tubular section insulated from exterior; flush glazing stops; drainage holes; internal weep drainage system.

2. Glazing Location in Framing: Front set, match curtain walls.

3. Mullions: Profile of extruded aluminum with internal reinforcement of aluminum or shaped steel structural section.

2.2 ALUMINUM-FRAMED STOREFRONTS (INTERIOR)

A. Manufacturers:

1. Kawneer North America; Trifab VG 451T Framing. Basis of Design.

2. EFCO Corp.; System 402.

3. Vistawall; FG-3000.

4. Tubelite; 14000 Series Framing.

B. Product Description:

1. Frames: 2 x 4 ½ inch nominal dimension; thermally broken with interior tubular section; flush glazing stops.

2. Glazing Location in Framing: Center set.

3. Mullions: Profile of extruded aluminum with internal reinforcement of aluminum or shaped steel structural section

2.3 COMPONENTS

A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper typical, 6061 alloy, T6 temper for extruded structural members.

B. Sheet Aluminum: ASTM B209, 5005 alloy, H15 or H34 temper.

C. Sheet Steel: ASTM A653/A653M; galvanized to minimum G90.

D. Steel Sections: ASTM A36/A36M; shaped to suit mullion sections, galvanized to G90.

E. Glass: Specified in Section 088100.

F. Glazing Materials: Storefront manufacturer’s standard types to suit application and to achieve weather, moisture, and air infiltration requirements.

G. Flashings: Minimum 0.032 inch thick aluminum.

H. Firestopping: Specified in Section 078400.

I. Air Barriers: Specified in Section 072100.

J. Sealant and Backing Materials:

1. Sealant Used within System (Not Used for Glazing): Manufacturer's standard materials to achieve weather, moisture, and air infiltration requirements.

2. Perimeter Sealant: Specified in Section 079200.

K. Fasteners: Stainless or Hot-dip galvanized steel.

L. Note: Storefront manufacturer to provide all interior and exterior break metal covers and mullion extensions to match adjacent storefront finish.

M. Note: Storefront manufacturer to provide all fasteners, clips, and all other pieces necessary for a complete assembly.

N. Note: Storefront should match in profile and finish aluminum windows and aluminum door frames.

2.4 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Break form cladding to match framing profiles. Fabricate cladding to align flush with adjacent cladding.

C. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

D. Prepare components to receive anchor devices. Fabricate anchors.

E. Arrange fasteners and attachments to conceal from view.

F. Reinforce interior horizontal head rail, where indicated to receive drapery or blind track brackets and attachments.

G. Prepare components with internal reinforcement for door hardware.

H. Reinforce framing members for imposed loads.

2.5 SHOP FINISHING

A. Exterior: Exterior Face: Black Anodized Finish: AA-M10C21A44, Class I, 0.7 mills or thicker. Interior Face: Clear Anodized Finish: AA-M10C21A41, Class I, 0.7 mills or thicker.

B. Interior: Clear Anodized Finish: AA-M10C21A41, Class I, 0.7 mills or thicker.

C. Concealed Steel Items: Galvanized in accordance with ASTM A123 to thickness Grade 85, 2.0 oz/sq ft.

D. Apply bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar metals.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other Work.

B. Verify wall openings and adjoining air and vapor seal materials are ready to receive Work of this Section.

3.2 INSTALLATION

A. Install wall system in accordance with AAMA - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent Work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent Work to form water tight dam.

G. Coordinate attachment and seal of perimeter air and vapor barrier materials.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Install cladding with hair line joints. Seal joints watertight. Completely cover surfaces of framing so no aluminum is visible in finished construction.

J. Install integral flashings and integral joint sealers.

K. Set thresholds in bed of mastic and secure.

L. Install hardware using templates provided. Refer to Section 087100 for installation requirements.

M. Coordinate installation of glass with Section 088000; separate glass from metal surfaces.

N. Seal perimeter joints in accordance with Section 079200.

3.3 ERECTION TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 ADJUSTING

A. Adjust operating hardware for smooth operation.

3.5 CLEANING

A. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

B. Remove excess sealant by method acceptable to sealant manufacturer.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Protect finished Work from damage.

END OF SECTION

1. PART 1 - GENERAL

1.1 WORK INCLUDED

A. Furnish and install aluminum architectural windows and all related components as shown on drawings and specified in this section.

1.2 TESTING AND PERFORMANCE REQUIREMENTS

A. Test Units

1) Air, water, and structural test unit minimum size 5'-2-5/16" x 8'-0", shall conform to requirements set forth in latest edition of ANSI/AAMA 101.

B. Test Procedures and Performances

1) All windows shall conform to latest edition of ANSI/AAMA 101 requirements for referenced window type in section 1.5. The following specific performance requirements shall be met:

a) Air Infiltration Test
b) Water Resistance Test
c) Uniform Load Structural Test
d) Condensation Resistance Test (CRF)
e) Thermal Transmittance Test

1.3 QUALITY ASSURANCE

A. Provide test reports from AAMA accredited laboratory certifying the performance as specified in Section 1.2.

B. Test reports shall be accompanied by the window manufacturer's letter of certification stating that the tested window meets or exceeds the aforementioned criteria for the appropriate ANSI/AAMA 101 latest edition window type.

C. Where required, windows shall bear ANSI/AAMA certification labels of conformance.

1.4 SUBMITTALS

A. Contractor or window manufacturer shall submit shop drawings, finish samples, test reports and warranties, per requirements of Architect.

1) Samples of materials may be requested without cost to Owner, i.e. frame sections, corner samples, mullions, extrusions, anchors, and glass.

2) VOC data:

a) Adhesives for site installation and factory fabrication:

[1] Submit manufacturer's product data for adhesives. Indicate VOC limits of the product. Submit MSDS highlighting VOC limits.

1.5 MANUFACTURERS

A. Acceptable Manufacturers:

1) All windows shall be Winco 3350 frame depth 3½" / 1" insulated glass / fixed or awning as shown on the drawings.

a) Alternate 9

Under alternate 9 All windows shall be equal to Winco 3385 frame depth 3½" / 1" insulated glass / 1" blind / three pain integral blind system projected out awning and fixed as shown on the drawings.

2) Winco Windows are base specification. Capitol Aluminum 325SS series windows, Manko Window System Series #3527, Wausau 3250 series visuline, EFCO modle 810I, and Traco Windows TR451, and Litex architectural windows meeting or exceeding this specification are also approved.

B. All windows shall have structural polyurethane thermal breaks. Non-structural thermal barriers are not acceptable.

1.6 WARRANTIES

A. Window System

1) Manufacturer shall warrant all aluminum windows for a period of five years against workmanship and defects, after final inspection.

2. PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum

1) Extruded aluminum shall be 6-63-TS or 6063-T6 alloy and tempered, with a tensile strength of 24,000 PSI.

B. Glass

1) Exterior glazing for windows on the east, south, and west elevations shall be tinted gray glass. Interior glazing shall be clear.

2) Glass is to be ¼” on both in board, and 1” insulated double pain on the out board lites for a total of three pains of glass. See section 08 80 00 for description of glass.

3) Windows in room 116 shall receive window tinting. See section 08 80 00.

2.2 FABRICATION

A. General

1) All aluminum frame and vent extrusions shall have a minimum wall thickness of .125".

2) Depth of main frame shall not be less than 3 1/2″ for Winco Windows. Depth of main frame shall not be less than 3¼" for Capitol and Wausau Windows.

B. Frame

1) Frame components shall be assembled by means of triple screws, and chemically welded.

C. GLAZING

1) All units shall be glazed with pre-shim tape, silicone cap bead on both interior and exterior, and extruded snap-in aluminum glazing bead.

D. FINISH

1) Finish all exposed areas of aluminum windows and components with electrolytically deposited color in accordance with Aluminum Association. Color to be clear anodized, submit color sample to Architect for approval.

3. PART 3 - EXECUTION

3.1 INSPECTION

A. Job Conditions

1) Verify that openings are dimensionally correct and within allowable tolerances. Openings must be plumb, level, and clean. Provide a solid anchoring surface that is in accordance with approved shop drawings.

3.2 INSTALLATION

A. Use only skilled craftsmen for work to be done in accordance with approved shop drawings and specifications.

B. Adjust windows for proper ease of operation after installation has been completed.

C. Contractor furnish and apply sealant to provide a weathertight installation at all opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.

3.3 ADJUSTING AND CLEANING

A. After completion of window installation windows shall be inspected, adjusted, and left in working order. Windows shall be left clean, free of labels, dirt, etc. Protection from this point shall be the responsibility of the building occupant.

◆ END OF SECTION ◆

SECTION 08 71 00

DOOR HARDWARE

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. Aluminum-Framed Entrances and Storefronts – Section 08 41 13
B. Hollow Metal Doors and Frames – Section 08 11 13

C. Aluminum Doors and Frames – Section 08 11 16

D. Wood Doors – Section 08 14 00

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

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: cylindrical on all new doors to match existing.

1) General: The quality of each cylindrical 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:

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 current 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) 1-1/2 Pair, Full Mortise 4-1/2" x 4-1/2" ball bearing, standard weight, Butt hinges with non-rising removable pins:

[1] "McKinney”
[2] "Hager
[3] or approved equal

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. Push/Pull Units: Through bolted type.

H. Hardware Finishes

1) Unless noted elsewhere, finish of hardware shall have finish best matching the selected finish series.

2.2 AUXILIARY MATERIALS

A. Door Trim Units: Kick plates

1) Kick plates shall be heights as indicated in the schedule, length shall be two (2) inches less than door width and shall be minimum weight 16 gauge, .050" thickness with edges eased.

B. 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.

C. Weatherstripping and thresholds.

1) Thresholds shall be provided at all exterior openings and shall be similar or equal to Durable model number specified.

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 A.D.A. accessible thresholds.

D. Key Fob

1) All key fob and power supply (example – 12 or 24 volt) to be provided outside of contract by owner's security contractor. See electrical drawings for further information on power / data that is to be installed for support to key fob and power supply.

E. Firemans Key Box

1) Provide (1) key lock box total recessed in the masonry wall outside of door 100A. The box shall be equal to "Knox Box" Model 3275 Black with Recessed Mount. Telephone: 1-800-552-5669. Fax: 714-252-0482

2.3 ACCEPTABLE MANUFACTURERS

ITEM	ACCEPTABLE MANUFACTURER
Butts	McKinney: T4A3786 (4½ X 4½)
	Hager: BB1168
	Stanley: FBB168
Locksets	Dorma: ML 9070 LTA, ML 9040 LTA, ML 9080 LTA, ML 9010 LTA, ML 9050 LTA
	Sargent: Classroom 8237 LNJ, Privacy 8265 LNJ, Storeroom 8204 LNJ, Passage 8215 LNJ, Office 8205 LNJ

	Schlage: L9000 Series 174
Closers	L.C.N.: 1460 PA
	Sargent: EN-351-UO
	Russwin Corbin: DC 8210-689
	Schlage: SE 71 RWPA
	Norton: CLP9500
Exit Bolts	Ives: FB 457
	Adams Rite: MS 1850 SN , 4015, 4016
	Rockwood: 555 12”
Stops	Burns Mfg.: 570
	Nes Glynn Johnson: 408
	Rockwood: 409
Overhead Stops	Rockwood 414S Nes Guyn Johnson 530
Thresholds	National Guard: 425
	Reese: S104A
	Pemko: 171A
Weather Stripping	National Guard: 155 VA
	Reese: 128 CV
	Zero Pemko: 297 PK-PG
Kick Plate	Rockwood
Sweep	National Guard: 102 VA
	Reese: 362C
	Pemko: 307V, 321N
Sound Seal	National Guard: 107N
	Pemko: 379C
Continuous Hinge	Select Hinges: SL24HD 83”
	Roton/Hager: 780 112HD
	McKinney Hinge: MCK12HD 83 Clear
Panic Device	Von Duprin: 99 series
	Sargent: WD 8600 Series
	Dor-o-Matic: 1690 Series
Auto-Equalizer Power Operated/Assist Door Openers	L.C.N.: Auto Equalizer 4640 Series
	Sargent: Low Energy Door Opener 2600

2.5 HARDWARE SCHEDULE

HARDWARE SET #1
Door: 101A

1 – Continuous Hinge SL11	AL	Select Products
1 – Push/Pull BF15747	32D	Rockwood
1 – Door Closer EN-351-P9 x EN-351D	AL	Sargent
1 – Threshold 425	AL	National Guard
1 – Set of Weatherstrip by Frame Supplier		
1 – Sweep 102VA	AL	National Guard

HARDWARE SET #2
Door: 100B

1 – Continuous Hinge SL11	AL	Select Products
1 – Panic 8810 x 864	32D	Sargent
1 – Electric Strike 9600 24VDC	32D	HES
1 – Door Closer EN-351-P9 x EN-351-D	AL	Sargent
1 – Push Button 660-PB		Schlage

HARDWARE SET #3
Door: 101A

3 – Hinges TA2714 4 ½” x 4 ½”	26D	McKinney
1 – Exit Lock 10G15-3 LL	26D	Sargent
1 – Wall Stop #409	32D	Rockwood

HARDWARE SET #4
Doors: 101B, 105A, 111A, 113A, 116B, 124A, 135A

3 – Hinges TA2714 4 ½” x 4 ½”	26D	McKinney
1 – Lockset 70-28-10G05 LL	26D	Sargent
1 – Wall Stop #409	32D	Rockwood
1 – Core Contact McElheney Locksmith		

HARDWARE SET #5
Doors: 102A, 136A, 137A, 140A

3 – Hinges TA2714 4 ½” x 4 ½”	26D	McKinney
1 – Combination Lock CO-100-CY-70-KP-RHO BD	26D	Schlage
1 – Door Closer EN-351-UO x TB	AL	Sargent
1 – Wall Stop #409	32D	Rockwood
1 – Core Contact McElheney Locksmith		

HARDWARE SET #6
Doors: 103A, 104A, 118A, 126A, 127A, 128A, 138A, 138B, 151A

3 – Hinges TA2714 4 ½” x 4 ½”	26D	McKinney
1 – Privacy Set 28-10U65 LL	26D	Sargent
1 – Wall Stop #409	32D	Rockwood
1 – Indicator D271	26D	Falcon

HARDWARE SET #7
Doors: 105A, 106A, 110B, 119A, 120A, 125A, 130A, 136B, 140B, 142B, 146A, 147A, 152B

3 – Hinges TA2714 4 ½" x 4 ½"	26D	McKinney
1 – Passage Set 28-10U15 LL	26D	Sargent
1 – Wall Stop #409	32D	Rockwood
1 – Smoke Seal 5050B (Door #106A Only)	Black	National Guard

HARDWARE SET #8
Doors: 110A, 115A

3 – Hinges TA2714 4 ½" x 4 ½"	26D	McKinney
1 – Lockset 70-28-10G05 LL	26D	Sargent
1 – Wall Stop #409	32D	Rockwood
1 – Smoke Seal 5050B	Black	National Guard
1 – Core Contact McElheney Locksmith		

HARDWARE SET #9
Doors: 114A, 121A, 148A

1 – Continuous Hinge SL11	AL	Select Products
1 – Panic 70-8804 x 864	32D	Sargent
1 – Electric Strike 9600	32D	HES
1 – Door Closer EN-351-UO	AL	Sargent
1 – Drop Plate EN-351-D	AL	Sargent
1 – Threshold 425	AL	National Guard
1 – Set of Weatherstrip by Frame Supplier		
1 – Sweep 102VA	AL	National Guard
1 – Core Contact McElheney Locksmith		

HARDWARE SET #10
Doors: 114B, 121B

1 – Continuous Hinge SL11	AL	Select Products
1 – Push/Pull Bar BF15747	32D	Rockwood
1 – Door Closer EN-351-UO	AL	Sargent
1 – Drop Plate EN-351-D	AL	Sargent
1 – Wall Stop #409	32D	Rockwood

HARDWARE SET #11
Doors: 116A, 143F, 143M

1 – Continuous Hinge SL11	AL	Select Products
1 – Combination Lock CO-100-CY-70-KP-RHO P6	626	Schlage
1 – Door Closer EN-351-UO	AL	Sargent
1 – Threshold 425	AL	National Guard
1 – Set of Weatherstrip by Frame Supplier		
1 – Sweep 102VA	AL	National Guard
1 – Core Contact McElheney Locksmith		

HARDWARE SET #12
Door: 122A

3 – Hinges TA2714 4 ½" x 4 ½"	26D	McKinney

1 – Panic 70-8804	26D	Sargent
1 – Storeroom Lock 70-10G04 LL	26D	Sargent
1 – Door Closer EN-351-UO	AL	Sargent
1 – Wall Stop #409	32D	Rockwood
1 – Core Contact McElheney Locksmith		

HARDWARE SET #13
Door: 131A

3 – Hinges TA2714 4 ½" x 4 ½"	26D	McKinney
1 – Panic 70-8804	26D	Sargent
1 – Combination Lock CO-100-993R-70-KP-BD	26D	Schlage
1 – Door Closer EN-351-UO	AL	Sargent
1 – Wall Stop #409	32D	Rockwood
1 – Core Contact McElheney Locksmith		

HARDWARE SET #14
Doors: 132A, 133A, 134A, 134B

3 – Hinges TA2714 4 ½" x 4 ½"	26D	McKinney
1 – Passage Set 28-10U15 LL	26D	Sargent
1 – Door Closer EN-351-UO	AL	Sargent
1 – Wall Stop #409	32D	Rockwood

HARDWARE SET #15
Doors: 143J, 143K, 143L, 152A, 142A, 143A, 143B, 143C, 143D, 143E, 143G, 143H
All Hardware by Others

HARDWARE SET #16
Door: 149A

1 – Continuous Hinge SL11	AL	Select Products
1 – Storeroom Lock 70-28-10G04 LL	26D	Sargent
1 – Door Closer EN-351-UO	AL	Sargent
1 – Threshold 425	AL	National Guard
1 – Set of Weatherstrip by Frame Supplier		
1 – Sweep 102VA	AL	National Guard
1 – Core Contact McElehney Locksmith		

HARDWARE SET #17
Doors: 150A, 150B

4 – Hinges SP3786 4 ½" x 4 ½"	26D	McKinney
1 – Panic FM8715 ETL	26D	Sargent
1 – Door Closer EN-281-P10 x TB	AL	Sargent
1 – Kick Plate 10" x 2" LDW	32D	Rockwood
1 – Threshold 171	AL	Pemko
1 – Set of Weatherstrip S773	AL	Pemko
1 – Door Bottom 220NA	AL	National Guard

HARDWARE SET #18
Doors: 201A, 201B

3 – Hinges TA2714 4 ½" x 4 ½"	26D	McKinney

1 – Exit Lock 28-10G15-3 LL	26D	Sargent
1 – Auto Wall Stop #490	26D	Rockwood
1 – Set of Weatherstrip 160S	AL	National Guard
1 – Sweep 102VA	AL	National Guard

HARDWARE SET #19
Doors: 200A, 202A

3 – Hinges TA2714 4 ½" x 4 ½"	26D	McKinney
1 – Storeroom Lock 70-28-10G04 LL	26D	Sargent
1 – Door Closer EN-351-UO	AL	Sargent
1 – Wall Stop #409	32D	Rockwood
1 – Smoke Seal 5050B	Black	National Guard
1 – Set of Weatherstrip 160S	AL	National Guard
1 – Sweep 102VA	AL	National Guard
1 – Core Contact McElheney Locksmith		

HARDWARE SET #20
Door: 203A

3 – Hinges TA2714 4 ½" x 4 ½"	26D	McKinney
1 – Passage Set 28-10U15 LL	26D	Sargent
1 – Door Closer EN-351-UO x TB	AL	Sargent
1 – Wall Stop #409	32D	Rockwood
1 – Smoke Seal 5050B	Black	National Guard
1 – Set of Weatherstrip 160S	AL	National Guard
1 – Sweep 102VA	AL	National Guard

HARDWARE SET #21
Doors: 138A

3 – Hinges TA2714 4 ½" x 4 ½"	26D	McKinney
1 – Combination Lock CO-100-CY-70-KP-RHO BD	26D	Schlage
1 – Wall Stop #409	32D	Rockwood
1 – Indicator D271	26D	Falcon
1 – Core Contact McElheney Locksmith		

3. PART 3 - EXECUTION

3.1 GENERAL

A. Install all new 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. Aluminum Doors & Frames - Section 08 11 16

C. Wood Doors - Section 08 14 00

D. Aluminum Windows - Section 08 51 13

E. Glazing Accessories - Section 08 85 00

1.3 Submittals

A. Provide shop drawings

1) Submit manufacturer's or fabricator's shop drawings, including plans, elevations, sections, and details, indicating glass dimensions, tolerances, types, thicknesses, and coatings.

B. Product Data

1) Submit manufacturer's product data, including performance characteristics and installation instructions.

2) Submit manufacturer's standard warranty for sealed insulating glass units.

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. Energy Performance

1) Glazing shall combine with framing to achieve rating per NFRC.

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 DEFINITIONS

A. Sealed Insulating Glass Unit Surfaces:

1) Surface No. 1 Exterior surface of outer lite.

2) Surface No. 2 Interior surface of outer lite.

3) Surface No. 3 Exterior surface of inner lite.

4) Surface No, 4 Interior surface of inner lite.

B. Airspace: Space between lites of an insulating glass unit that contains dehydrated air or other inert specified gas.

1.7 MANUFACTURERS

A. Material equal to that specified below and manufactured by Garden Industries Corp., 14600 Romine Road, Carleton, Michigan 48117. Toll Free (800) 521-9040. Phone (734) 654-6264. Fax (734) 654-0935. Web Sites www. Guardian.com, www.sunguardglass.com. Or Libbey-Owens-Ford Glass Co. or P.P.G. Industries, or A.S.G. Industries, or Mississippi Plate Glass Company, will be accepted as equal.

2. PART 2 - PRODUCTS

2.1 GLASS

A. Sealed Insulating Glass Units

1) Double-Glazed Sputter-Coated Insulating Glass Units: ASTM E 2190, Class CBA

a) Outboard Lite: Sputter-coated CrystalGray® Float Glass:

[1] Annealed CrystalGray® Gloat Glass: ASTM C 1036, Type 1, Class 2, Quality q3.

[2] Vacuum Deposition Sputtered Coating: ASTM C 1376.

[3] Coating on Surface No. 2: SunGuard SuperNeutral 68 (SN 68).

[4] Glass Thickness: 6 mm (1/4 inch).

[5] Heat Treatment: Heat-strengthened, ASTM C 1048, Kind HS and for windows and Tempered; ASTM C 1048 for door and door frame glazing..

b) Air Space: 12 mm (1/2 inch) wide, hermetically sealed, dehydrated air space.

c) Inboard Lite: Clear float glass.

[1] Annealed Glear Float Glass: ASTM C 1036, Type 1, Class 1, Quality q3.

[2] Glass Thickness: 6 mm (1/4 inch)

[3] Heat-Treatment: Tempered; ASTM C 1048 for door and door frame glazing only.

d) Glass Unit Performance Characteristics:

[1] Visible Light Transmittance: 49 percent

[2] Visible Light Reflectance Outdoors: 8 percent

[3] Direct Solar Energy Transmittance: 24 percent

[4] Direct Solar Energy Reflectance Outdoors: 16 percent

[5] Winter U-Value Nighttime: 0.29

[6] Summer U-value Daytime 0.28

[7] Shading Coefficient: 0.34

[8] Solar Heat Gain Coefficient: 0.30

[9] Summer Relative Heat Gain: 72

e) Edge Seals: ASTM E 773, with aluminum spacers and silicone sealant for glass-to-spacer seals.

f) Sealant: Approved by glass manufacturer.

g) Application: Glazing to be used in the following areas:

[1] For all exterior door glazing and exterior door frame glazing.

[2] For all exterior window and storefront glazing.

[3] Note: Insulating glass to be tempered where used in doors and door frames and as required by storefront manufacturers and tinted windows in room 116.

B. Heat Treated Glass Products: Tempered glass, ASTM C 1048.

1) Tempered Glass –¼" Tempered Plate/Float clear.

a) Application for all inner vestibule doors, and interior non-fire rated doors and windows.

2) Tempered Glass –1" insulated dual glazing - Tempered Plate/Float clear.

a) Application for all exterior vestibule doors and all interior non-fire rated doors and windows as noted on drawings.

C. Window Tint:

1) Application for all exterior windows in room 116.

2) 3M 5% window tint or approved equal.

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. Remove all labels from glass surface. Do not use harsh cleaning materials or methods that would damage glass.

E. Preparation

1) Verify glazing openings are correct size and within tolerance. Verify glazing channels, recesses, and weeps are clean and free of obstructions.

◆ 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. Aluminum Doors & Frames - Section 08 11 16
C. Wood Doors - Section 08 14 00
D. Aluminum Windows - Section 08 51 13
E. Glass Glazing - Section 08 81 00

1.3 SUBMITTALS

A. Provide manufactures 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

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. Refer to "Recommended Specification on Levels of Gypsum Board Finish" as published by the Gypsum Association (and AWCI/CISCA/PDCA) for finish levels required.

C. Framing standards shall be in accordance with AISI, Specification for Design of Cold-Framed Steel Structural Members.

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., USG, Georgia Pacific, or the Flintokote Co., and equal to the following products specified in section 2.1 Gypsum Board.

2. PART 2 - PRODUCTS

2.1 GYPSUM BOARD (ASTM C - 36)

A. National Gyspsum Gold Bond Hi-Impact XP 5/8″ thick, high impact, for the first 8’-0” above the finish floor for all drywall walls.

B. USG Sheetrock Brand panels, on all walls starting at 8’-0” above the finish floor (above Hi-impact drywall) except as noted blow.

2.2 STEEL STUDS & ACCESSORIES

A. All galvanized 20 and 22 gauge studs, all galvanized track, bridging, end closures and accessories shall be formed from steel that corresponds to the requirements of ASTM C645 with a minimum yield of 33,000 psi.

B. All galvanized studs, joists, track, bridging and accessories shall be formed from steel having a G-90 galvanized coating meeting the requirements of ASTM A653.

C. Framing components may be preassembled into panels prior to erecting. Prefabricated panels shall be square, with components attached in a manner as to prevent racking.

D. All framing components shall be cut squarely for attachment to perpendicular members, or as required for an angular fit against abutting members. Members shall be held positively in place until properly fastened.

E. Provide insulation equal to that specified elsewhere in all double jamb studs and double header members which will not be accessible to the insulation contractor. See Section 07 21 00.

F. Prior to installation inspect work of all other trades. Verify that all such work is complete and accurate to the point where this installation may properly commence in strict accordance with framing shop drawings. Immediately notify Architect of all discrepancies.

G. Erect framing and panels plumb, level and square. Erection tolerance shall be 1/16 inch. Provide permanent bracking of walls for tops of walls, etc.

H. Handling and lifting of prefabricated panels shall be done in a manner as to not cause distortion in any member.

I. At track butt joints, abutting pieces of track shall be securely anchored to a common structural element, or they shall be butt-welded or spliced together.

J. Studs shall be plumbed, aligned and securely attached to the flange or webs of both upper and lower tracks.

K. Jack studs or cripples shall be installed below window sills, above window and door heads, and elsewhere to furnish support, and shall be securely attached to supporting members.

L. Wall stud bridging shall be attached in a manner to prevent stud rotation. Bridging rows shall be spaced according to the manufacturer's recommendation. Without

supportive data, the minimum bridging shall be 5′0″ on center for wind loaded walls and 3′4″ on center for walls 10 feet and higher.

M. Temporary bracing shall be provided until erection is completed.

N. Studs up to and including 10 feet in height shall be 22 gauge studs over 10 feet in height or supporting ceramic tile finish shall be 20 gauge or as indicated on drawings.

O. Studs for 5″ nominal wall are to be 3-5/8″ wide; studs for 7" nominal walls are to be 6″ wide.

P. Blocking shall be 2 x 4 lumber. Provide Blocking for wall hung cabinets and elsewhere as required for mounting equipment to walls. (i.e. grab bars, extinguisher cabinets etc). It is the contractors responsibility to locate and verify the locations of all required blocking.

2.3 STEEL FRAMING FOR FURRED CEILINGS

A. Channels: Cold rolled steel, 0.0598 inch minimum thickness of base metal and 7/16 inch wide flanges.

1) Carrying Channels: 1-1/2 inches deep, 475 pound per 1000 feet.

2) Furring Channels: ¾ inch deep, 300 pound per 1000 feet.

3) Finish: ASTM A 525, G90 hot dip galvanized coating.

2.4 SUSPENDED DRYWALL SYSTEMS

A. Provide USG Drywall Suspended System – Flat Ceilings, or equal by Armstrong where shown on drawings. Product shall be a pre-engineered system with the following physical properties

1) Finished: hot-dipped and galvanized

2) Material: G40 double-web tee, hot-dipped galvanized steel.

3) Must be installed in compliance with ATSM C636, ASTM E580, CISCA and standard industry practices, within all applicable code requirements.

4) Follow manufacturer’s recommendation for installation.

2.5 FURRING CHANNELS

A. USG – Furring Channels, Furring Channels (and clips). Furring size as required by installation and as indicated on drawings.

2.6 JOINT TREATMENT

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. Use moisture resistant compound in all restrooms and wet areas.

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.

2.7 SOUND ATTENUATION BLANKETS

A. See section 07 21 00

2.8 FASTENERS

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

2.9 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. Use ¾″ metal bullnose drywall bead where shown on drawings. Prefill hollow void of ¾″ bullnose corners before applying to wall with Durabond 90 compound.

D. The use of exposed leg J-shapes is prohibited.

2.10 CAULKING

A. USG Acoustical Sealant. Caulk along edges of dissimilar materials.

2.11 ACCESS HATCH ACCESSORIES

A. Acudor DW-5040 Flush access door or approved equal.

1) 24”x24”, 1 latch, concealed hinge, 20 gauge galv. formed door panel, 26 gauge galv. frame, paintable.

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. Conform to industry standard procedures.

1) Install gypsum board in a manner consistent with Division 1 Indoor Air Quality Management Requirements.

C. Joints shall be taped and spackled to a smooth finish.

D. Joints between gypsum drywall and other materials shall be comprised of a J-trim with minimum ¼” sealant joint.

E. Furnish additional blockings between the studs to support all wall mounted furnishings and equipments. i.e. caulk board, tack board, marker board, projection screen.

F. Provide in partitions all necessary blocking and reinforcing to accept items being attached and/or built-in by other trades.

G. Install sound blanket in partitions between offices and as called out on floor plans and reflected ceiling plans.

H. Indoor Air Quality:

1) Temporary ventilation: Provide temporary ventilation for work of this Section.

2) Multi-layer gypsum board: Screw attach. Adhesive attachment will not be permitted.

3.2 NON-LOAD-BEARING STEEL FRAMING INSTALLATION

A. General: Comply with ASTM C 754, and ASTM C840 requirements that apply to framing installation.

B. 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 GA-600 and 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. The furnishing and installation of ceramic floor tile and base to the extent as shown on the drawings and specified herein.

1.2 RELATED WORK

A. Joint Sealants – Section 07 92 00

1.3 QUALITY ASSURANCE

A. Tile Council of North America (TCA) “Handbook for Ceramic Tile Installation” shall be used as a guide to assist in standardizing installation specifications.

B. ANSI Ceramic Tile Standard: Provide tile that complies with A137.1, “Specifications for Ceramic Tile”.

C. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI Standards referenced in “Setting and Grouting Materials” Article.

D. International Standards and Training Alliance (INSTALL): The use of certified INSTALL professionals is highly recommended, however only one installer on site is required to hold this certification.

1) The installer certificate(s) documenting this certification must be submitted with shop drawings.

1.4 SUBMITTALS

A. Submit two (2) full sized samples of tile upon request of the architect.

B. Submit shop drawings to the architect for approval, showing control joints, elevations, sections, contours, and markings.

C. Submit mortar, mastic, and grout manufacturer data for review and approval.

2. PART 2 - PRODUCT

2.1 MORTAR

A. Portland Cement - ASTM C-150 Type 1

B. Sand - ASTM C-144, 100% passing #16 screen.

C. Hydrated Lime - ASTM C-207 Type S

D. Setting mortar for ceramic wall tile shall be dry-set formula 763 as manufactured only by manufacturers licensed by the Tile Council of America, Inc. (ANI A118.1).

E. Setting mortar for mud set ceramic floor tile shall be Portland cement mortar according to ANSI A108.2 (1 part Portland cement to 4 parts damp sand with reinforcing).

2.2 CONTROL JOINT

A. Control joint in ceramic tile shall be installed by this contractor. Material shall be type "C" sealant per Section 07 92 00.

2.3 GROUT

A. Floors: Grout shall be one of the following. Color to be selected by architect.

1) Hydroment Color-Poxy

2) TEC TA 470 Epoxy

3) Custom Building Products 100% Solids Epoxy Grout

B. Walls: Latex modified grout by Mapei, Hydroment, Custom Building Products, or TEC.

C. Grout needed shall be based on joint space:

1) Eighth of an inch or less - Use unsanded/dry grout.

2) Eighth of an inch or more - Use sanded grout.

2.4 TILE

A. Ceramic tile (12”x24”) and coved wall base (6”H) shall be Fusion Series by Olympia Tile (contact: Tina Rossi w/ Beaver Tile & Stone, 248.675.5070) or equal by Atlas Concorde, Crossville, or Daltile. Colors and installation method/pattern shall be determined by architect. Tile shall conform to TCA 137.1.

1) Colors: Ash and Grey

2) Thickness: 3/8”

3) Finish: Matte

4) Testing Performance:

a) Water Absorption – ISO 10545-3

b) Dynamic C.O.F. – ANSI A137.1/2012

c) Bending/Breaking Strength – ISO 10545-4

d) Modulus of Rupture – ISO 10545-4

e) Deep Abrasion Resistance – ISO 10545-6:2012

f) Chemical Resistance – ISO 105454-13

g) Frost Resistance – ISO 10545-12

h) Stain Resistance – ISO 10545-14

B. Tile shall have polymer-fortified grouted joints. Tile shall conform to TCA 127.1. Do not set cove base on top floor tile.

C. Trim and Shapes: Provide all required shapes as cove, bullnose, caps, angles, strips, etc., and unless noted otherwise, all internal corners shall be square and all external corners shall be bullnosed. Where ceramic tile occurs at door frames and openings, it shall be finished with a course of bullnose.

2.5 THRESHOLDS

A. Thresholds abutting concrete shall have bullnose edge.

3. PART 3 - EXECUTION

3.1 INSPECTION

A. Prior to starting installation of ceramic tile, all surfaces shall be inspected for defects and any such defects shall be submitted in writing to the architect.

3.2 INSTALLATION

A. Ceramic tile installation shall be mud set.

B. Install & prepare setting surface to flat for ceramic tile installation. Use self-leveling mortar or use medium bed mortar for major leveling issues when necessary.

C. Install ceramic wall tile and base using thin bed setting mortar and latex modified grout, as noted in the TCA base/cove alternates flush installation shown on page 12-1999 edition.

D. Install mud set ceramic floor tile using Portland cement mortar method and latex modified grout. Color shall be selected by architect.

E. Install control joints in underbed and tile floors (spaced approximately 16" o/c and where tile work abuts restraining surfaces, such as perimeter walls, curbs, columns, and pipes). Caulk everywhere two planes meet creating a true 90° angle (color gray) with half silicone/half latex caulk with acrylic . Caulk for tile shall be by Hydroment or DAP or approved equal and shall be low-VOC.

F. Portland Cement Mortar Method - Ceramic floor tile shall be installed in accordance with ANSI.A108.2. These shall be in accordance with Plate F102-03 Tile Handbook of the Tile Council of America.

G. Follow manufacturer's recommendations.

3.3 EXTRA STOCK

A. Provide 10% extra of the total square or linear footage for each color of floor tile and base used.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Acoustical ceiling tiles and panels.

1.2 QUALITY ASSURANCE

A. Panels shall meet the minimum performance criteria:

1) ASTM E 1264 for Class A materials.

2) ASTM E 1414: CAC 35 minimum.

3) ASTM E 1264: NRC .55 minimum.

4) Moisture Resistant: No visible sag under conditions not to exceed 90 percent humidity and 104 degrees F.

5) ASTM E 1477 LR 0.80 minimum.

6) Note: Where possible, panels in public areas shall meet ASTM C 367.

1.3 SUBMITTALS

A. Submit mock-up samples of each type of grid system and ceiling tile for architect's approval.

2. PART 2 - PRODUCTS

2.1 MINERAL BASE PANELS, WATER FELTED

A. Type, form and finish, provide one of the following:

1) ASTM E 1264, Type III, Form 2 with painted finish.

B. Pattern and sound transmission class, provide one of the following:

1) Perforated and fissured with square edge with CAC 35 minimum.

2) Lightly perforated and lightly textured with square edge with CAC 35, moisture resistant.

2.2 HIGH DENSITY CERAMIC BASE PANELS WITH SCRUBBABLE FINISH (CLEANABLE)

A. Type: ASTM E 1264, Type XX.

B. Pattern, Edge, and Sound Transmission Class: Smooth pattern with square edge and CAC 40.

2.3 DIRECT HUNG SUSPENSION SYSTEMS, NONFIRE RESISTANCE RATED

A. Type: Wide face, capped double web-galvanized steel, intermediate duty classification, G60 galvanizing, ASTM C 635.

B. Suspension System Accessories: Attachment devices and hangers, ASTM C 635.

C. Cap Material: Painted steel finish.

2.4 EXPOSED GRID SYSTEM

A. USG DX/DXL exposed grid system as manufactured by USG Donn Series. Components shall be formed from commercial quality cold-rolled steel, electro-zinc coated and pre-finished exposed finish shall be low sheen satin baked white enamel. Equal by Chicago Metallic Corporation or Armstrong will be acceptable.

B. The suspension system shall support the total ceiling assembly and the light fixtures and other items attached to the ceiling, as shown on drawings.

C. USG Donn ZXLA environmental grid shall be used in rooms scheduled to receive scrubbable ceiling tile.

D. Refer to drawings for ceiling layout. Refer to Heating and Ventilating Drawings and to Electrical Drawings for location of units and fixtures to be supported by the ceiling system. All ceiling scheduled to be fire rated shall have U.L. approved covers placed over all recessed lighting fixtures, and all air handling grilles.

E. Hold Down Clips

1) Use accessible hold down clips for access panels, located as required for electrical and mechanical controls.

2) Provide hold down clips in all vestibules.

F. Grid - One Hour Fire Rated - **For Fire Rated Ceilings**

1) Main Tees Donn DX/DXL24, 1½″ high with 15/16 face.

2) 4′-0″ Cross Tees - Donn DX/DXL424, 1½″ high with 15/16" face.

3) 2′-0″ Cross Tees - Donn DX/DXL216, 1″ high with 15/16" face. One-hour fire rated.

G. Grid - For Non-Fire Rated Ceilings

1) Main Tees Donn DX/DXL24 1½ high with 15.16 face

2) 4′-0″ Cross Tees - Donn DX422, 1″ high with 15/16" face.

3) 2′-0″ Cross Tees - Donn DX/DXL216

H. Additional Components

1) Hemmed edge steel wall angles. (Finish same as tees)

2) Steel miter molding for outside and inside corners. (Finish same as tees)

3) Grid adapters as required for soffits, light fixtures, or other items, built into the ceiling.

4) See drawings for details on ceiling clouds.

2.5 LAY-IN ACOUSTICAL PANEL

A. Acoustical Ceiling Tile

1) A1: 2’x2’ – USG Mars ClimaPlus, Item 86185, 2’ x 2’ x ¾” - non-rated

2) A2: 2’x2’ – USG Panz Metal Panels, Smooth Panel, USG Square Edge with 15/16” USG DX/DXL Suspension – Meets ASTM E84 Surface-Burning Characteristics, Class A , Flame Spread: 25 or less, Smoke Developed: 50 or Less

a) Shall be installed 18" around kitchen hood. Follow manufacturer’s recommendations and building code requirements for installation.

3) Equals by Certainteed and Armstrong.

2.6 ENVIRONMENTAL CHARACTERISTICS

A. Custom sizes that eliminate most field cutting, diverting construction and demolition debris from landfills.

B. Material constructed of sustainable resources.

2.7 SOUND BLANKET

A. Furnish and install sound blankets over walls as shown on the reflected ceiling plans.

3. PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

A. Acoustical materials shall be installed under temperature and humidity conditions, closely approximately those that will exist when the building is occupied. All windows and doors shall be in place and glazed. The heating system shall be installed and

operating where necessary to maintain proper conditions, before, during, and after the acoustical work is in process.

3.2 INSTALLATION FOR EXPOSED GRID SYSTEM

A. The main runners shall be hung by securely tied wire hangers spaced not more than 4′-0″ o.c. using 12-gauge galvanized annealed wire. Additional hangers shall be provided at light fixtures supported by grid system. Provide tie wires, as required, to support light fixtures at each corner. All wall angles shall have the hemmed edge notched to receive the main runner and cross tees to prevent raised ceiling boards where runners and tees meet wall channels.

B. Provide Cross Tees under all heating supply and return outlets.

C. The tie wires shall be securely saddle tied to the structural framing. This Contractor shall be responsible for the laying out and installation of all components of the ceiling system and shall make suitable provision to accept items of equipment being installed by the Electrical and Mechanical contractors.

D. All fire rated ceiling panels shall be clipped down to main runners and cross-tees. Provide for access panels to all Mechanical or Electrical Controls providing access clips for same.

E. The ceiling suspension systems shall be capable of supporting twice the weight of all lighting fixtures (maximum 50 lbs. per fixture to support 100 lbs.). Exposed type fluorescent lighting fixtures mounted on acoustical ceilings shall have main "T" runner placed in the center of each fixture and/or row of fixtures. The "T" runner shall be of same length as the lighting fixture and shall be supported (not less than 4′-0″ o.c.) to carry weight of the lighting fixture.

F. The ceiling panels and their suspension system shall be installed in strict accordance with their respective manufacturers printed installation instructions, not-withstanding these specifications.

G. Supply all wall channel moldings and T-bar runners as required for radiant heating ceiling panels.

3.3 SPARE PANELS

A. Contractor shall supply two extra cartons for each type of acoustical ceiling panel used.

◆ END OF SECTION ◆

SECTION 09 65 00

RESILIENT FLOORING

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Resilient flooring, base and other auxiliary materials.

1.2 QUALITY ASSURANCE

A. Fire Test Performance: Unless otherwise indicated, provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory.

1) ASTM E 648 (Critical Radiant Flux) of 0.45 watts per sq.cm. or greater, Class I.

2) ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less.

B. International Standards and Training Alliance (INSTALL): The use of certified INSTALL professionals is highly recommended, however only one installer on site is required to hold this certification.

1) The installer certificate(s) documenting this certification must be submitted with shop drawings.

1.3 SUBMITTALS

A. Submit product data for each product provided in this section.

B. Submit full set of colors available for architect’s approval.

1.4 DELIVERY, STORAGE & HANDLING

A. Materials must be delivered in manufacturer's original, unopened and undamaged containers with identification labels intact.

B. Store material protected from exposure to harmful weather conditions, on a clean, dry, flat surface protected from all possible damage. Rolls are to be stored in the upright position at all times.

C. Recommended environmental condition for storage is a minimum of 55 degrees F.

D. Material should not suffer excessive damage during handling (i.e. edge chipping, excessive warping etc)

2. PART 2 - PRODUCTS

2.1 ATHLETIC RUBBER TILE

A. Provide Triumph Sports Flooring, as manufactured by Tarkett (contact: Joyce Seal w/ Fishman Flooring Solutions, 330.801.9210), or equal by Roppe and Mondo.

1) Complies with requirements for ASTM F 1344 Standard Specification for Rubber Floor Tile Class 1-A and 1-B.

2) Tile manufactured of dual durometer layers composed of 100% synthetic and natural rubber.

3) Tile is two-ply vulcanized construction which incorporates a rubber wear layer and an elastic cushioned performance layer.

4) Spike and Skate resistant.

5) Wear layer thickness: .090" (2.3 mm).

6) Overall thickness: 3/8" [.375" (9.5 mm)].

7) Tile design, texture, and color:

a) Square Edge (glue down)
b) Hammered Texture
c) Color: LD7 Lunar Explorer

8) Tile size: Square Edge (glue down) 24" X 24" (61 cm X 61 cm)

9) Resilient Rubber athletic Flooring contains 7% rapidly renewable content

10) 100% Recyclable

11) Phthalate, chlorine and halogen-free

12) Rubber Athletic Tile Flooring contains 53% pre-consumer recycled content

2.2 WALL BASE

A. Rubber cove base, 4 and 6-inch height, 1/8 inch thick, complying with FS SS-W-40, Type I. Wall base shall be in 4 foot sections unless otherwise noted to match existing.

B. Rubber no-toe base, 4-inch height, 1/8 inch thick, complying with FS SS-W-40, Type I. Provide in vestibules as noted on room finish schedule.

C. Color: Match Roppe #114 Lunar Dust

D. Approved manufacturers include Roppe, Tarkett, and Nora.

2.3 ADHESIVE

A. Low emitting water-resistant type recommended by tile manufacturer to suit resilient floor tile products and substrate conditions indicated.

3. PART 3 - EXECUTION

3.1 SITE CONDITIONS

A. Maintain a stable room and subfloor temperature for a minimum period of 48 hrs prior, during and 48 hrs after installation. Recommended temperature range: 65 degrees to 80 degrees.

B. Installation to be carried-out no sooner than the specified curing time of concrete subfloor (normal density concrete curing time is approximately 28 days for development of design strength).

C. Moisture vapor emission content of the concrete slab must not exceed the tolerance of the adhesive used when tested using the Calcium Chloride test as per ASTM F 1869.

D. Installation of commercial flooring will not commence unless all other finishes in the building have been completed.

3.2 WALL SURFACE INSPECTION

A. All surfaces should be inspected prior to installation. Use only on structurally sound interior wall surfaces such as dry plaster, cured drywall, exterior grade plywood (Group 1, CC type), concrete, and masonry that are clean, smooth, dry, and structurally sound. Rubber base is not to be installed over non-porous surfaces such as vinyl or rubber wallcoverings, laminated masonite, plastic laminates, or non-porous paints, or freshly painted surfaces, or over existing alcohol resin adhesives. All surfaces must be completely free from moisture, alkali, old adhesive, dust dirt, wax, oil, grease, loose paint, or plaster, non-porous wall coverings or paints, and other extraneous coatings or materials that could prevent a successful bond. Plaster and cement must be thoroughly dry and cured. Any rough or uneven surfaces may telegraph through the wall base.

B. Follow the manufacturer’s recommendations for any patching materials. Warning: When removing old wall base or adhesives, unless they can be positively identified not to contain hazardous materials, you must presume the materials may contain hazardous materials. Follow the recommended practices for the proper removal and disposal of the materials.

3.3 INSTALLATION FOR RUBBER BASE

A. Spread adhesive with a saw-tooth spreader evenly on the back of the base or wall surface. DO NOT spread adhesive within ¼" from the top of the wall base or allow adhesive to dry or skinover.

B. Caution: DO NOT STRETCH the wall base. The wall base can be stretched while rolling and will later return to its original length causing gaps at the seams. Bond the base to the wall within 15 minutes after adhesive application and lightly roll with a hand wall base roller. At least 90% of the base must be covered with adhesive.

Adhesive open time will vary upon the type of surface, temperature of the surface, ambient temperature, humidity, and proper conditioning of the adhesive.

3.4 PREPARATION FOR ATHLETIC RUBBER TILE

A. All subfloors must be permanently dry, clean, smooth, and structurally sound. The surface must be free of all dust, loose particles, solvents, paint, grease, oil, wax, alkali, sealing/curing compounds, old adhesive, and any other foreign material, which could affect the installation and adhesive bond to the substrate. Permanent and non-permanent markers, pens, crayons, paint, or similar marking tools used to mark the substrate or the back of the resilient flooring material will cause migratory staining. All substrate contaminants must be mechanically removed prior to the installation of the flooring material.

B. Fill all depressions, cracks, and other surface irregularities with a good quality Portland cement based underlayment patching compound appropriate for this purpose.

C. Concrete subfloors must be constructed as recommended by the American Concrete Institute's ACI 302.2 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials and prepared in accordance with ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

D. Do not install flooring over expansion joints, control joints, or other moving joints in the substrate. These joints must be respected and should not be filled with products that are not intended for that purpose. Contact an expansion joint cover manufacturer to meet specific flooring conditions.

E. All concrete subfloors must be tested for moisture and pH (alkalinity): Moisture testing must be conducted in accordance with ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes or ASTM F 1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride. Following ASTM F 2659 Preliminary Evaluation of Comparative Moisture Condition of Concrete, Gypsum Cement and Other Floor Slabs and Screeds Using a Non-destructive Electronic Moisture Meter can provide qualitative information prior to performing ASTM F 2170 or ASTM F 1869. Follow manufacturer's recommendations for moisture limits.

3.5 INSTALLATION FOR ATHLETIC RUBBER TILE

A. Square the area and establish reference points on substrate.

B. Lay out the tiles so that a minimum of one-half of a tile forms the border along the perimeter.

C. Apply the adhesive to the substrate and allow proper open time. Open and working times are dependent on the ambient temperature, humidity, air movement, and substrate porosity and temperature. It is the installer's responsibility to modify the open and working time for jobsite conditions.

D. Use established reference points and install the flooring.

E. Lay tiles with the directional arrow (found on back) pointing in the same direction.

F. Tiles should be lightly butted together when placing the flooring into the adhesive.

G. Do not force tiles together creating a ledge condition at the seams and corners. Sliding tiles will result in forcing the adhesive out between the seams.

H. Periodically, lift the corner of an installed tile to ensure proper transfer of adhesive.

I. Roll floor in both directions with a 100 pound three-section roller. Use a small hand roller in areas that cannot be reached with a large roller.

J. Inspect the floor surface, especially seams, and remove any adhesive on the surface.

3.6 CLEANING AND PROTECTION FOR RESILIENT PRODUCTS

A. DO NOT rub or apply lateral or vertical pressure to the wall base for at least 72 hours after the installation is complete to allow the adhesive to properly cure.

B. At completion of installation, and when directed by the Owner, clean all base, treads, and tile (including adhesive smears from adjacent surfaces) with a cleaner recommended by the manufacturer. It is the intent that the cleaning be done just prior to the occupancy of the premises by the Owner. The Contractor shall provide the Owner with the manufacturer's recommendations for cleaning and maintenance.

C. Floor coverings, base, etc., shall be clean, smooth free from buckles, cracks, projecting edges, with butt joints tight and in alignment.

3.7 All preparation and installation of resilient products shall follow the manufacturers' recommendations.

3.8 EXTRA STOCK

A. Provide a minimum of 3% of resilient materials listed per color selected.

◆END OF SECTION ◆

SECTION 09 67 00
RESINOUS FLOORING

1. PART 1 - GENERAL

1.1 WORK INCLUDED

A. The furnishing and installation of resinous flooring and base to the extent as shown on drawings and specified herein.

B. Under Alternate 4, provide Epoxy System #2 (EP2) in Apparatus Bays 143.

1.2 SYSTEM DESCRIPTION

A. The work shall consist of preparation of the substrate, the furnishing and application of a cementitious urethane based self-leveling seamless flooring system with Macro or Micro size decorative colored chip broadcast, epoxy resin broadcast and aliphatic polyaspartic ester topcoat.

B. The system shall have the color and texture as specified by the Owner with a nominal thickness of 3/16 inch. It shall be applied to the prepared area(s) as defined in the plans strictly in accordance with the Manufacturer's recommendations.

1.3 QUALITY ASSURANCE

A. The Manufacturer shall have a minimum of 10 years of experience in the production, sales, and technical support of epoxy and urethane industrial flooring and related materials.

B. The Applicator shall have experience in installation of the flooring system as confirmed by the manufacturer in all phases of surface preparation and application of the product specified.

C. System shall be in compliance with requirements of United States Department of Agriculture (USDA), Food, Drug Administration (FDA), and local Health Department.

D. System shall be in compliance with the Indoor Air Quality requirements of California section 01350 as verified by a qualified independent testing laboratory.

E. A pre-installation conference shall be held between Applicator, General Contractor, Architect and the Owner to review and clarification of this specification, application procedure, quality control, inspection and acceptance criteria and production schedule.

1.4 SUBMITTALS

A. Submit full set of color samples to Architect.

B. Submit shop drawings to the Architect for approval, showing control joints, elevations, sections, contours, and markings.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping

1) All components of the system shall be delivered to the site in the Manufacturer's packaging, clearly identified with the product type and batch number.

B. Storage and Protection

1) The Applicator shall be provided with a dry storage area for all components. The area shall be between 60 F and 85 F, dry, out of direct sunlight and in accordance with the Manufacturer's recommendations and relevant health and safety regulations.

2) Copies of Material Safety Data Sheets (MSDS) for all components shall be kept on site for review by the Engineer or other personnel.

C. Waste Disposal

1) The Applicator shall be provided with adequate disposal facilities for non-hazardous waste generated during installation of the system.

1.6 PROJECT CONDITIONS

A. Site Requirements

1) Application may proceed while air, material and substrate temperatures are between 60 F and 85 F providing the substrate temperature is above the dew point. Outside of this range, the Manufacturer shall be consulted.

2) The relative humidity in the specific location of the application shall be less than 85 % and the surface temperature shall be at least 5 F above the dew point.

3) The Applicator shall be supplied with adequate lighting equal to the final lighting level during the preparation and installation of the system.

B. Conditions of new concrete to be coated with cementitious urethane material.

1) Concrete shall be moisture cured for a minimum of 3 days and have fully cured a minimum of 5 days in accordance with ACI-308 prior to the application of the coating system pending moisture tests.

2) Concrete shall have a flat rubbed finish, float or light steel trowel finish (a hard steel trowel finish is neither necessary nor desirable).

3) Sealers and curing agents should not to be used.

4) Concrete shall have a minimum design strength of 3.500 psi. and a maximum water/cement ratio of 0.45

5) Concrete surfaces on grade shall have been constructed with a vapor barrier to protect against the effects of vapor transmission and possible delamination of the system.

C. Safety Requirements

1) The Owner shall be responsible for the removal of foodstuffs from the work area.

2) Non-related personnel in the work area shall be kept to a minimum.

1.7 WARRANTY

A. Dur-A-Flex, Inc. warrants that material shipped to buyers at the time of shipment substantially free from material defects and will perform substantially to Dur-A-Flex, Inc. published literature if used in accordance with the latest prescribed procedures and prior to the expiration date.

B. Dur-A-Flex, Inc. liability with respect to this warranty is strictly limited to the value of the material purchase.

2. PART 2 - PRODUCT

2.1 MANUFACTURER

A. Basis of Design: Dur-A-Flex, Inc., 95 Goodwin Street, East Hartford, CT 06108

1) Contact: Bret LePard, 312.833.9424 / bretl@dur-a-flex.com

B. Approved Equals: The Stonhard Group and Florock.

C. Manufacturer of Approved Systems shall be single source and made in the USA.

2.2 EPOXY SYSTEM #1

A. Hybri-Flex EC with Armor Top seamless flooring system, as manufactured by Dur-A-Flex.

1) System Materials:

a) Topping: Dur-A-Flex, Inc, Poly-Crete SL resin, hardener and SL aggregate.

b) The colored chips shall be Dur-A-Flex, Inc. Macro or Micro colored chips.

c) Broadcast coat: Dur-A-Glaze #4 resin and hardener.

d) Topcoats: Dur-A-Flex, Inc. Armor Top.

2) Patch Materials

a) Shallow Fill and Patching: Use Dur-A-Flex, Inc. Poly-Crete SL (up to ¼ inch).

b) Deep Fill and Sloping Material (over 1/8 inch): Use Dur-A-Flex, Inc. Poly-Crete WR.

3) Color

a) Flooring shall match Dur-A-Flex, " Olivestone."

B. PRODUCT REQUIREMENTS

1) Topping: Poly-Crete SL

a) Percent Reactive: 100%

b) VOC: 0 g/L

c) Bond Strength to Concrete ASTM D 4541: 400 psi, substrates fails

d) Compressive Strength, ASTM C 579: 9,000 psi

e) Tensile Strength, ASTM D 638: 2,175 psi

f) Flexural Strength, ASTM D 790: 5,076 psi

g) Impact Resistance @ 125 mils, MIL D-3134, No visible damage or deterioration: 160 inch lbs

2) Broadcast Coat: Dur-A-Glaze #4

a) Percent Solids: 100 %

b) VOC: 3.8 g/L

c) Compressive Strength, ASTM D 695: 11,200 psi

d) Tensile Strength, ASTM D 638: 2,100 psi

e) Flexural Strength, ASTM D 790: 5,100 psi

f) Abrasion Resistance, ASTM D 4060 C-10 Wheel, 1,000 gm load, 1,000 cycles: 29 mg loss

g) Flame Spread/NFPA-101, ASTM E 84: Class A

h) Impact Resistance MIL D-24613: 0.0007 inches, no cracking or

delamination

i) Water Absorption. MIL D-24613: Nil

j) Potlife @ 70 F: 20 minutes

3) Topcoat: Armor Top

a) Percent Solids: 95%

b) VOC: 0 g/L

c) Tensile Strength, ASTM D 2370: 7,000 psi

d) Adhesion, ASTM 4541: Substrate Failure

e) Hardness, ASTM D 3363: >4H

f) 600 Gloss ASTM D 523

[1] Satin: 50 +/-10

[2] Gloss: 75 +/-10

g) Abrasion Resistance, ASTM D4060 CS 17 wheel (1,000 g load) 1,000 cycles

[1] Gloss: 4mg loss with grit

[2] Satin: 8mg loss with grit

[3] Gloss:10mg loss without grit

[4] Satin: 12mg loss without grit

h) Pot Life, 70 F, 50% RH: 45 Minutes

i) Full Chemical Resistance: 7 days

2.3 EPOXY SYSTEM #2 (Alternate 4)

A. Poly-Crete SLB with Armortop top coat, self-leveling broadcast quartz, seamless flooring system, as manufactured by Dur-A-Flex.

1) System Materials:

a) Topping: Dur-A-Flex, Inc, Poly-Crete SL resin, hardener and SL aggregate.

b) The aggregate shall be Dur-A-Flex, Inc. Flintshot quartz aggregate.

c) Grout coat: Dur-A-Flex, Inc. Dur-A-Glaze Shop Floor resin and hardener.

d) Topcoat: Dur-A-Flex, Inc. Armor Top resin and hardener and colorant

2) Patch Materials

a) Shallow Fill and Patching: Use Dur-A-Flex, Inc. Poly-Crete MD (up to ¼ inch).

b) Deep Fill and Sloping Material (over ¼ inch): Use Dur-A-Flex, Inc. Dur-A-Tex UM.

3) Color

a) Selected by architect from manufacturer's standard colors.

B. PRODUCT REQUIREMENTS

1) Topping: Poly-Crete SL

a) Percent Reactive: 100 %

b) VOC: 0 g/L

c) Bond Strength to Concrete ASTM D 4541: >400 psi, substrates fails

d) Compressive Strength, ASTM C 579: 9,000 psi

e) Tensile Strength, ASTM D 638: 2,175 psi

f) Flexural Strength, ASTM D 790: 5,076 psi

g) Impact Resistance @ 125 mils, MIL D-3134, No visible damage or deterioration: Pass

2) Grout Coat: Dur-A-Glaze Shop Floor

a) VOC: 8 g/L

b) Compressive Strength, ASTM D 695: 17,500 psi

c) Tensile Strength, ASTM D 638: 4,000 psi

d) Flexural Strength, ASTM D 790: 6,250 psi

e) Flexural Modulus of Elasticity, ASTM D 790: 6.2 x 105

f) Abrasion Resistance, ASTM D 4060 CS17 Wheel, 1,000 gm load,

1,000 cycles: 24 mg loss

g) Flame Spread/NFPA-101, ASTM E 84: Class A

h) Flammability, ASTM D 635: Self Extinguishing

i) Indentation, MIL D-3134: 0.025 Max

j) Impact Resistance MIL D-3134: Pass

k) Water Absorption. MIL D-24613: 0.04%

3) Topcoat: Armor Top

a) Percent Solids: 95 %

b) VOC: 0 g/L

c) Tensile Strength, ASTM D 2370: 7,000 psi

d) Adhesion, ASTM 4541: Substrate Failure

e) Hardness, ASTM D 3363: >4H

f) 600 Gloss ASTM D 523

[1] Satin: 50 +/-10

[2] Gloss: 75 +/-10

g) Abrasion Resistance, ASTM D4060 CS 17 wheel (1,000 g load) 1,000 cycles

[1] Gloss: 4mg loss with grit

[2] Satin: 8mg loss with grit

[3] Gloss: 10mg loss without grit

[4] Satin: 12 mg loss without grit

h) Pot Life, 70 F, 50% RH: 45 Minutes

i) Full Chemical Resistance: 7 days

3. EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas and conditions, with Applicator present, for

compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance.

1) Verify that substrates and conditions are satisfactory for flooring installation and comply with requirements specified.

3.2 PREPARATION

A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.

1) Mechanically prepare substrates as follows:

a) Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and re-circulates the shot by vacuum pickup. Obtain a CSP3 profile.

b) Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.

2) Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.

3) Verify that concrete substrates are dry.

a) Perform in situ probe test, ASTM F 2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 85 percent.

b) Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 2-3 lb of water/1000 sq. ft. of slab in 24 hours.

c) Perform additional moisture tests recommended by manufacturer. Proceed with application only after substrates pass testing.

4) Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

E. Treat control joints and other non-moving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations.

F. Substrate: Must be a flat and level floor, FFFL 50 (<1/8" per 10' for flatness and <1/8" per 1' for level).

3.3 APPLICATION

A. General: Apply each component of flooring system in compliance with manufacturer's direction to produce a uniform monolithic wearing surface of thickness indicated, uninterrupted except at divider strips, sawn joints or other types of joints (if any), indicated or required.

1) Coordinate application of components to provide optimum adhesion of flooring system to substrate, and optimum intercoat adhesion.

2) Cure flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.

3) At substrate expansion and isolation joints, provide joint in flooring to comply with flooring manufacturer's written recommendations.

a) Apply joint sealant to comply with manufacturer's written recommendations.

B. Primer: Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates.

C. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, of cove base. Round internal and external corners.

D. Apply metal trowel single mortar coat in thickness indicated for flooring system. Hand or power trowel and grout to fill voids. When cured, sand to remove trowel marks and roughness.

E. Apply topcoat(s) in number of coats indicated for flooring system and at spreading rates recommended in writing by manufacturer.

F. Sealant: Mix and apply topcoat material over base with strict adherence to manufacturer's installation procedures and coverage rates.

3.4 TRANSITIONS

A. Traditional "L" transitions are not recommended for use with self-levelers, due to the inherent difficulty with obtaining a flush transition with a self-leveling material. Where a flush transition is desired, please contact your local manufacturer

representative.

B. A “T” style transition is recommended when adjoining a similar height surface.

3.5 TERMINATIONS

A. Chase edges to “lock” the flooring system into the concrete substrate along lines of termination.

B. Penetration Treatment: Lap and seal resinous system onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.

C. Trenches: Continue flooring system into trenches to maintain monolithic protection. Treat cold joints to assure bridging of potential cracks.

D. Treat floor drains by chasing the flooring system to lock in place at point of termination.

3.6 JOINTS AND CRACKS

A. Treat control joints to bridge potential cracks and to maintain monolithic protection.

B. Treat cold joints and construction joints to bridge potential cracks and to maintain monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.

C. Discontinue floor coating system at vertical and horizontal contraction and expansion joints by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.

3.7 FIELD QUALITY CONTROL

A. The right is reserved to invoke the following material testing procedure at any time, and any number of times during period of flooring application.

B. The Owner will engage service of an independent testing laboratory to sample materials being used on the job site. Samples of material will be taken, identified and sealed, and certified in presence of Contractor.

C. Testing laboratory will perform tests for any of characteristics specified, using applicable testing procedures referenced herein, or if none referenced, in manufacturer’s product data.

D. If test results show materials being used do not comply with specified requirements, Contractor may be directed by Owner to stop work; remove non-complying materials; pay for testing; reapply flooring materials to properly prepared surfaces which had previously been coated with unacceptable

materials.

3.8 CURING, PROTECTION AND CLEANING

A. Cure flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 24 hours.

B. Protect flooring materials from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application. General Contractor is responsible for protection and cleaning of surfaces after final coats.

C. Cleaning: Remove temporary covering and clean flooring just prior to final inspection. Use cleaning materials and procedures recommended by flooring manufacturer.

3.9 Because the success of this product is based on the experience of the installers, the installation of the fluid-applied epoxy floor must be completed by an experienced flooring contractor. Flooring contractor must provide references of projects with successful installations of this type of flooring. Unsuccessful installation of flooring system will result in the replacement of the floor system at the cost of the flooring contractor.

3.10 Installers shall consult with manufacturer's rep and abide by the manufacturer's recommendations.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Carpet tile and walk-off carpet tile materials and accessories.

1.2 QUALITY ASSURANCE

A. Carpet shall have a minimum average flux of not less than 0.2 watts/sq.cm. per ASTM E-648 (floor radiant panel test) requirements and shall meet Federal Flammability Test, Fed. Std. DOC-FF-1-70.

B. Indoor Air Quality: All carpet specified must be in compliance with the Carpet and Rug Institute (CRI) Green Label Plus program. The program label and registration number serve as evidence of compliance.

C. International Standards and Training Alliance (INSTALL): The use of certified INSTALL professionals is highly recommended, however only one installer on site is required to hold this certification.

1) The installer certificate(s) documenting this certification must be submitted with shop drawings.

1.3 STANDARDS

A. All work and materials must meet the requirements and recommendations of the following:

1) The Carpet and Rug Institute – CRI

2) LEED (Leadership in Energy and Environmental Design)

3) American Society for Testing and Materials - ASTM

4) Tufted Textile Manufacturer's Association - TTMA

5) United States of America Standards Institute - USASI (ASA)

6) Ohio Building Code - OBC

1.4 SUBMITTALS

A. Shop Drawings showing the extent of carpet, installation methods, and accessories shall be submitted to Architect for approval prior to installation.

B. Carpet schedule using same room designations indicated on drawings.

C. Product Data: Provide data on specified products, describing physical and

performance characteristics, sizes, patterns, colors available, and method of installation.

D. Verification Samples: Submit full size carpet tile sample illustrating color and pattern for each carpet material specified.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

F. Maintenance Data: Include maintenance procedures, recommendations for maintenance materials and equipment, and suggested schedule for cleaning.

G. Manufacturer's Carpet Warranty.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Carpeting shall be delivered to the job site in original mill wrapping and stored in an enclosed and dry area protected from damage and soiling.

B. Deliver materials to the site in manufacturer's original packaging listing manufacturer's name, product name, identification number, and related information.

C. Store in a dry location, between 60 degrees F and 80 degrees F and a relative humidity below 65%. Protect from damage and soiling. Stack carpet rolls horizontally on a flat surface, stacked no higher than two rolls.

D. Make stored materials available for inspection by the Owner's representative.

E. Store materials in area of installation for minimum period of 48 hours prior to installation.

1.6 WARRANTY

A. The carpet manufacturer and carpet contractor shall be jointly responsible for the carpet installation for a period of one year from the date of acceptance. This includes the re-laying of any carpet, which does not provide an attractive wrinkle-free appearance and the correction of any conditions due to faulty installation and/or defective materials at no cost to the owner.

B. A non-prorated 20-year warranty shall be provided for edge ravel, delamination and zippering.

C. A non-prorated 20-year warranty shall be provided for all carpet installations.

D. A non-prorated 20-year warranty shall be provided for stain removal.

E. A non-prorated 20-year warranty shall be provided for excessive surface wear (more that 15% loss of pile fiber weight).

2. PART 2 - PRODUCTS

2.1 TECHNICAL DATA

A. Minimum of 24-ounce face weight tufted or woven loop constructed carpet.

B. Yarn to be type 6.0 hollow filament nylon with permanent inherent stain resistance within the chemical composition of the nylon or as specified below.

C. Static resistance of carpet construction to provide a minimum of 3.0 KU resistance of 20 percent R.H. at 70 degrees F (21 degrees C) AATCC 134.

D. Carpet to have a grey scale rating of 4 or better on products darkest colors after 180 standard fading hours as compared to AATCC Grey Scale for evaluation of change in color. AATCC 16E-1982.

E. Primary and secondary backings to be a thermal plastic or vinyl composition.

1) Non water soluble

2) Impervious to water damage

3) Provide a liquid barrier

F. Performance Features

1) Flammability

a) Radiant Panel Test Class 1

b) Methenamine Pill Test Passes

2) Static Generation

a) Electrostatic Propensity Less than 3.5 KV

3) Smoke

a) Optical Smoke Density Less than 450, Flaming Mode

G. Carpet manufacturer shall comply with the following environmental policy practices.

1) Manufacturer shall comply with applicable environmental laws and regulations and other policies and programs as appropriate for the corporation that provide a strong foundation for environmental initiatives that extend beyond compliance.

2) Manufacturer shall comply to strive to continually reduce waste and prevent pollution, including the reuse and recycling of waster streams and the redesign of our products and processes.

3) Manufacturer shall comply to seek alternative sources of energy and strive to develop closed-loop technologies that use post consumer products as production process inputs.

2.2 PRODUCTS

A. CARPET TILE

1) Carpet tile shall be “Commons Tile” 5T323, as manufactured by Shaw Contract Group (contact: Kristie Tucker, 419.346.5481), or approved equal by J+J Flooring or Mannington Commercial.

a) Color: Rope #23555

b) Collection: Campus

c) Construction: Multi-Level Pattern Loop

d) Fiber: Eco Solution Q Nylon

e) Dye Method: 100% Solution Dyed

f) Primary Backing: Synthetic

g) Secondary Backing: Ecoworx Tile

h) Protective Treatment: SSP Shaw Soil Protection

i) Product Size: 24”x24”

j) Gauge: 1/10”

k) Stitches: 10 per inch

l) Finished Pile Thickness: 0.088 inches

m) Average Density: 6545 per cubic yard

n) Tufted Weight: 16.0 oz/SY

o) Installation Method: Monolithic

B. WALK-OFF TILE

1) Walk-off tile shall be “Portal Tile” 5T035 as manufactured by Shaw Contract Group (contact: Kristie Tucker, 419.346.5481), or equal by J+J Flooring or Mannington Commercial.

a) Color: Lava #34549

b) Collection: All Access

c) Construction: Multi-Level Pattern Loop

d) Fiber: Eco Solution Q Nylon

e) Dye Method: 100% Solution Dyed

f) Primary Backing: Synthetic

g) Secondary Backing: Ecoworx Tile

h) Protective Treatment: SSP Shaw Soil Protection

i) Product Size: 24”x24”

j) Gauge: 1/12”

k) Stitches: 9 per inch

l) Finished Pile Thickness: 0.129 inches

m) Average Density: 7814 per cubic yard

n) Tufted Weight: 28.0 oz/SY

o) Installation Method: Monolithic

2.3 ACCESSORIES

A. Provide latex underlayment as necessary to provide sound and level base for carpeting.

B. Provide base as shown on drawings.

3. PART 3 - EXECUTION

3.1 Follow manufacturer’s recommendations for examination, preparation, and installation of carpet products.

3.2 EXAMINATION AND PREPARATION

A. Floor covering installation contractor shall visit the site and be responsible for all measurements and job conditions.

B. Sequence carpet installation with other work so as to minimize the possibility of damage and soiling of carpet.

C. Sub-floor preparation is to include all required work to prepare the existing floor for installation of the product as specified in this document and manufacturer’s installation instructions.

D. Do not install carpet until space is enclosed and weatherproof, wet-work in space

is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

E. Report, in writing, any unacceptable conditions to the general contractor, before commencing work of this section.

F. Prior to installation, all floors must be clean and free from all waxes, finishes, sealers, or other contaminants.

G. All material used in sub-floor preparation and repair shall be recommended by the carpet manufacturer and shall be chemically and physically compatible with the carpet system being bid.

H. Maintain minimum 65 degrees F ambient temperature and 65% Relative Humidity for 72 hours prior to, during, and 48 hours after installation.

I. The maximum amount of moisture evacuation from the floor is 3.0 pounds per 1,000 square feet in 24 hours. The acceptable pH level of the substrate is between 7.0 and 9.0. Flooring contractor is responsible for floor testing.

3.3 INSTALLATION

A. Beginning installation in any given area means acceptance of all surfaces and conditions affecting work of this area by the floor covering installation contractor.

B. Carpet shall be installed in strict accordance with manufacturer's written instructions and recommendations.

C. Cement carpet directly to floor with low-VOC waterproof and fire-retardant adhesives recommended by the carpet manufacturer.

D. After installation, continue to fresh-air ventilate for 48-72 hours at normal room temperatures by operating the ventilation fan system at full capacity and by opening windows and doors, if possible.

3.4 RESTORATION

A. Any damage done to paint, walls, woodwork, floors, and/or similar finishes as a result of this work shall be the responsibility of the carpet contractor.

3.5 CLEANING

A. Upon completion of installation remove all waste materials, tools and equipment.

B. Using commercial vacuums, thoroughly vacuum the entire floor surface to the architect's satisfaction.

C. Remove spots or replace carpet where spots cannot be removed.

3.6 EXTRA STOCK

A. Provide additional 10% of each type, color, and pattern furnished. Coordinate

storage location with owner.

B. Deliver all unused carpet and large scraps to owner for “attic stock.” Dispose of scraps less than 8” in width.

◆ 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.

B. All coatings shall conform to the current VOC regulations for the Ohio EPA.

1.3 SUBMITTALS

A. Submit a list of the products to be used by “type” as specified under 2.2 below.

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.

D. Multiple paint colors may be selected for project.

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.

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.

12) Plenum rated fire alarm cable, or fire alarm cable in open ceiling space

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 brands and quality as herein-after specified. If Contractor desires to use materials of a manufacturer other than the materials specified, he shall make the request in writing to the Architect, giving the name of the manufacturer and the specific name of each product he offers as a substitute and shall state the amount, if any, to be added or deducted from his bid for such substitution. All substitution requests must be made ten days prior to the bid date.

2.2 TYPES OF PAINT

A. Basis of design is Sherwin-Williams. Approved equals include Benjamin Moore and PPG. The kinds of paint and number of coats required on the various surfaces shall be as follows:

B. EXTERIOR COATINGS

1) **Type EXT-1 |** Exterior Wood – Painted

a) First Coat: SW Exterior Latex Wood Primer

b) Second and Third Coat: SW A-100 Exterior Latex Satin, A82 Series

2) **Type EXT-2 |** Exterior Metal

a) First Coat: SW Pro-Cryl Universal Metal Primer

b) Second and Third Coat: SW Pro Industrial Acrylic, Semi-Gloss

3) **Type EXT-3 |** Exterior Wood Stain

a) First amd Second Coat: SW Woodscapes Semi-Transparent Exterior Stain, A15T5

C. INTERIOR COATINGS

1) **Type INT-1 |** Interior Wood – Painted

a) First Coat: SW Premium Wall & Wood Primer

b) Second and Third Coat: SW ProClassic Water Based Semi-Gloss

c) Use on interior wood called out to be painted.

2) **Type INT-2 |** Interior Wood – Stained

a) First Coat: SW Minwax 250 VOC Stain

b) Second and Third Coat: SW Minwax Performance Series Waterbased Polyurethane Stain

c) Use on interior wood called out to be stained.

3) **Type INT-3 |** Interior Metal - Semi-Gloss Finish

a) First Coat: S.W. ProCryl Universal Primer, B66-310 Series - omit if metal has a shop coat of primer.

b) Second and Third Coat: SW Pro-Industrial Pre-Catalyzed Epoxy Semi-Gloss

c) Use on all items of miscellaneous metal including electric panels, fire extinguisher cabinets, piping and conduit exposed to view, access doors, grilles, hollow metal door frames, hollow metal doors, and metal heating cabinets.

4) **Type INT-4 |** Interior High Performance Metal - Semi-Gloss Finish

a) First Coat: SW Macropoxy 646 Fast Cure

b) Second and Third Coat: SW Hi-Solids Polyurethane

c) Use on items of miscellaneous metal including interior railings and steel ladders.

5) **Type INT-5 |** Interior Galvanized Metal

a) First Coat: SW ProCryl Universal Primer, B66-310 Series

b) Second and Third Coat: SW Pro-Industrial Pre-Catalyzed Epoxy Semi-Gloss

c) Use on interior exposed galvanized metal.

6) **Type INT-6 |** Interior Drywall - Eg-Shel Finish

a) First Coat: SW ProMar 200 Zero VOC Wall Primer B28W2600

b) Second and Third Coat: SW ProMar 200 Zero VOC Eg-Shel B20W2651 Series

c) Use on all interior drywall wall surfaces, except walls called out to receive epoxy.

7) **Type INT-7 |** Interior Drywall - Epoxy Coating

a) First Coat: SW ProMar 200 Zero VOC Wall Primer B28W2600

b) Second and Third Coat: SW Pro-Industrial Waterbased Catalyzed Epoxy Eg-Shel, B73 Series

c) Use on all interior drywall wall surfaces scheduled to receive epoxy.

8) **Type INT-8 |** Interior Concrete Floors

a) First and Second Coat: H&C Clarishield Waterbased Wet Look Sealer, Semi-Glass

b) Use on interior concrete floors called out to be sealed.

9) **Type INT-9 |** Exposed Interior Masonry - Eg-Shel Finish

a) First Coat: SW Loxon Block Surfacer, A24W200

b) Second and Third Coat: SW ProMar 200 Zero VOC Eg-Shel Wall Paint B20W2651

c) Use on all exposed interior masonry walls, with the exception of walls scheduled to receive epoxy and prefinished walls.

10) **Type INT-10 |** Exposed Interior Masonry - Epoxy Coating

a) First Coat: SW Loxon Block Surfacer, A24W200

b) Second and Third Coat: SW Pro-Industrial Waterbased Catalyzed Epoxy Eg-Shel, B73 Series

c) Use on all exposed interior masonry walls scheduled to receive epoxy.

11) **Type INT-11 |** Interior Galvanized Metal – Ductwork

a) First and Second Coat: SW Waterborne Acrylic Dryfall

[1] B42W1 on ductwork called out to be flat white

[2] B42BW3 on ductwork called out to be flat black

[3] B42T1 on ductwork called out to be a tinted paint color

b) Use on interior galvanized ducts called out to be painted.

[1] DO NOT use in rooms called out under Type INT-13 below.

12) **Type INT-12 |** Interior Metal – Exposed Ceiling / Overhead Components

a) First Coat: SW ProCryl Universal Primer, B66-310 Series

b) Second and Third Coat: SW Waterborne Acrylic Dryfall

[1] B42W1 on ductwork called out to be flat white

[2] B42BW3 on ductwork called out to be flat black

[3] B42T1 on ductwork called out to be a tinted paint color

c) Use on non-galvanized exposed metal deck, uncovered pipers, radiators, supports, and exposed ceiling components called out to be painted.

[1] DO NOT use in rooms called out under Type INT-13 below.

13) **Type INT-13 |** Interior Metal – Exposed Structural Framing

a) First Coat: S.W. Pro-Cryl Universal Metal Primer

b) Second and Third Coats: S.W. Pro Industrial Acrylic Semi-Gloss B66-650 Series

c) Use in rooms 139, 143, and 145 with exposed structural framing, exposed steel piping, and fire protection lines to prevent rust. Do NOT used on galvanized metal. If metal is galvanized, consult Architect.

3. PART 3 – EXECUTION

3.1 PREPARATION OF SURFACES

A. Follow manufacturer's recommendations for preparation of all surfaces.

B. 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.

C. 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.

D. 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.

E. 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.

F. 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.

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 ◆

SECTION 10 11 00

VISUAL DISPLAY SURFACES

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Markerboards, tackboards, framing systems, and accessories.

1.2 SUBMITTALS

A. Submit shop drawings that include the dimensions, quantities, and locations of all visual display boards, as well as product data.

B. Submit full set of colors available for markerboard and tackboard surfaces for architect's approval.

2. PART 2 - PRODUCTS

2.1 MARKERBOARDS

A. Face Sheet: 28-gauge liquid chalk writing surface.

B. Core: 3/8-inch thick particleboard.

C. Backing: .005 inch thick aluminum foil.

D. Trim: Anodized extruded aluminum with tray and 1 inch map rail with colored cork insert to match tackboards.

E. The markerboards shall be equal to Polyvision 110 Series Premium Whiteboards with e3 Environmental Ceramicsteel or equals by Claridge, Educational Equipment/K-Pro Specialties, Marsh or Platinum Visual Systems.

2.2 TACKBOARDS

A. Material: Uni-colored linoleum natural homogeneous resilient tackable surface material in sheets.

B. Trim: Anodized extruded aluminum. Include 1" map rail with cork insert as listed in the schedule.

C. The tackboards shall be equal to Polyvision 110 Series "Colored Cork Bulletin Board" with Trim Series #1, factory frames, ¼" thick, vinyl impregnated cork (washable surface). Cork shall be laminated to ¼" hardboard backing to form a ½" thick unit. Cork panels shall be formed of one piece with splices permitted only in boards over 12'-0" in length. Color to be selected by the Architect from the manufacturer's standard 12 colors.

D. Approved manufactures include Polyvision 110 Series, Claridge, Educational Equipment/K-Pro Specialties, Marsh, and Platinum Visual Systems.

2.3 ENVIRONMENTAL CHARACTERISTICS

A. Ceramic Surface

1) Enamel fused to cold-rolled enameling-grade steel

2) In all coatings, the total amount of heavy metals cadmium, mercury, hexavalent chromium, and lead is less than 0.1%

3) All coatings are free of arsenic and antimony

4) No Volatile Organic Compounds (VOCs)

5) Steel core is made from minimum 30% post-consumer and post-industrial waste

6) e3 environmental ceramicsteel surface is 99% recyclable

B. Core Material

1) Particle Board- Made from 100% recycled post-consumer and post-industrial waste

2) 99% Recyclable

C. Backer

1) Aluminum is 65% post-consumer and post-industrial waste

2) 99% Recyclable

D. Trim-Aluminum Extrusion

1) 99% Recyclable

E. Adhesive

1) 100% PVA

2) No VOCs

2.4 ACCESSORIES

A. Provide the following accessories for each individual markerboard unit:

1) 4 spring clip hooks (metal).

2.5 LOCATIONS

A. Schedule

Cons. No.	Qty.	Size (WxH)	Item
100	1	4W'x4'H	Tackboard
105	2	6'Wx4'H	Markerboard
	1	3'Wx4'H	Tackboard
	1	3'Wx4'H	Markerboard
107	1	4'Wx4'H	Markerboard
	1	4'Wx4'H	Tackboard
108	1	4'Wx4'H	Tackboard
115	1	8'Wx4'H	Markerboard
	1	4'Wx4'H	Tackboard
116	1	2'Wx4'H	Markerboard
	1	4'Wx4'H	Tackboard
123	1	3'Wx4'H	Tackboard
135	1	4'Wx4'H	Tackboard
152	1	6'Wx4'H	Markerboard

B. Verify all quantities and locations on drawings.

3. PART 3 - EXECUTION

3.1 The markerboards and tackboards shall be installed by using mechanical anchors and adhesive.

3.2 Apply one half (½) dollar size adhesive on wall and apply markerboard or tackboard to wall, then air it.

3.3 Upon completion, the contractor shall leave boards and all trim in a neat and clean condition.

3.4 Installers shall coordinate with technology contractor in regards to installing interactive whiteboards between markerboards. Installer shall verify all dimensions prior to installing all display boards.

◆ END OF SECTION ◆

SECTION 10 14 00

INTERIOR SIGNAGE

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Signage designed and configured for interior installation.

B. Provide blocking for future signage by owner, as shown on drawing.

1.2 QUALITY ASSURANCE

A. Comply with signage requirements indicated in the Americans with Disabilities Act.

1.3 SHOP DRAWINGS

A. Submit shop drawings of each product specified herein showing size, details of construction, and installation. Schedule of inscriptions shall be included. Do not fabricate any product until shop drawings are approved and colors selected.

2. PART 2 - PRODUCTS

2.1 PANEL SIGNS

A. Type: Framed.

B. Material: Plastic.

C. Copy: Raised text, Braille and pictograms.

D. Room identification signs shall have raised symbols and Brailled characters. Raised letters shall be one monolithic piece with the sign. Letters shall be raised 1/32” and shall be 1” high and room numbers shall be 1-1/2” high. Signs shall be placed at the latch side of the door and shall be mounted 60” above the floor.

E. Provide white vinyl foam tape for anchorage to walls.

F. All signs mounted on glass are to have a blank backer plate on opposite side of glass.

2.2 LOCATIONS

A. Schedule:

Cons. No.	Room Name	Quantity	Size (HxW)	Inscription
100	Vestibule	1	8”x8”	EXIT
101	Triage	1	6”x9”	TRIAGE
102	Lobby	1	3”x9”	LOBBY
		1	8”x8”	EXIT

103	Toilet	1	3”x9”	RESTROOM
104	Toilet	1	3”x9”	RESTROOM
105	Training Room	1	6”x9”	TRAINING ROOM
		1	6”x12”	MAXIMUM OCCUPANCY: 82
106	Storage	1	3”x9”	STORAGE
107	Executive Assistant	1	6”x9”	EXECUTIVE ASSISTANT
108	Work Alcove	1	3”x9”	WORK ALCOVE
109	Corridor	2	8”x8”	EXIT
110	Chief	1	3”x9”	CHIEF
111	Assistant Chief	1	3”x9”	ASSISTANT CHIEF
112	Plan Review	1	3”x9”	PLAN REVIEW
113	Assistant Chief	1	3”x9”	ASSISTANT CHIEF
114	Vestibule	1	8”x8”	EXIT
115	Conference	1	6”x9”	CONFERENCE ROOM
116	Dayroom	1	6”x9”	DAYROOM/KITCHEN
		1	6”x12”	MAXIMUM OCCUPANCY: 15
		2	8”x8”	EXIT
118	Toilet	1	3”x9”	RESTROOM
119	Mechanical	1	3”x9”	MECHANICAL
120	Storage	1	3”x9”	STORAGE
121	Vestibule	1	8”x8”	EXIT
122	Electrical	1	3”x9”	ELECTRICAL
123	Lockers	1	3”x9”	LOCKERS
124	Duty Office	1	3”x9”	DUTY OFFICE
125	Laundry	1	3”x9”	LAUNDRY
126	Shower	1	6”x9”	RESTROOM/SHOWER
127	Shower	1	6”x9”	RESTROOM/SHOWER

128	Shower	1	6”x9”	RESTROOM/SHOWER
129	Corridor	3	8”x8”	EXIT
130	Storage	1	3”x9”	STORAGE
131	Corridor	1	8”x8”	EXIT
132	EMS Dorm 1	1	3”x9”	EMS DORM
133	EMS Dorm 2	1	3”x9”	EMS DORM
134	Dorm	1	3”x9”	DORM
		1	6”x12”	MAXIMUM OCCUPANCY: 15
135	Watchroom	1	3”x9”	WATCHROOM
136	Vestibule	1	8”x8”	EXIT
137	EMS Supply	1	3”x9”	EMS SUPPLY
138	Decon Shower/Toilet	1	6”x9”	DECON SHOWER/TOILET
139	Decon Alcove	1	3”x9”	DECON ALCOVE
140	Vestibule	1	8”x8”	EXIT
141	Stair	1	3”x9”	STAIR
142	Outdoor Storage	1	6”x9”	OUTDOOR STORAGE
143	Apparatus Bays	1	6”x9”	APPARATUS BAYS
		1	6”x12”	MAXIMUM OCCUPANCY: 51
		1	20”x12”	TORNADO SAFE ROOM
		3	8”x8”	EXIT
144	Fire Risers	1	3”x9”	FIRE RISERS
145	Tools	1	3”x9”	TOOLS
146	Laundry	1	3”x9”	LAUNDRY
147	SCBA	1	3”x9”	SCBA
148	Corridor	1	20”x12”	TORNADO SAFE ROOM
149	Compressor Room	1	6”x9”	COMPRESSOR ROOM
150	Storage	1	3”x9”	STORAGE
151	Shower	1	3”x9”	SHOWER

152	Fitness	1	3”x9”	FITNESS
200	Mech.	1	3”x9”	MECHANICAL
201	Mezzanine	1	3”x9”	MEZZANINE
202	Data	1	3”x9”	DATA CLOSET
203	Stair	1	3”x9”	STAIR

B. See drawing LS1 for quantities and locations of tactile EXIT signs.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Mechanically attach signage to substrate.

B. All products shall be installed where indicated by the Architect, in accordance with the manufacturer’s recommendations.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SHOP DRAWINGS

A. Submit one set of drawings of each product specified herein, to the Architect for approval, showing sizes, details of construction and installation. Do not fabricate any product until shop drawings are approved and colors selected.

2. PART 2 – PRODUCTS

2.1 BUILDING SIGN “41”

A. Furnish and install custom 10 gauge stainless steel numbers on exterior walls as shown on the elevations and detail A6.1/A8.9. See detail for sizes and locations.

B. Furnish custom L angle brackets as shown on drawings for installation of metal letters.

C. Coordinate location of custom lighting with electrical drawings.

2.2 FIRE DEPARTMENT STREET SIGN

A. Furnish and install digital sign as indicated on the drawing.

B. Sign is to be GS6-40x125 – 15.85-RGC-2V by Daktronics. Sign face will be on both sides of sign. Fastening system of sign face to be as required by sign manufacturer and shall not be visible.

C. Size is to be as shown on drawing A8.5.

D. Sign is to be level and mounted to brick base as shown on drawing A8.5.

E. Coordinate exact location with civil drawings.

F. Coordinate electrical requirements with electrical drawings.

2.3 FIRE DEPARTMENT EMBLEM

A. Custom premanufactured box lit aluminum sign.

1) See sign detail E6.1/A8.9 on sheet A8.9 for size and shape.

B. Sign frame is to be 6” deep and aluminum. Sign panel is to be .125” thick; removable; and acrylic (color to be selected by the Architect). Sign shall have interior illumination. Sign face will be on one side of sign. Fastening system of sign face to be as required by sign manufacturer and shall not be visible.

C. Sign is to be level.

D. Coordinate electrical requirements with electrical drawings.

2.5 POST-MOUNTED SIGNS

A. Exterior “Accessible Parking” Signs

1) 12 by 18 inch, 18 gauge steel with 1 inch radius corners. Bolt through top and bottom of sign face into 2 by 2 inch square steel post by 11 foot long (3.65 pounds/feet) with vandal resistant fasteners. Set square post into 6" guard post where indicated and drawings. See drawings for locations.

2) Finish: Baked enamel finish. Color of sign face is to be blue with white graphics. Color of post is to be selected by the Design Professional.

B. Stop and other traffic regulatory signs.

C. Visitor parking signs.

1) Provide signs mounted the same as “Accessible Parking Signs” (above). All square posts will be set into 6" guard posts.

D. QUALITY ASSURANCE

1) Comply with US Manual on Uniform Traffic Control Devices for signs within public rights-of-way.

2) All signs shall be mounted on breakaway post supports

3. **PART 3 – EXECUTION**

3.1 All products shall be installed where indicated by the Architect, in accordance with the manufacturer's recommendations.

♦ END OF SECTION ♦

SECTION 10 21 23

CUBICLES

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Ceiling-mounted curtains, tracks, and other hardware located in Dorm 134.

1.2 SUBMITTALS

A. Submit shop drawings showing dimensions, quantities, and locations, as well as product data.

B. Submit full set of colors available for architect's approval.

2. PART 2 - PRODUCTS

2.1 MATERIALS

A. Curtains: Flameproof nylon reinforced anti-bacterial vinyl material with nickel plated brass grommets.

1) Mesh Top : No. 50

2) Curtain Drop: Beaded Chain

B. Curtain Tracks: Surface mounted extruded anodized aluminum box channel type. Track shall be 19100 Series Track by Salsbury Industries.

C. Curtain Carriers: Rustproof wire and break away bead chain riding a nylon wheeled carrier. Carrier shall be 19103 Series by Salsbury Industries.

D. Approve manufacturers include ARNelson, Imperial Fastener Company, and General Cubicle Company.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Cubicle track should be drilled in the center at a maximum of 32" intervals to accommodate the fastener being used. Use a maximum of 16" intervals for securing I.V. track. End caps, snap out fitting and splices should be drilled at the ends of the track for these same fasteners. If you are installing cubicle track, it should be determined which end of the track is preferred for the snap out fitting which allows the user to install and remove the carriers. Note: the head of the screw should be no larger than a #12 pan head so that the carriers can clear.

B. Mark the ceiling where the track is to be installed. Prop the predrilled track in position against the ceiling in alignment with those marks. Depending upon the fastener being used, track can be fastened to the ceiling without any additional drilling. If the fastener requires predrilled holes in the ceiling for an insert or toggle bolt, mark the hole locations before drilling the ceiling.

C. If splicers are required for the installation, make sure the edges of the track are aligned and free of burrs so that the carriers run smoothly. This should be done prior to fastening the track to the ceiling.

◆ END OF SECTION ◆

SECTION 10 26 00

WALL PROTECTION

1. PART 1 - GENERAL

1.1 SUMMARY

A. This section includes wall protection systems, including vinyl corner guards and FRP wall protection panels.

1) Provide all wall protection from a single source.

1.2 RELATED SECTIONS

A. Blocking in walls for fasteners

1.3 REFERENCES

A. National codes (IBC, UBC, SBCCI, BOCA and Life Safety)

B. American Society for Testing and Materials (ASTM)

C. Underwriters Laboratories (UL)

1.4 SUBMITTALS

A. Product data and detailed specifications for each system component and installation accessory required, including installation methods for each type of substrate.

B. Shop drawings showing locations, extent and installation details of corner guards. Show methods of attachment to adjoining construction.

C. Samples for verification purposes: Submit the following samples, as proposed for this work, for verification of guard.

1) 12" (304.8mm) long sample of each model specified.

D. Product test reports from a qualified independent testing laboratory showing compliance of each component with requirements indicated.

E. Maintenance data for wall protection system components for inclusion in the operating and maintenance manuals specified in Division 1.

1.5 QUALITY ASSURANCE

A. Code compliance: Assemblies should conform to all applicable codes including IBC, UBC, SBCCI, BOCA and Life Safety.

B. Fire performance characteristics: Provide wall protection system components with UL label indicating that they are identical to those tested in accordance with ASTM-E84 (CAN/ULC S102.2) for Class 1 characteristics listed below:

1) Flame spread: 25 or less

2) Smoke developed: 450 or less

a) International Fire Ratings Include:

b) UK: BS476-part 7, Class 1.

c) France: MI.

d) Spain: MI.

e) Germany: DIN4102, BI Classification.

f) Italy: Class 1.

C. Impact Strength: Provide assembled wall protection units that have been tested in accordance with the applicable provisions of ASTM F476.

D. Chemical and stain resistance: Provide wall protection system components with chemical and stain resistance in accordance with ASTM D-1308.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the project site in unopened original factory packaging clearly labeled to show manufacturer.

B. Store materials in original, undamaged packaging in a cool, dry place out of direct sunlight and exposure to the elements. A minimum room temperature of 40°F (4°C) and a maximum of 100°F (38°C) should be maintained.

C. Material must be stored flat.

1.7 PROJECT CONDITIONS

A. Materials must be acclimated in an environment of 65°-75°F (18°-24°C) for at least 24 hours prior to beginning the installation.

B. Installation areas must be enclosed and weatherproofed before installation commences.

2. PART 2 - PRODUCTS

2.1 CORNER GUARDS

A. MANUFACTURER

1) The basis of design for vinyl corner guard products shall be IPC Door and Wall Protection Systems.

a) Contact: InPro Corporation, PO Box 406 Muskego, WI 53150 USA; Telephone: 800.222.5556, Fax: 888.715.8407, www. inprocorp.com.

2) Approved equals by Korogard and Construction Specialties/Acrovyn.

B. MATERIALS

1) Vinyl: Snap on cover of .080" thickness shall be extruded from chemical and stain resistant polyvinyl chloride with the addition of impact modifiers. No plasticizers shall be added (plasticizers may aid in bacterial growth). Colors shall be one of manufacturer's standard colors and shall be selected by the architect.

C. PRODUCT

1) Model #160, High Impact Corner Guard Profile

2) 2" x 2" x 48”H , 90 degree

D. COMPONENTS

1) Top caps and bottom caps shall be made of injection molded thermoplastics.

2) Fasteners: All mounting system accessories appropriate for substrates indicated on the drawings shall be provided.

3) Optional flexible top caps shall be made of injection molded flexible PVC.

E. FABRICATION

1) General: Fabricate wall protection systems to comply with requirements indicated for design, dimensions, detail finish and member sizes.

F. LOCATIONS

1) Provide at drywall corners, as shown on drawings. They’re labeled “CG.”

2.2 FRP PANELS

A. MANUFACTURER

1) Acceptable Manufacturer: IPC Door and Wall Protection Systems, InPro Corporation, PO Box 406 Muskego, WI 53150 USA; Telephone: 800.222.5556, Fax: 888.715.8407, www. inprocorp.com

2) Or equal by Korogard or Construction Specialties/Acrovyn.

3) Provide all Palladium® Rigid Vinyl Sheet and wall protection from a single source.

B. MANUFACTURED UNITS

1) Rigid Vinyl Sheet

a) Palladium® Rigid Vinyl Sheet Options

b) Panel Width: 4’W

c) Panel Height: 6’H

d) Thickness: 0.030” (1/32”)

e) Backing: unbacked

f) Texture: Velvet

g) Color: To be selected from IPC’s standard line of solids.

2) Accessories:

a) Vinyl

[1] 408 Vertical Divider Bar; Length: 8' standard, 10' available

b) Color Matched Caulk

C. MATERIALS

1) Vinyl: Palladium® Rigid Vinyl Sheet shall be manufactured from chemical and stain resistant polyvinyl chloride with the addition of impact modifiers. No plasticizers shall be added.

D. ACCESSORIES

1) Top caps, inside corners, divider bars and outside corners shall be made of extruded PVC.

E. FINISHES

1) Color or pattern of Palladium® Rigid Vinyl Sheet to be selected by the architect from the Palladium® Rigid Vinyl Sheet finish selection. Surface shall have a velvet texture.

2) Vinyl Accessories: Top caps, inside corners, divider bars and outside corners shall be of a color matching the IPC.

3. Part 3 - Execution

3.1 Follow manufacturers' recommendations for preparation and installation.

3.2 EXAMINATION AND 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) Do not proceed until unsatisfactory conditions have been corrected.

2) Preparation

B. Surface preparation: Prior to installation, clean substrate to remove dirt, debris and loose particles. Perform additional preparation procedures as required by manufacturer's instructions.

C. Protection: Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

3.3 INSTALLATION

A. Install the work of this section in strict accordance with the manufacturer's recommendations, using only approved mounting hardware, and locating all components firmly into position, level and plumb.

B. General: Locate the Palladium® Rigid Vinyl Sheet as indicated on the approved detail drawing for the appropriate substrate and in compliance with the IPC installation instructions. Install level and plumb at the height indicated on the drawings.

C. Installation of Palladium® Rigid Vinyl Sheet:

1) Adhere to substrate with InPro Bond, a freeze-thaw stable, nonflammable, high strength, water-based adhesive that trowels on and allows approximately 20 minutes working time before firming.

2) Adhere to substrate with XT-2000+, a freeze-thaw stable,nonflammable, high strength, water-based adhesive that trowels on and allows approximately 20 minutes working time before firming.

3) Adhere to substrate with Fastbond 30, a nonflammable, high strength, water-dispersed contact adhesive, with very little odor. Smooth roll surface.

D. Temperature at the time of installation must be between 65°-75°F (18°-24°C) and be maintained for at least 48 hours after the installation.

3.4 CLEANING

A. General: Immediately upon completion of installation, clean vinyl covers and accessories in accordance with manufacturer's recommended cleaning method.

B. Remove surplus materials, rubbish and debris resulting from installation as work progresses and upon completion of work.

3.5 PROTECTION

A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Supplied and installed by contractor:

1) Coat Hook

2) Electric Hand Dryer

3) Grab Bars

4) Mirrors

5) Mop & Broom Holder

6) Shower Rod & Curtain

7) Folding Shower Seat

B. Supplied by owner; installed by contractor:

1) Paper Towel Dispenser

2) Soap Dispenser

3) Toilet Paper Dispenser

1.2 QUALITY ASSURANCE

A. NFPA 70 – National Electrical Code

B. Underwriters Laboratory

1.3 SUBMITTALS

A. Submit manufacturer's product data for each item, along with installation instructions.

2. PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 0.034-inch (22-gauge) minimum thickness.

B. Brass: Unleaded, flat products, ASTM B19; rods, shapes, forgings, and flat products with finished edges, ASTM B16; castings, ASTM B30.

C. Sheet Steel: Cold rolled commercial quality ASTM A336, 0.04-inch (20-gauge) minimum. Surface preparation and metal pretreatment as required for applied finish.

D. Galvanized Steel Sheet: ASTM A527, G60.

E. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B456, Type SC2.

F. Mirror Glass: Nominal 6.0mm (0.23 inch) thick, conforming to ASTM C1036, Type I, Class 1, Quality q2, and with silvering electro-plated copper coating, and protective organic coating.

2.2 COAT HOOK/TOWEL HOOK

A. Surface mounted stainless steel towel pin shall be constructed entirely of Type 304 stainless steel with bright polished finish.

B. Flange shall be equipped with 16-gauge mounting bracket, which locks to concealed 16-gauge wall plate with stainless steel lock screw.

C. Cap shall be 10-gauge stainless steel welded to post.

D. Towel hooks shall be model 5153 single hook as manufactured by Gamco or equal by Bobrick, AJ Washroom, or Bradley.

E. See schedule below for locations.

CONS. NO.	QUANTITY
103	1
104	1
118	1
126	2
127	2
128	2
138	2
151	2

2.3 ELECTRIC HAND DRYER

A. Product: Bobrick B-7128 or equal by Bradley or American Specialties

B. Mounting: Surface mounted

C. Operation: Electronic-sensor activated with timed power cut-off switch

D. Cover Material and Finish: Stainless steel, No. 4 finish (satin)

E. Electrical Requirements: 115V, 15A, 1725W

F. See schedule below for locations.

CONS. NO.	QUANTITY
103	1
104	1
118	1
126	1
127	1
128	1
138	1
151	1

2.4 GRAB BARS

A. Stainless Steel Type: Provide grab bars with wall thickness not less than 0.05 inch and as follows:

1) Mounting: Concealed, manufacturer's standard flanges and anchorages.

2) Clearance: 1-1/2" clearance between wall surface and inside face of bar.

3) Gripping Surfaces: Smooth, satin finish, unless noted otherwise.

a) Manufacturer's standard non-slip texture in wet areas.

4) Heavy Duty Size: Outside diameter of 1-1/4" minimum.

B. The grab bars shall be model #UG, length as tabled, and heavy duty, as manufactured by AJ Washroom or equal by Bobrick, Bradley, or Gamco.

C. See schedule below for locations.

CONS. NO.	QUANTITY	SIZE
103	1	42" L, 1-1/2" Dia.

	1	36” L, 1-1/2” Dia.
	1	18”L, 1-1/2” Dia.
104	1	42” L, 1-1/2” Dia.
	1	36” L, 1-1/2” Dia.
	1	18”L, 1-1/2” Dia.
118	1	42” L, 1-1/2” Dia.
	1	36” L, 1-1/2” Dia.
	1	18”L, 1-1/2” Dia.
126	1	42” L, 1-1/2” Dia.
	1	36” L, 1-1/2” Dia.
	1	18”L, 1-1/2” Dia.
138	1	42” L, 1-1/2” Dia.
	1	36” L, 1-1/2” Dia.
	1	18”L, 1-1/2” Dia.
151	1	42” L, 1-1/2” Dia.
	1	36” L, 1-1/2” Dia.
	1	18”L, 1-1/2” Dia.

2.5 MIRRORS

A. RESTROOM MIRRORS

1) Stainless Steel Framed Mirror: Mirror shall have a one piece, Type 304 stainless steel angle frame, 3/4”x3/4” with continuous integral stiffener on all sides and beveled front to hold frame tightly against mirror.

2) Corners shall be heliarc welded, ground and polished smooth.

3) All exposed surfaces shall have satin finish with vertical grain.

4) Float/plate glass mirror shall be guaranteed for 15 years against silver spoilage.

5) All edges shall be protected by plastic filler strips and the back shall be protected by full size, shock absorbing, water resistant, nonabrasive, 1/8" thick polyethylene padding.

6) Galvanized steel back shall have integral hanging brackets for mounting on concealed rectangular wall hanger(s). Mirror shall be secured to hanger(s) with concealed Phillips head locking screws located in bottom of frame.

7) Mirrors shall be the B-290 Series as manufactured by Bobrick or equal by AJ Washroom, Bradley, or Gamco.

8) See schedule below for locations.

CONS. NO.	QUANTITY	SIZE
103	1	18" x 36"
104	1	18" x 36"
118	1	18" x 36"
126	1	18" x 36"
127	1	36" x 36"
128	1	36" x 36"
138	1	18" x 36"
151	1	18" x 36"

B. FITNESS MIRRORS

1) Provide (6) 48"Wx72"H frameless tempered glass mirrors in Fitness 152.

2) Float/plate glass mirror shall be guaranteed for 15 years against silver spoilage.

3) Mounting shall include mirror clips, J-bar, screws, and adhesive.

4) Safety backing shall be provided.

5) Mirrors shall be appropriate for fitness setting.

2.6 MOP & BROOM HOLDER

A. Surface mounted mop and broom holders with shelf shall be Type 304 stainless steel with satin finish.

B. Unit shall be 36 inches long with 4 spring-loaded, rubber cam holders. Unit shall hold (4) mops.

C. Mop and broom holder shall be model US-2 as manufactured by Gamco or equal by Bobrick, AJ Washroom, or Bradley.

D. Provide (2) mop holders at each mop sink location.

2.7 SHOWER ROD

A. Shower curtain rod shall be 1-1/4 inch outside diameter and constructed of 18-gauge, Type 304, stainless steel with satin finish.

B. Flanges shall be 20-gauge, one piece, die-formed, Type 304 stainless steel with satin finish.

C. Shower rods shall be model 9531 as manufactured by Bradley or equal by Bobrick, Gamco, or AJ Washroom.

D. Provide (1) in each shower in rooms: 126, 127, 128, 138, and 151.

2.8 SHOWER CURTAIN

A. Shower curtains shall be vat dyed, water resistant nylon taffeta.

B. Curtains to be at least 10 percent wider than the rod from which they hang and shall extend to within 2 inches of floor.

C. Top hems to be 1-1/2 inch wide, of triple thickness, double stitched, and to contain centered size #0 roll edged, nickel plated brass grommets at 6 inches on center. Provide the required number of #3 hooks.

D. Bottom hems of curtains to be 3/4 inch wide, of double thickness, single stitched, and to contain continuous chain weight of non-corrosive metal. Bottom hems to be reversed to prevent collection of water and soap.

E. Vertical hems to be 3/4 inch wide and double stitched.

F. Edges to be turned.

G. Curtains shall be model 9535 as manufactured by Bradley or equal by AJ Washroom, Gamco, or Bobrick.

H. Provide (1) in each shower in rooms: 126, 127, 128, 138, and 151.

2.9 FOLDING SHOWER SEAT

A. Folding shower seat frame shall be fabricated of 1”Dia. type 304 (18-8), 18-gauge stainless steel tubing, heliarc welding.

B. Wall bracket shall be fabricated of 16-gauge stainless steel with stainless steel piano hinges.

C. Retaining bracket shall be 16-gauge stainless steel. Positive bullet-type catch shall hold seat securely in up position.

D. Seat shall be type 304 (18-8), 16-gauge stainless steel with exposed surfaces in architectural satin finish, rounded corners, heliarc welded and ground smooth.

E. Overall dimensions shall be 34-1/2”W x 22”D x 1-3/8” thick.

F. Folding shower seat shall be model 956-30 as manufactured by Bradley or equal by AJ Washroom, Gamco, or Bobrick.

G. Provide (1) in each shower in rooms 126, 138, and 151.

2.10 Contractor to verify all quantities and locations of toilet accessories on drawings and bid greatest quantity.

3. PART 3 – EXECUTION

3.1 INSTALLATION

A. Install accessories with vandal resistant fasteners.

B. Follow manufacturer’s recommended installation instructions.

◆ END OF SECTION ◆

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

1. **PART 1 - GENERAL**

1.1 WORK INCLUDED

A. Fire Extinguishers

B. Cabinets

C. Accessories

1.2 RELATED WORK

A. Painting - Section 09 91 00

1.3 REFERENCES

A. NFPA 10 Portable Fire Extinguishers

B. ADA Accessibility Guidelines

1.4 QUALITY ASSURANCE

A. Conform to NFPA 10 requirements for portable fire extinguishers.

B. Provide fire extinguishers, cabinets, and accessories by single manufacturer.

1.5 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 Model 5ABC and J.L. Industries Model FG6.

2.3 FIRE EXTINGUISHER CABINETS

A. Where indicated on schedule, provide Larens's semi-recessed cabinet model No. 2409-6R for masonry walls and 2409-R4 for metal stud walls. Both shall have full panel glazing clear acrylic door and decal on door. Door frame and trim to be fabricated from aluminum with clear satin anodized finish. Approved equal by J. L. Industries or Potter Roemer Fire Protection Equipment (1-800-547-3473)

B. Extinguisher Brackets

1) Provide brackets as scheduled.

2.4 SCHEDULE

Room	Fire Extinguisher	Quantity	Cabinet/Bracket
109	MP6	1	Semi Recessed Cabinet
116	MP6	1	Semi Recessed Cabinet
119	MP6	1	Bracket
122	MP6	1	Bracket
131	MP6	1	Semi-Recessed Cabinet
134	MP6	1	Semi-Recessed Cabinet
143	MP6	1	Bracket
148	MP6	1	Bracket
200	MP6	1	Bracket

3. PART 3 - EXECUTION

3.1 INSPECTION

A. Verify that rough openings for cabinets are correctly sized and located.

B. 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.

B. Headers: Install (2) 3 ½ x 3 ½ x ¼” steel angles over semi-recessed cabinets in masonry with 4” block behind cabinet recess. Install (2) 3 5/8” metal studs above semi-recessed cabinets in metal stud framed partitions.

♦ END OF SECTION ♦

SECTION 10 56 13

STORAGE SHELVING

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Open manufactured shelving for general storage.

B. Heavy-Duty Wall Organization System.

C. Rod and Shelf System

1.2 SHOP DRAWINGS

A. Submit shop drawings of each product specified herein showing sizes, quantities, and locations, load limits, as well as details of construction and installation. Do not fabricate any product until shop drawings are approved and colors selected.

2. PART 2 - PRODUCTS

2.1 OPEN METAL SHELVING (S1, S2, AND S3)

A. Materials

1) Steel Sheet: ASTM A 366 matte finish, suitable for exposed applications, and stretcher leveled or roller leveled to stretcher leveled flatness.

B. Shelving Units: Provide open shelving consisting of posts, shelves, and connectors of size, material, and assembly to comply with MH 28.1 for the following evenly distributed shelf load:

1) Shelf Capacity: 50 pounds per square foot.

C. Shelving Unit Bracing: Manufacturer's standard single or double diagonal cross bracing at back and ends, as required for stability and load-carrying capacity.

D. Shelves: Adjustable over the entire height of the post and as follows:

1) Solid steel sheet as indicated, of thickness required for shelf loading capacity.

E. Posts: Fabricated from 0.0677 inch thick, cold-rolled steel; in manufacturer's standard shape; with perforations at 1½ inches o.c. to receive shelf-to-post connectors.

1) Post Base: Steel foot plate, adjustable, and drilled for mechanical attachment to floor.

F. Shelving shall be as manufactured by Val Tec (#VT400 Series). Equals by Lyon or Broadhead Garret.

G. See floor plans and casework legend for locations and dimensions.

2.2 WALL ORGANIZATION SYSTEM (S4)

A. Manufacturer

1) Knape & Vogt Manufacturing Company, 2700 Oak Industrial Drive NE, Grand Rapids, MI USA 49505-6026, or approved equal.

B. Provide 85/185 Series extra-duty standards, brackets, and shelves.

1) Family: Extra-Duty

2) Load Capacity: Up to 680 lbs per pair

3) Design: Double-Slot

4) Vertical Adjustment: 1”

5) Wall Standard Width: 1-1/4”

6) Wall Standard Depth: ½”

7) Mounting: Wall

8) Provide all necessary hardware and accessories to install organization system completely and per manufacturer’s recommendations.

C. Extra-Duty Standards

1) 85 Series Double-Slot Wall Standards

2) Size: as shown on drawings

a) 24” in rooms 125 and 135.

b) 48” in room 150.

3) Material: 16-gauge steel

4) Color: Anochrome

D. Shelf Brackets

1) 185 Series Brackets

2) Size: 18”D

3) Material: 14-gauge steel

4) Color: Anochrome

5) Provide a quantity of (5) pairs per unit.

E. Shelves

1) Length as shown on drawings.

2) Quantity per location as shown on drawings.

a) (2) shelves per section in rooms 125 and 135.

b) (3) shelves in room 150.

3) Material shall be heavy-duty and accommodate load capacity without bowing or sagging.

F. Locations

1) Provide in Laundry 125, Watch Room 135, and Storage 150.

a) In Storage 150, coordinate mounting height and location with electrical.

2.3 ROD AND SHELF SYSTEM (S5)

A. Manufacturer

1) Knape & Vogt Manufacturing Company, 2700 Oak Industrial Drive NE, Grand Rapids, MI USA 49505-6026, or approved equal.

B. Provide Closet-Pro HD Heavy-Duty Adjustable Closet Rod, Shelve and Rod-Bracket System, chrome finish

1) Heavy-Duty Shelf & Rod Brackets, model RP-0495-CH

a) Holds up to 1,000 lbs. per pair

b) Slide-through feature

c) Poles snap into place

d) Provide shelf bracket screws for installation.

2) Heavy-Duty Adjustable Closet Rod, model RP0020-30/48CH

a) Material wall thickness: 1.25mm

b) Pole adjusts 30”-48”

c) 1.25” diameter

3) Closet Pole End Caps, model CD-0017-CH

a) Packed in pairs

b) Covers up ole ends

c) Keeps hangers from sliding off

d) Set screw holds cap in place

4) Shelf

a) Shelf shall be compatible with bracket system.

b) Material shall be heavy-duty and accommodate load capacity without bowing or sagging.

c) Length as shown on drawings.

C. Location

1) Provide in Chief 110.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Install to manufacturer's recommendations.

B. 18"D freestanding units shall be anchored to the wall.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Casework manufactured with plastic laminate facing.

B. High pressure plastic laminate countertops.

C. Under Alternate 6, provide stainless steel countertops in Kitchen 117 in lieu of high pressure plastic laminate.

D. Under Alternate 7, provide quartz countertops in Kitchen 117 I lieu of high pressure plastic laminate.

1.2 RELATED SECTIONS

A. 06 60 00 Plastic Fabrications

B. 09 65 00 Resilient Flooring – Install resilient base in all toe kicks.

C. 10 56 13 Storage Shelving

D. 12 50 00 Furniture

1.3 QUALITY ASSURANCE

A. Casework Grade: Provide plastic laminate faced casework complying with the referenced quality standard and the following grade:

1) Grade: custom.

1.4 SUBMITTALS

A. Submit shop drawings showing general arrangement of the equipment, required mechanical and electrical connections, and details for construction of the custom-fabricated equipment.

B. Submit brochures containing manufacturer's illustration sheets covering all manufactured items under this Contract.

1.5 GUARANTEE

A. This Contractor shall furnish a written guarantee to the Owner warranting that the materials, workmanship and equipment for the entire installation are first class in every respect, and that he will replace any new equipment which becomes defective, except that which becomes defective due to misuse or abuse of the equipment, within one calendar year from the date of substantial completion. This Contractor shall replace any new equipment, which becomes defective during the

guarantee period without cost to the Owner, compensating the other trades (mechanical, electrical, etc.) for any work necessitated by such replacement.

2. PART 2 - PRODUCTS

2.1 TYPES AND LOCATIONS

A. Contractor shall refer to the drawings, including Interior Design Plans (A9.1), Interior Elevations (A9.2-A9.4), and Details (A8.4-A8.10) for locations and types of equipment units required. The Casework Legend is located on drawing A9.3.

2.2 MANUFACTURERS

A. The basis of the drawings and these specifications are Stevens Advantage with door edging profile 3-mil radius edge, chrome, wire and five knuckle hinges. All cabinets to have high pressure laminate exterior.

B. Equal casework by the following manufacturers is also approved:

1) Case Systems

2) LSI

3) Rivereast Custom Cabinets

4) Southern Cabinetry

5) Spyker Specialty Millwork

6) Walbridge Woodworks

C. Manufacturer substitution requests must be received at least 10 days prior to the bid date. Detailed specifications and a brochure illustrating each item of equipment they propose to substitute for the equipment scheduled must be provided.

2.3 MATERIALS

A. Plastic laminates, provide one of the following:

1) High pressure decorative laminate complying with NEMA LD3, Grade GP-28.

2) High pressure decorative laminate complying with NEMA LD3, Grade CL-20.

3) High pressure decorative laminate complying with NEMA LD3, Grade BK-20.

B. Edge Banding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3mm thick at doors and drawer fronts, 1mm thick elsewhere.

C. Melamine Faced Particleboard: Medium density particleboard complying with ANSI A208.1, Grade M-2, with decorative surface of thermally fused, melamine impregnated web complying with ALA 1992.

D. Particleboard: ANSI A208.1, Grade M-2.

E. Hardboard: AHA A135.4, Class 1 tempered.

F. Shelf on top of file cabinet in all wardrobe cabinets must be fixed and loose.

G. Locks shall be SA-402, 6 tumbler dead bolt

H. Pulls shall be 128 mm.

I. All toe kicks shall be complete with horizontal and vertical filler.

2.4 PLASTIC LAMINATE CASEWORK CONSTRUCTION

A. Dimensions are the minimum.

B. See table below:

	CORE	SURFACE	EDGE	CONSTRUCTION / JOINERY	HARDWARE
Cabinet Boxes - Base and Wall					
- Exposed vertical surfaces	All front and sides: ¾" particleboard Base bottom: 3/4" plywood Wall top and bottom: 1" particleboard Back: entrapped - 3/8" particleboard or 1/4" tempered hardboard	GP28	Finish all exposed edges (including wall cabinet top and bottom with 1mm PVC)	Doweled and glued under pressure	
- Semi-exposed parts (interior of open cabinets, not including drawer bodies)		CL20			

	CORE	SURFACE	EDGE	CONSTRUCTION / JOINERY	HARDWARE
- Concealed surfaces		CL20			
- Panel ends		GP28			
Countertops (wet areas)	Phenolic resin particleboard	GP50 Balanced with backing sheet	Post form	Apply low-VOC silicone sealant to joint between HPL top and backsplash Field joints >48" apart and >48" from end of top	
Countertops	1-1/8" particleboard	GP50	GP50 Post form	Apply low-VOC silicone sealant to joint between HPL top and backsplash	
Cabinet Doors	¾" particleboard	GP28 with CL20 liner on back	3mm PVC		Heavy duty, 5 knuckle, 2-3/4" institutional type hinge or Hettich Selecta Top 100 (no concealed hinges)
Drawer Fronts	¾" particleboard	GP28 with CL20 liner on back	3mm PVC	Doweled and glued under pressure	128 mm design pulls
Drawer Sides and Backs	5/8" medium density fiberboard	Melamine on all visible surfaces with drawer in normal open position		Grass Zargen System	Combination epoxy coated steel and nylon roller bearing drawer slides Self-closing Full extension for file drawers
Drawer Bottoms	Fully captured MDF construction - Minimum thickness: 1/4" Platform	Particle-board.			Platform construction - must use wrap around drawer slide

	CORE	SURFACE	EDGE	CONSTRUCTION / JOINERY	HARDWARE
	construction – Minimum thickness: 1/2"				
Shelves	1" particleboard	GP28	1mm PVC on front and back edges	Multiple holes (minimum 5mm diameter at 1-1/4" O.C.)	

2.5 COMPONENTS

A. Work surface: Plastic laminate countertop with grommets for cord access to electrical receptacles and computer ports below work surface. Grommets to be drilled in the field with locations coordinated with owner. Work surface would be placed at required height for specific tasks with knee space under it and structural supports to the floor.

B. Provide stop chains where cabinet will be hitting another cabinet next or adjacent to.

C. File drawer slide shall be a ball-bear slide by KV, minimum 150 lbs full extension drawer.

D. Provide finished and filler panels as shown and as recommended by the manufacturer.

E. Provide top corner closure panels to conceal open spaces behind and between tall cabinets.

F. Provide L-shaped support brackets at all mounted countertop locations. Quantity and location shall be as recommended by manufacturer to ensure proper support and prevent bowing over time.

2.6 ALTERNATES

A. Under Alternate 6, provide stainless steel countertops in Kitchen 117 in lieu of high pressure plastic laminate.

1) Manufactures include VM Systems and Columbus Stainless Steel, or approved equal.

2) Stainless steel shall be type 316 kitchen grade.

3) Technical Data:

a) 18% chromium

b) 10% nickel

c) 2% molybdenum

d) Chlorine resistant

e) superior corrosion resistance

B. Under Alternate 7, provide quartz countertops in Kitchen 117 I lieu of high pressure plastic laminate.

1) Provide products from Corian Quartz, or equal by Cambria.

a) Architect to select from price groups 1 and 2.

2) MATERIALS

a) Homogeneous mixture containing 93% pure quartz with additions of high performance polyester resin, pigments, and special effects.

b) Thickness: 3cm

c) Identification: Material shall be labeled with manufacturer's identifying mark.

d) Edge Profile shall be selected by owner.

e) Performance:

[1] Moisture Absorption: 0.02% (ASTM C97)

[2] Modulus of Rupture: 6,800 psi (ASTM C99)

[3] Compressive Strength: 24,750 psi (ASTM C170)

[4] Moisture Expansion: <0.01 (ASTM C370)

[5] Abrasion Resistance: 223 (ASTM C501)

[6] Bond Strength: 205 psi (ASTM C482)

[7] Thermal Shock: passes 5 cycles (ASTM 484)

[8] Coefficient of Thermal Expansion: 1.2x10^-5 inch/degree F (ASTM C531)

[9] Breaking Strength of Tile: 3,661 lbf (ASTM C648)

[10] Resistance to Freeze Thaw Cycling: unaffected 15 cycles (ASTM C1026)

[11] Coefficient of Friction Pull Method: .75 average dry / .55 average wet (ASTM C1028)

[12] Surface Burning Characteristics: 17 (ASTM E84)

[13] Smoke Density: flaming 196, non-flaming 69 (ASTM E662)

[14] Stain Resistance: Unaffected (ANSI Z124.6)

3) ACCESSORIES

a) Mounting Adhesive:

[1] Provide structural grade '50 year" 100% silicone or epoxy adhesive, as recommended by manufacturer.

b) Quartz Surface Adhesive:

[1] Provide epoxy or polyester adhesive of a type recommended by manufacturer for application and conditions of use.

[2] Adhesive which will be visible in finished work shall be tinted to match quartz surface.

c) Joint Sealant:

[1] Clear sealant of type recommended by manufacturer for application and use.

[2] Provide anti-bacterial type.

[3] Provide where countertop terminates at wall, backsplash, or other vertical plain.

d) Solvent:

[1] Denatured alcohol for cleaning quartz surfacing to assure adhesion of adhesives and sealants.

e) Cleaning Agents:

[1] Mild soap and water.

4) FABRICATION

a) Layout: Layout surface to minimize joints and avoid L-shaped pieces of quartz surfacing. Layout and fabricate with "hairline" joints.

b) Inspection of Materials: Inspect materials for defect prior to fabrication.

c) Tools: Cut and polish with water cooled powered tools.

d) Cutouts:

[1] Cutouts shall have a minimum of ¼" radius.

[2] Where edges of cutouts will be exposed in finished work, polish edges.

e) Lamination: laminate layers of quartz surfacing gas required to create built up edges following procedures recommended by the manufacturer.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Assemble and erect equipment, providing anchorage and attachments as required.

B. Counter top cut outs shall be the responsibility of the General Contractor and coordinated with the cabinet supplier.

C. In all locations where back and end-splashes meet walls, contractor shall apply low-VOC caulk.

D. Repair damaged or abraded surfaces.

E. Clean all equipment immediately prior to turning over to the Owner.

F. Non-with-standing these specifications, all equipment and furniture shall be installed in strict accordance with the manufacturer's written recommendations.

3.2 INSTALLATION OF STAINLESS STEEL (ALTERNATE 6)

A. Follow manufacturers recommendations for storage, verification, inspection, preparation, installation, and protection of surfaces.

3.3 INSTALLATION OF QUARTZ (ALTERNATE 7)

A. Installation shall be by an approved installer, certified in writing by the manufacturer.

B. Site Verification:

1) Verify dimensions by field measurements prior to installation.

2) Verify that substrates supporting quartz surfaces are plumb, level and flat to within 1/8" in 10 feet and that all necessary supports and blocking are in place.

3) Base cabinets and millwork shall be secured to adjoining units and back wall.

C. Inspection of Quartz Surfaces:

1) Inspect materials for imperfections prior to installation.

D. Prepare Surface:

1) Clean surfaces prior to installation.

E. Protection of Quartz Surfaces:

1) Protect finished surfaces from scratches. Apply masking where necessary. Take necessary precautions to prevent dirt grit dust and debris from other trades from contacting the surface by covering the top and exposed edge profiles after installation is completed.

F. Installation:

1) Install materials in accordance with manufacturer's instructions and approved shop drawings.

2) Preliminary Installation:

a) Position materials to verify the correct size.

b) If size adjustments, or additional fabrication is necessary, use water cooled tools. Protect jobsite and surface from dust and water. Perform work away from installation site if possible.

c) Allow gaps for expansion of not less than 1/8" per ten feet when installed between walls or other fixed structures.

3) Permanent Installation:

a) After verification of fit and finish, clean substrate; remove loose and foreign matter which may interfere with adhesion. Clean quartz surface backside and joints with denatured alcohol.

b) Horizontal Surface: Apply continuous bead of 100% silicone at the intersection point of the countertop and the substrate or cabinet. This bead will be continuous throughout the entire perimeter.

c) Vertical Surface: Apply continuous bead of mounting adhesive around perimeter. In addition, apply ¼" mounting adhesive bead every eight inches on vertical center.

d) Install fasteners, grout, and hardware as required and recommended by manufacturer.

e) Install quartz surfacing plumb, level, square and all on the same plane.

f) Align adjacent pieces in same plane.

4) Joints:

a) Joints shall be flush, tight fitting, level, and neat.

b) Securely join adjacent pieces with recommended adhesive.

c) Fill joints level to polished surface.

d) Secure adjacent quartz surfaces with vacuum clamps until adhesive hardens.

G. Perform finish work or replace damaged material in a satisfactory manner.

H. Remove masking, excessive adhesive and sealants. Clean exposed surfaces with denatured alcohol.

I. Protect installed fabrications with non-staining sheet coverings.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 DESCRIPTION

A. Manually operated, roll-up fabric interior window shades including mounting and operating hardware.

1.2 REFERENCES

A. NFPA 70 - National Electrical Code.

B. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.

1.3 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product specified.

B. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.

C. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings, field verified window dimensions, quantities, type of shade, controls, fabric, and color, and include opening sizes and key to typical mounting details.

D. Selection Samples: For each finish product specified, one complete set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.

E. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.4 DELIVERY, STORAGE AND HANDLING

A. Do not deliver skylight shades until building is enclosed and construction within spaces where shades will be installed is substantially complete.

B. Deliver products in manufacturer’s original, unopened, undamaged containers with labels intact.

C. Label containers and shades according to window shade schedule.

2. PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Draper, Inc., 411 South Pearl Street, Spiceland, Indiana 47385-0425; Phone 765-987-7999.

B. Or equals by Hunter Douglas, Levelor, and MechoShade.

2.2 MANUAL OPERATED SHADES

A. Manually Operated Spring Roller Shade: Manually operated, vertical roll-up, fabric window shade with components necessary for complete installation; Spring Roller Shades as manufactured by Draper, Inc.

1) Operation: Spring roller operating mechanism with metal roller containing heavy duty spring with positive locking mechanism permitting shade to be stopped at each half turn of roller. Provide cord clasp and braided cotton cord attached to bottom shade slat. Spring sized by manufacturer to accommodate shade size. Provide roller idler assembly of molded nylon and zinc-plated steel pin.

2) Roller Tube: Fabricated from extruded aluminum, galvanized steel, or enameled steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade type and size. Fabric connected to the roller tube with LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal. Adhesive attachment to eliminate horizontal impressions in fabric.

3) Mounting Brackets: Plated stamped steel. Provide size compatible with roller size.

a) Mounted to jamb.

4) Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.

a) Endcap covers: To match fascia color.

5) Fascia: L shaped aluminum extrusion to conceal shade roller and hardware.

a) Attachment: Snaps onto endcaps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands. No notching is required.

b) Shape: Square Fascia Panel.

c) Finish: to be selected by architect from manufacturer’s standard colors.

6) Shade slat: Slat encased in heat seamed hem.

2.3 FABRIC

A. Manufacturer: Mermet or equal.

1) Fabric (except Dorm 134) shall have a 3-4% openness factor.

2) Fabric in Dorm 134 shall be black-out.

B. Fire rating: NFPA 701, both small- and large-scale tests.

C. Antistatic treated.

2.4 SCHEDULE & LOCATIONS

A. Schedule:

ROOM NUMBER	SHADE COUNT	WINDOW TYPE	NOTES
101	1	A	Shade to begin below arch.
102	1	D	
107	1 1	A G	Shade to begin below arch.
108	1	A	Shade to begin below arch.
110	2	A	Shade to begin below arch.
111	1	A	Shade to begin below arch.
112	1	A	Shade to begin below arch.
113	1 1	A B	Shade to begin below arch.
116	3	B	
134	6	B	Black-Out
135	1 1	C D	

B. Field verify dimensions prior to fabrication.

3. PART – EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Field verify dimensions prior to fabrication.

B. Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install roller shades level, plumb, square, and true. Allow proper clearances for window operation hardware.

3.4 TESTING AND DEMONSTRATION

A. Test window blinds to verify that operating components are functional. Correct deficiencies.

B. Demonstrate operation of shades to Owner's designated representatives.

3.5 PROTECTION

A. Clean blind assemblies and protect from damage from construction operations. If damage occurs, remove and replace damaged components or entire unit as required to provide units in their original, undamaged condition

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Murphy bed located in Duty Office 124.

1.2 RELATED SECTIONS

A. 12 30 00 Casework

1.3 SUBMITTALS

A. Submit shop drawings that include the dimensions, quantities, and locations of all furniture, as well as manufacturer's product data.

B. Submit full set of colors available for office furniture components for architect's selection and approval.

2. PART 2 – PRODUCTS

2.1 MURPHY BED UNIT

A. Product: Basis of Design shall be Twin Bed unit, as manufactured by "Space Advantages" Murphy Bed Center, 6475 E. Main Street, Reynoldsburg, Ohio 43068. 888.772.2323.

B. Approved Equals:

1) Murphy Bed Co., Inc.

2) More Space Place

C. Size: 45"W x 85"H x 20"D

D. Mounting: Manufacturers standard floor mounting to precast concrete floor slabs.

E. Access Doors: Manufacturers standard bi-fold doors with blank face and heavy-duty concealed "grass" hinges.

1) Blank face to accept custom panel that coordinates with adjacent casework.

F. AWI Type of Cabinet Construction: Reveal overlay on face frame.

G. Reveal Dimension: ½"

H. Laminate Cladding for Exposed Surfaces: Match high pressure plastic laminate on adjacent cabinets.

I. Materials for Semi-Exposed Surfaces Other Than Drawer Bodies: high-pressure plastic laminate.

J. Colors, Patterns, and Finishes: Match adjacent cabinetry, as selected by architect.

K. Hardware: Match hardware of adjacent cabinetry.

L. Provide dust panels of ¼" plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

M. Coordinate power requirements in rear of cabinet with electrical contractor.

1) Provide cut-outs required for rough-in boxes.

3. PART 3 - EXECUTION

3.1 ASSEMBLY AND INSTALLATION

A. Furniture shall be assembled and installed by qualified and experienced furniture installer.

B. Follow manufacturer's recommendations for assembly.

C. Coordinate with casework installer.

D. See floor plans for locations.

E. Damaged furniture shall be noted and replaced by contractor.

3.2 CLEANING AND MAINTENANCE

A. Keep site clean and free from accumulation of debris.

B. Remove all packaging and clean all furniture immediately prior to turning over to the owner.

C. Laminate surface may be cleaned with any detergent or spray cleaner.

D. Follow regular maintenance guidelines outlined in the owner's manual.

◆ END OF SECTION ◆

1. PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes a complete single-story, single span, rigid-frame type pre-engineered metal building of the nominal length, width, eave height, and roof pitch indicated. Overhead doors, mechanical equipment, electrical equipment and piping loads and framing shall be included in the engineering load criteria.

1. Exterior walls are covered with factory-finished wall panels attached to framing members. Provide all louvers shown on drawings.

2. Interior metal liner system is required for exterior walls of the apparatus bay and as shown on the drawings.

3. Roof system consists of the manufacturer's standard standing-seam galvalume roof, over insulation. Provide all roof penetration seals.

4. Manufacturer's standard building structural components and accessories may be used, provided components, accessories, and complete structure conform to design indicated and specified requirements, including concrete masonry on the elevation.

5. The intent of this specification section is to provide the manufacturer's standard metal panels (as noted in Items 2.5 and 2.6) that meet or exceed the specifications. In the event a manufacturer's standard panel specification does not comply, the manufacturer is to supply the closest comparable panel products in all aspects.

1.2 SECTION INCLUDES

A. Design, fabricate, and erect the metal building including:

1. Structural-steel framing.
2. Metal roof panels.
3. Metal wall panels.
4. Metal soffit panels.
5. Thermal insulation.
6. Doors and frames loading design – For doors to be installed see specification sections 08 36 00 section doors, 08 11 13 hollow metal doors and frame, 08 16 16 aluminum doors and frames and 08 41 13 aluminum framed storefronts.
7. Windows loading design – For windows to be installed see specification section 08 51 13 aluminum windows.
8. Accessories.

1.3 REFERENCES

A. AISI S100 – North American Specification for the Design of Cold-Formed Steel Structural Members - Latest Edition.

B. AISC 360 - Specification for Structural Steel Buildings, Chicago, IL
C. AISC Steel Design Guide Series 3 - Serviceability Design Considerations for Low-Rise Building– latest edition, Chicago, IL.
D. ASTM A36 - Specification for Carbon Structural Steel.
E. ASTM A325 - Specification for Structural Bolts, Steel, Heat Treated.
F. ASTM A475 - Specification for Zinc-Coated Steel Wire Strand.
G. ASTM A529 - Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
H. ASTM A572 - Specification for High Strength Low-Alloy Columbium-Vanadium Steel.
I. ASTM A1011 SS or ASTM A1011HSLAS - Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
J. ASTM A792 - Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process.
K. ASTM A992 - Specification for Structural Steel Shapes.
L. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
M. ASTM C1311 – Standard Specification for Solvent Release Sealants.
N. ASTM D1494 - Test Method for Diffuse Light Transmission Factor of Reinforced Plastic Panels.
O. ASTM D2244 - Practice for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
P. ASTM D4214 - Test Method for Evaluating the Degree of Chalking of Exterior Paint Films.
Q. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
R. ASTM E283 - Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
S. ASTM E331 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference.
T. ASTM E1514 – Standard Specification for Structural Standing Seam Steel Roof Panel Systems.
U. ASTM E1592 - Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
V. ASTM E1646 - Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
W. ASTM E1680 - Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems.
X. ASTM E 2140 – Standard Test Method for Water penetration of Metal Roof Panel Systems by Static Water Pressure Head.
Y. AWS A2.4 - Standard Welding Symbols.
Z. AWS D1.1 - Structural Welding Code – Steel.
AA. AWS D1.3 - Structural Welding Code - Sheet Steel.
BB. FM4471 – Factory Mutual Research Corporation Standard 4471 Class 1.
CC. IAS - International Accreditation Service, Inc.
DD. MBMA Metal Building Systems Manual - Latest Edition.
EE. NAIMA 202 - Standard for Flexible Fiberglass Insulation Systems in Metal Buildings.
FF. UL 580 - Underwriters Laboratory -Tests for Uplift Resistance of Roof Assemblies .
GG. UL 790 – Underwriters Laboratory – Test Methods for Fire Tests of Roof Coverings.
HH. UL 2218 Underwriters Laboratory – Impact Resistance of Prepared Roof Covering Material.
II SSPC-SP2 - Steel Structures Painting Council, Surface Preparation Specification No.

2, Hand Tool Cleaning.

JJ. ANS/SDI A250.8 Specifications for Standard Steel Doors and Frames (SDI-100).

KK. ASTM E119 – Standard Methods of Fire Tests of Building Construction and Materials.

1.4 DEFINITIONS

A. Terminology Standard: See MBMA's "Metal Building Systems Manual - latest Edition" for definitions of terms for metal building system construction not otherwise defined in this Section or in referenced standards.

B. Bay: Dimension between main frames measured normal to frame (at centerline of frame) for interior bays, and dimension from centerline of first interior main frame measured normal to end wall (outside face of end-wall girt) for end bays.

C. Building Length: Dimension of the building measured perpendicular to main framing from end wall to end wall (outside face of girt to outside face of girt).

D. Building Width: Dimension of the building measured parallel to main framing from sidewall to sidewall (outside face of girt to outside face of girt).

E. Clear Span: Distance between supports of beams, girders, or trusses (measured from lowest level of connecting area of a column and a rafter frame or knee).

F. Eave Height: Vertical dimension from finished floor to eave (the line along the sidewall formed by intersection of the planes of the roof and wall).

G. Clear Height under Structure: Vertical dimension from finished floor to lowest point of any part of primary or secondary structure, not including crane supports, located within clear span.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of metal building system component. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

1. Structural-steel-framing system.
2. Metal roof panels.
3. Metal wall panels.
4. Metal liner panels.
5. Insulation and vapor retarder facings.
6. Flashing and trim.
7. Accessories.

B. Shop Drawings: For the following metal building system components. Include plans, elevations, sections, details, and attachments to other work.

1. Anchor-Bolt Plans: Submit anchor-bolt plans and templates before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location.

2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.

    a. Show provisions for attaching roof curbs**,** and Overhead Cranes.

3. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.

    a. Show roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, and items mounted on roof curbs.
    b. Show wall-mounted items including doors, windows, louvers, and lighting fixtures.

4. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:

    a. Flashing and trim. section 07 62 00 sheet metal flashing and trim
    b. Gutters. See specification section 07 62 00 sheet metal flashing and trim
    c. Downspouts. See specification section 07 62 00 sheet metal flashing and trim
    d. Louvers. See mechanical drawings and specifications.
    e. Roof Curbs. See section 07 72 00 Roof Accessories.

C. Samples for Verification: For each type of exposed finish required, prepared Samples of sizes indicated below:

1. Metal Panels: Nominal 12 inches (300 mm) long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
2. Flashing and Trim: Nominal 12 inches (300 mm) long. Include fasteners and other exposed accessories.
3. Vapor-Retarder Facings: Nominal 6-inch- (150-mm-) square Samples.
4. Accessories: Nominal 12-inch- (300-mm-) long Samples for each type of accessory.

D. Door Schedule: See drawings and specification sections 08 36 00 section doors, 08 11 13 hollow metal doors and frame, 08 16 16 aluminum doors and frames and 08 41 13 aluminum framed storefronts..

E. Delegated-Design Submittal: For metal building systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer, Registered in the State of Ohio, responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified erector, manufacturer, and professional engineer.

B. Welding certificates.

C. Metal Building System Certificates: For each type of metal building system, from manufacturer.

1. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:

a. Name and location of Project.
b. Order number.
c. Name of manufacturer.
d. Name of Contractor.
e. Building dimensions including width, length, height, and roof slope.
f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
g. Governing building code and year of edition.
h. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
i. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
j. Torque requirements for bolted connections.
k. Building-Use Category: Indicate category of building use and its effect on load importance factors.
l. AISC Certification for Category MB: Include statement that metal building system and components were designed and produced in an AISC-Certified Facility by an AISC-Certified Manufacturer.
m. Design calculations.

D. Erector Certificates: For each product, from manufacturer, and signed by manufacturer certifying that the erector complies with requirements.

E. Manufacturer Certificates: For each product, from manufacturer, and signed by manufacturer certifying that products comply with requirements.

F. Material Test Reports: For each of the following products:

1. Structural steel including chemical and physical properties.
2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shop primers.
5. Nonshrink grout.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for insulation and vapor-retarder facings. Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.

H. Source quality-control reports.

I. Field quality-control reports.

J. Surveys: Show final elevations and locations of major members. Indicate discrepancies between actual installation and the Contract Documents. Have surveyor who performed surveys certify their accuracy.

K. Warranties: Sample of special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panel finishes to include in maintenance manuals.
B. See specification section 01 78 00 Project Closeout and Warranties.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer and member of MBMA.

1. AISC Certification for Category MB: An AISC-Certified Manufacturer that designs and produces metal building systems and components in an AISC-Certified Facility.
2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
1. Minimum of 5 years experience in this or similar trade
2. Five similar installation references in past 3 years

C. Source Limitations: Obtain metal building system components, including primary and secondary framing and metal panel assemblies, from single source from single manufacturer.

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

E. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.
1. Domestic Steel Certificate: Certify compliance with Section 153.011 of the Ohio Revised Code.

F. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

G. Fire-Resistance Ratings: Where indicated, provide metal panel assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
2. Combustion Characteristics: ASTM E 136.

H. Pre-installation Conference: Conduct conference at Project Site. Contractor, Owner, and Architect of Record shall attend this conference.

1. Review methods and procedures related to metal building systems including, but not limited to, the following:

   a. Condition of foundations and other preparatory work performed by other trades.
   b. Structural load limitations.
   c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
   d. Required tests, inspections, and certifications.
   e. Unfavorable weather and forecasted weather conditions.

2. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:

   a. Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.
   b. Structural limitations of purlins and rafters during and after roofing.
   c. Flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
   d. Temporary protection requirements for metal roof panel assembly during and after installation.
   e. Roof observation and repair after metal roof panel installation.

3. Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:

   a. Compliance with requirements for support conditions, including alignment between and attachment to structural members.
   b. Structural limitations of girts and columns during and after wall panel installation.
   c. Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
   d. Temporary protection requirements for metal wall panel assembly during and after installation.
   e. Wall observation and repair after metal wall panel installation.

4. Review coordination items such as but not limited to:

   a. Window installation
   b. Door installation
   c. Overhead door installation and structural support.

1.9 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements:

1. Established Dimensions for Foundations: Comply with established dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.
2. Established Dimensions for Metal Panels: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal panels without field measurements, or allow for field trimming metal panels. Coordinate construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.10 COORDINATION

A. Coordinate sizes and locations of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-Place Concrete."

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations, which are specified elsewhere.

C. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leak-proof, secure, and noncorrosive installation.

D. Coordinate ALL required loads and bracing for building equipment, including but not limited to: mechanical equipment.

1.11 WARRANTY

A. Special Warranty on Metal Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period due to any cause.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Completion.

B. Special Weather tightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain watertight,

including leaks, or otherwise fail to remain weather tight within specified warranty period, due to material or installation failure within the specified warranty period with a NO dollar limit.

1. Warranty Period: 20 years from date of Completion.

1.12 ATTIC STOCK

A. Maintenance Stock: Pack, protect, and label all excess material and store on site as directed by the Design professional.
   1. Provide 3% excess Nuts, Bolts, Screws, Washers and other required fasteners for each metal building.
   2. Provide 3% full length metal wall and liner panels.

PART 2 - PRODUCTS

2.1 METAL BUILDING SYSTEMS

A. Description: Provide a complete, integrated set of metal building system manufacturer's standard mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.

   1. Provide metal building system of size and with bay spacing, roof slopes, and spans as indicated in the construction document.

B. Primary-Frame Type:

   1. Rigid Clear Span: Solid-member, structural-framing system without interior columns.
   2. Lean to: Solid- or truss-member, structural-framing system without interior columns designed to be partially supported by the main metal building structure.

C. End-Wall Framing: Manufacturer's standard, for buildings not required to be expandable, consisting of load-bearing end-wall and corner columns and rafters.

D. Secondary-Frame Type: Manufacturer's standard purlins and joists and exterior framed bypass girts.

E. Clear Height under Structure: See drawings

F. Roof Slope: See drawings

G. Roof System: Manufacturer's standard trapezoidal-rib, standing-seam metal roof panels with insulation. Finish color shall be DMI colonial red.

H. Exterior Wall System: Manufacturer's standard tapered-rib, exposed-fastener metal wall panels with field-installed insulation. Finish color shall be DMI putty.

2.2 METAL BUILDING SYSTEM PERFORMANCE

A. Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."

B. **See also structural drawings for design loads.**

1. Design Loads: As indicated on Drawings.
2. Design Loads: As required by Ohio Building Code.
3. Live Loads: Include vertical loads induced by the building occupancy indicated on Drawings. Include loads induced by maintenance workers, materials, and equipment for roof live loads.

   a. Building Occupancy: As indicated on Drawings.

4. Roof Snow Loads: Include vertical loads induced by the weight of snow, as determined by Ohio Building Code. Allow for unbalanced and drift loads.

5. Wind Loads: Include horizontal loads induced by a basic wind speed as required by Ohio Building Code

6. Collateral Loads: Collateral loads include additional dead loads over and above the weight of the metal building system such as liner system, rigid roof insulation, lighting, garage equipment, sprinkler systems and roof-mounted mechanical systems, make-up air units, door opening motors, canopies. Include individual mechanical units and not less than 5 LBF/SQ.FT loading.

   a. Structural Framing and Roof and Siding Panels: Design primary and secondary structural members and exterior covering materials for applicable loads and combinations of loads in accordance with the Metal Building Manufacturers Association's (MBMA) "Design Practices Manual" and the Ohio Building Code. Provide framing to support make-up air units, exhaust fans, vehicle service reels and vehicle exhaust reels. Confirm loads with contractors for that work. Design

      connections to the pre-engineered structure for the masonry exterior walls. For smaller mechanical equipment items, respective mechanical trades Contractor to provide steel supports and connectors, but metal building supplier must provide connection details of hangers to the structure.

   b. Contractors shall confirm weight and dimensions with manufacturer and coordinate final locations.

7. Auxiliary Loads: Include dynamic live loads, such as those generated by cranes and materials-handling equipment indicated on Drawings.

8. Load Combinations: Design metal building systems to withstand the most critical effects of load factors and load combinations as required by the Ohio Building Code

9. Deflection Limits: Design metal building system assemblies to withstand design loads

with deflections no greater than the following:

a. Purlins and Rafters: Vertical deflection of L/360 (under Live Load, Snow Load, or Wind Load) and L/240 under Dead Load plus Live Load.
b. Girts: Horizontal deflection of L/240..
c. Metal Roof Panels: Vertical deflection 1/240 of the span.
d. Metal Wall Panels: Horizontal deflection of 1/180 of the span.
e. Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.

10. Drift Limits: Engineer building structure to withstand design loads with drift limits no greater than the following:

    a. Lateral Drift: Maximum of 1/500 of the building height.

11. Metal panel assemblies shall withstand the effects of gravity loads and loads and stresses within limits and under conditions indicated according to ASTM E 1592.

C. Seismic Performance: Metal building systems shall withstand the effects of earthquake motions determined according to Ohio Building Code.

D. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

E. Air Infiltration for Metal Roof Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) of roof area when tested according to ASTM E 1680 at negative test-pressure difference of 1.57 lbf/sq. ft. (75 Pa).

F. Air Infiltration for Metal Wall Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) of wall area when tested according to ASTM E 283 at static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).

G. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E 1646 at test-pressure difference of 2.86 lbf/sq. ft. (137 Pa).

H. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward acting, wind load design pressure of not less than 6.24lbf/sqft (330 Pa) and not more than 12lbf/sq.ft (575 Pa).

I. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 90.

J. Thermal Performance: Provide vinyl faced batt insulation with the following maximum U- factors

and minimum R-values for opaque elements when tested according to ASTM C 1363 or ASTM C 518:

1. Metal Roof Panel Assemblies:
   a. R-Value: 19

2. Metal Wall Panel Assemblies:
   a. R-Value: 19

2.3 STRUCTURAL-STEEL FRAMING

A. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.

1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.

   a. Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, as approved by Design professional.

2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
3. Rigid Modular Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide interior columns fabricated from round steel pipes or tubes, or shop-welded, built-up steel plates.
4. Truss-Frame, Clear-Span Frames: Rafter frames fabricated from joist girders, and I-shaped column sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.
5. Truss-Frame Modular Frames: Rafter frames fabricated from joist girders, and I-shaped column sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide interior columns fabricated from round steel pipes or tubes, or shop-welded, built-up steel plates.
6. Long-Bay Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide interior columns fabricated from round steel pipes or tubes, or shop-welded, built-up steel plates.
7. Frame Configuration: Single gable and Lean to, with high side connected to and supported by another structure
8. Exterior Column Type: Tapered.
9. Rafter Type: Tapered.

B. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:

1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet.
2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; or I-shaped sections

fabricated from shop-welded, built-up steel plates or structural-steel shapes.

C. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following:

1. Purlins: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; minimum 2-1/2-inch wide flanges.

   a. Depth: Minimum depth as indicated. Greater depth as needed to comply with system performance requirements.

2. Purlins: Steel joists of depths indicated.
3. Girts: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees from flange, with minimum 2-1/2-inch wide flanges.

   a. Depth: Minimum depth as indicated. Greater depth as needed to comply with system performance requirements.

4. Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.
5. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch- diameter, cold-formed structural tubing to stiffen primary-frame flanges.
6. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
7. Base or Sill Angles: Minimum 3-by-2-inch zinc-coated (galvanized) steel sheet.
8. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
9. Secondary End-Wall Framing: Manufacturer's standard sections fabricated from zinc-coated (galvanized) steel sheet.
10. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.
11. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.

D. Canopy Framing: Manufacturer's standard structural-framing system, designed to withstand required loads; fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide frames with attachment plates and splice members, factory drilled for field-bolted assembly.

1. Type: Straight-beam, eave type as indicated on drawings.

E. Dormer Framing: Manufacturer's standard structural-framing system, designed to withstand required loads; fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide frames with attachment plates and splice members, factory drilled

for field-bolted assembly.

F. Bracing: Provide adjustable wind bracing as follows:

1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50; or ASTM A 529/A 529M, Grade 50; minimum 1/2-inch diameter steel; threaded full length or threaded a minimum of 6 inches at each end.
2. Cable: ASTM A 475, 1/4-inch-(6-mm-) diameter, extra-high-strength grade, Class B zinc-coated, 7-strand steel; with threaded end anchors
3. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
4. Rigid Portal Frames: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
5. Fixed-Base Columns: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
6. Diaphragm Action of Metal Panels: Design metal building to resist wind forces through diaphragm action of metal panels.
7. Bracing: Provide wind bracing using any method specified above, at manufacturer's option.

G. Bolts: Provide plain-finish bolts for structural-framing components that are primed or finish painted. Provide hot-dip galvanized bolts for structural-framing components that are galvanized.

H. Materials:

1. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade 50 or 55 (345 or 380); or ASTM A 529/A 529M, Grade 50 or 55 (345 or 380).
2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55 (345 or 380); or ASTM A 529/A 529M, Grade 50 or 55 (345 or 380).
3. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55 (345 or 380); or ASTM A 529/A 529M, Grade 50 or 55 (345 or 380).
4. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
5. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.
6. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55 (205 through 380), or High-Strength Low-Alloy Steel (HSLAS), Grades 45 through 70 (310 through 480); or cold-rolled, ASTM A 1008/A 1008M, Structural Steel (SS), Grades 25 through 80 (170 through 550), or High-Strength Low-Alloy Steel (HSLAS), Grades 45 through 70 (310 through 480).
7. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades 33 through 80 (230 through 550), or High-Strength Low-Alloy Steel (HSLAS), Grades 50 through 80 (340 through 550); with G60 (Z180) coating designation; mill phosphatized.
8. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

    a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades 33 through 80 (230 through 550) or High-Strength Low-Alloy Steel (HSLAS), Grades 50 through 80 (340 through 550); with G90 (Z275) coating designation.

9. Joist Girders: Manufactured according to "Standard Specifications for Joist Girders," in SJI's "Standard Specifications and Load Tables for Steel Joists and Joist Girders"; with steel-angle, top- and bottom-chord members, and end- and top-chord arrangements as indicated and required for primary framing.
10. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), carbon-steel, hex-head bolts; ASTM A 563 (ASTM A 563M) carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.

    a. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.

11. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563 heavy-hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

    a. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.

12. Primer: SSPC-Paint 15, Type I, red oxide.

2.4 METAL ROOF PANELS

A. Trapezoidal-Rib, Standing-Seam Metal Roof Panels Formed with raised trapezoidal ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.

1. Material: Aluminum-zinc alloy-coated steel sheet, 0.034-inch (22 GA) nominal thickness.

    a. Exterior Finish: Fluoropolymer.

    b. Color: DMI Colonial Red

2. Clips: Manufacturer's standard, floating type to accommodate thermal movement; fabricated from aluminum-zinc alloy-coated steel sheet.
3. Joint Type: Mechanically seamed, folded according to manufacturer's standard.
4. Panel Coverage: 24 inches (610mm)
5. Panel Height: 3 inches (76mm)
6. Uplift Rating: UL 90.

B. Finishes:
1. High-Performance Organic Finish (2-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions, except as modified below

2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.5 METAL WALL PANELS

A. Tapered-Rib-Profile, Exposed-Fastener Metal Wall Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.

1. Material: Zinc-coated galvanized steel sheet, 24 GA, 50,000 psi (min.).
   a. Exterior Finish: Fluoropolymer.
   b. Color: DMI Putty

2. Major-Rib Spacing: 12 inches o.c.
3. Panel Coverage: 36 inches.
4. Panel Height: 1.5 inches.

B. Tapered-Rib-Profile, Metal Liner Panels: Formed with raised, trapezoidal major ribs and flat pan between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.

1. Material: Zinc-coated (galvanized) steel sheet, 24 GA, 50,000 psi (min.).

   a. Exterior Finish: Acrylic enamel.
   b. Color: As selected by the design professional from manufacturer's full range.

2. Major-Rib Spacing: 6 inches o.c.
3. Panel Coverage: 36 inches.
4. Panel Height: 1.25 inches.

C. Finishes:

1. Exposed Coil-Coated Finish:

   a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.6 METAL SOFFIT PANELS

A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.

B. Metal Soffit Panels: Contractor shall provide perforated, flat profile metal soffit panels – REGARDLESS of whether this is a standard manufacturer's product.

1. Finish: Match finish and color of metal wall panels.

2.7 THERMAL INSULATION

A. Mineral-Fiber-Blanket Insulation: ASTM C 665, type indicated below; consisting of fibers manufactured from glass, slag wool, or rock wool.

1. Reflective Faced: Type III (blankets with reflective membrane covering), Category 1 (membrane is a vapor retarder), Class A (membrane-faced surface with a flame-spread index of 25 or less).

a. Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than 0.02 perm (1.15 ng/Pa x s x sq. m) when tested according to ASTM E 96/E 96M, Desiccant Method.

1) Composition: Aluminum foil facing, elastomeric barrier coating, fiberglass scrim reinforcement, and kraft-paper backing.

2) Composition: White polypropylene film facing, fiberglass scrim reinforcement, and metallized-polyester film backing.

B. Retainer Strips: 0.025-inch (0.64-mm) nominal-thickness, formed, metallic-coated steel or PVC retainer clips colored to match insulation facing.

C. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.8 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise

indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
2. Clips: Manufacturer's standard, formed from steel sheet, designed to withstand negative-load requirements.
3. Cleats: Manufacturer's standard, mechanically seamed cleats formed from steel sheet.
4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction. Provide metal trim cover for closure strips.
6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1-inch (25-mm) standoff; fabricated from extruded polystyrene.

C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction. Provide metal trim cover for closure strips.

D. Flashing and Trim: Formed from 0.022-inch (0.56-mm) nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match adjacent metal panels.

1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, internal and external corners, fasciae, and fillers.
2. Opening Trim: Formed from 0.022-inch (0.56-mm) nominal-thickness, aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

E. Gutters: See specification section 07 62 00 Sheet metal flashing and trim

1. Gutter Supports: Fabricated from same material and finish as gutters: spaced 36 inches (900mm) o.c.
2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.

F. Downspouts: See specification section 07 62 00 Sheet metal flashing and trim

1. Mounting Straps: Fabricated from same material and finish as gutters: spaced 5 feet o.c.

G. Louvers*:* Size and design indicated; self-framing and self-flashing. Fabricate welded frames from minimum 0.052-inch (1.32-mm) nominal-thickness, metallic-coated steel sheet; finished to match metal wall panels. Form blades from 0.040-inch (1.02-mm) nominal-thickness, metallic-coated steel sheet; folded or beaded at edges, set at an angle that excludes driving rains, and secured to frames by riveting or welding. Fabricate louvers with equal blade spacing to produce uniform appearance.

1. Blades: Fixed.
2. Free Area: Not less than 7.0 sq. ft. (0.65 sq. m) for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver.
3. Bird Screening: Galvanized steel, 1/2-inch- (13-mm-) square mesh, 0.041-inch (1.04-mm) wire; with rewirable frames, removable and secured with clips; fabricated of same kind and form of metal and with same finish as louvers.

   a. Mounting: Interior face of louvers.

4. Vertical Mullions: Provide mullions at spacing recommended by manufacturer, or 72 inches (1830 mm) o.c., whichever is less.

H. Roof Curbs: See specification ection 07 72 00 Roof Accessories.

1. Curb Subframing: Fabricated from 0.064-inch (1.63-mm) nominal-thickness, angle-, C-, or Z-shaped metallic-coated steel sheet.
2. Insulation: 2-inch- (25-mm-) thick, rigid type.

I. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

J. Snow Guards: Snow Guards: Prefabricated, noncorrosive units designed to be installed without penetrating roof panel, with predrilled holes and clamps or hooks for anchoring. ***Snow Guards to be located as noted in the drawings.*** Allow for free movement of roof panels and snow guard rails as recommended by manufacturer. Snow Guard shall be approved for use with project roof type, roof panel width, project snow load and roof pitch by snow guard manufacturer.

1. Metal Rail Type Guard: Consisting of two aluminum or stainless-steel rods or bars held in place by supports clamped to vertical ribs of standing-seam roof. System compatible with metal building manufacturers standing seam profile and height. Provide all accessories necessary including intermediate snow clips for complete system as recommended by system manufacturer.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: The Owner or the Architect of Record will employee/engage a qualified testing agency to evaluate/test product.

B. Testing: Test and inspect shop connections for metal buildings according to the following:

1. Bolted Connections: Shop-bolted connections shall be ***tested and*** inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
2. Welded Connections: In addition to visual inspection, shop-welded connections shall be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at inspector's option:

   a. Liquid Penetrant Inspection: ASTM E 165.
   b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
   c. Ultrasonic Inspection: ASTM E 164.
   d. Radiographic Inspection: ASTM E 94.

C. Product will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

2.10 FABRICATION

A. General: Design components and field connections required for erection to permit easy assembly.

1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.

B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances and with AISC “Specification for Design, Fabrication, Erection of Structural Steel for Buildings”.

C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.

1. Make shop connections by welding or by using high-strength bolts.
2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
4. Weld clips to frames for attaching secondary framing.
5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.

D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.

1. Make shop connections by welding or by using non-high-strength bolts.
2. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.

E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.

1. Engage professional Surveyor Engineer to perform surveying.

C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION OF STRUCTURAL FRAMING

A. Erect metal building system according to manufacturer's written erection instructions and erection drawings.

B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.

F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.

1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for bolt type and joint type specified.

a. Building manufacturer to provide torque requirements for high strength bolt connections.

b. Contractor to coordinate with Owner’s employed third party testing agency confirming bolted connections are installed per metal building manufacturer’s recommendations.

G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.

1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
2. Locate and space wall girts to suit openings such as doors and windows.
3. Locate canopy framing as indicated.
4. Provide supplemental framing at entire perimeter of openings, including doors, windows,

louvers, ventilators, and other penetrations of roof and walls.

H. Steel Joists and Joist Girders: Install joists, girders, and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Standard Specifications and Load Tables for Steel Joists and Joist Girders," joist manufacturer's written instructions, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
4. Bolt joists to supporting steel framework using carbon-steel bolts unless otherwise indicated.
5. Bolt joists to supporting steel framework using high-strength structural bolts unless otherwise indicated. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
6. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

I. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.

1. Tighten rod and cable bracing to avoid sag.
2. Locate interior end-bay bracing only where indicated.

J. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

K. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303-10.

3.4 METAL PANEL INSTALLATION, GENERAL

A. Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.

1. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.

B. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.

a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.

2. Install metal panels perpendicular to structural supports unless otherwise indicated.
3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment.
6. Lap metal flashing over metal panels to allow moisture to run over and off the material.

C. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

E. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.

1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
2. Prepare joints and apply sealants to comply with construction document requirements."

3.5 METAL ROOF PANEL INSTALLATION

A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.

1. Install ridge caps as metal roof panel work proceeds.
2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.

B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.

1. Install clips to supports with self-drilling or self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.

3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels for fasteners.
6. Provide metal closures at peaks, rake edges, rake walls, and each side of ridge caps.

C. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

D. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 METAL WALL PANEL INSTALLATION

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Provide an exterior grade clearance to underside of exterior wall enclosure panels of a minimum of 8” above finished grade.

2. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
3. Shim or otherwise plumb substrates receiving metal wall panels.
4. When two rows of metal panels are required, lap panels 4 inches minimum.
5. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
6. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.
7. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
8. Install screw fasteners in predrilled holes.
9. Install flashing and trim as metal wall panel work proceeds.
10. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated; or, if not indicated, as necessary for waterproofing.
11. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
12. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.

C. Installation Tolerances: Shim and align metal wall panels within installed tolerance of 1/4 inch in

20 feet (6 mm in 6 m), nonaccumulative, on level, plumb, and on location lines as indicated, and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.7 METAL SOFFIT PANEL INSTALLATION

A. Provide metal soffit panels the full width of soffits. Install panels perpendicular to support framing.

B. Flash and seal metal soffit panels with weather closures where panels meet walls and at perimeter of all openings.

3.8 THERMAL INSULATION INSTALLATION

A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.

1. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.
2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.
3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths, with both sets of facing tabs sealed, to provide a complete vapor retarder.
4. Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation, with both sets of facing tabs sealed, to provide a complete vapor retarder.

B. Blanket Roof Insulation: Comply with the following installation method:

1. Two-Layers-between-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder-facing tabs up and over purlin, overlapping adjoining facing of next insulation course and maintaining continuity of retarder. Install layer of filler insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.

   a. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.

2. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal wall panels fastened to secondary framing.

1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
2. Sound-Absorption Insulation: Where sound-absorption requirement is indicated for metal liner panels, cover insulation with polyethylene film and provide inserts of wire mesh to form acoustical spacer grid.

3.9 DOOR AND FRAME INSTALLATION

A. **See Door Schedule on drawings and other specification sections for man-door and overhead doors.**

B. General: Install doors and frames plumb, rigid, properly aligned, and securely fastened in place according to manufacturers' written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each door frame with elastomeric sealant used for metal wall panels.

C. Personnel Doors and Frames: Install doors and frames according to SDI A250.8. Fit non-fire-rated doors accurately in their respective frames, with the following clearances:

1. Between Doors and Frames at Jambs and Head: 1/8 inch (3 mm).
2. Between Edges of Pairs of Doors: 1/8 inch (3 mm).
3. At Door Sills with Threshold: 3/8 inch (9.5 mm).
4. At Door Sills without Threshold: 3/4 inch (19.1 mm).
5. At fire-rated openings, install frames according to, and doors with clearances specified in, NFPA 80.

3.10 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed 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 weather resistant.

1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant

(concealed within joints).

C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

1. Provide elbows at base of downspouts to direct water away from building.
2. Tie downspouts to underground drainage system indicated.

E. Louvers: Locate and place louver units level, plumb, and at indicated alignment with adjacent work.

1. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
2. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.
3. Protect galvanized- and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of corrosion-resistant paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
4. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 07 Section "Joint Sealants" for sealants applied during louver installation.

F. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet metal roof panels.

G. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Owner or the Architect of Record will employee/engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. High-Strength, Field-Bolted Connections: Connections shall be **tested and** inspected during installation according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
2. Welded Connections: In addition to visual inspection, field-welded connections shall be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at inspector's option:

a. Liquid Penetrant Inspection: ASTM E 165.

b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

C. Product will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.12 ADJUSTING

A. Doors: After completing installation, test and adjust doors to operate easily, free of warp, twist, or distortion.

B. Door Hardware: Adjust and check each operating item of door hardware and each door to ensure proper operation and function of every unit. Replace units that cannot be adjusted to operate as intended.

3.13 CLEANING AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.

1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Tool Cleaning."
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

C. Touchup Painting: Cleaning and touchup painting are as specified in the Construction Document.

D. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

E. Louvers: Clean exposed surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

1. Restore louvers damaged during installation and construction period so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by the design professional, remove damaged units and replace with new units.

a. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 FIRE PROTECTION SECTIONS

A. SECTION 21 00 00 – GENERAL PROVISIONS

B. SECTION 21 10 00 – WATER BASED FIRE -SUPPRESSION

1.2 SCOPE OF WORK

A. Work under Fire Protection includes all work required to complete the installation of an approved sprinkler system throughout the entire school building.

1) All fire risers complete with accessories and connections.

2) Provide listed heat trace on wet piping in canopy.

3) All sprinkler lines, sprinkler heads and all fittings.

4) Hydraulic calculations and data sheets for submission to submit to plan approval.

5) All tests, 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 and installed by this contractor, it is the responsibility of this 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.

2.2 ACCESSIBILITY AND ACCESS PANELS

A. Install work so as to be readily accessible for operation, maintenance and repair. Where valves or other specialties are concealed in the construction or behind a wall or ceiling surface, contractor shall furnish and install an access panel of adequate size to permit adjustment or service or a concealed panel of adequate size to permit adjustment or service of concealed device. Panels shall be of a design suitable for installation in the material forming the finished surface in which each is mounted.

2.3 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. ThIs 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 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 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 the 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 the contractor. Cutting of existing walls for new ducts and piping shall be accomplished by the 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. The 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, the 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, the 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 equipment and insulation from damage, dirt, plaster, water, etc. The contractor shall be responsible to repair and/or replace all damaged equipment and materials.

E. At the time of completion, the Contractor shall clean thoroughly all the apparatus and equipment furnished by him.

3.7 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, or other building services.

C. These drawings shall also record the location of all concealed piping 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.

3.8 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 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.

3.9 TESTS AND ADJUSTMENTS

A. The 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, the 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.

3.10 GUARANTEE AND WARRANTY

A. The 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. The 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.

3.11 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.

3.12 VISITING THE SITE

A. 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.

3.13 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.

3.14 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.

3.15 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.

3.16 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.

3.17 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.

3.18 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.

3.19 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.

3.20 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.

3.21 SAFETY REQUIREMENTS

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

3.22 PROHIBITED CONSTRUCTION

A. There shall be no lines placed over electrical switchgear, transformers, or electric wall panels.

3.23 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.

3.24 PERSONNEL INSTRUCTION

A. Provide a minimum of 4 hours total 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.

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

3.25 FIREPROOFING

A. Contractors 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. Piping systems.
B. Sprinkler System
C. Sprinkler Heads
D. Double detector check valves.

1.2 SUBMITTALS

A. Refer to Section 21 00 00, and as follows:

1) Detailed drawings are required for this work. Submit shop drawings to the authority having jurisdiction. Outline all ductwork, lights, and other obstructions on shop drawings to show proper installation of all sprinkler work. Hydraulic calculations shall be included for all hydraulically designed systems.

2) The system shall have the approval of the local fire department having jurisdiction, the State Inspection Bureau and shall be installed according to the requirements of NFPA and the FM.

3) Distribute detailed drawing to Mechanical Contractor for coordination purposes.

B. Tests

1) Secure and pay for any tests, inspections, permits, certificates which may be required by authorities having jurisdiction.

2) The appropriate tests and flushing procedures shall be conducted as the installation progresses, as stipulated by the applicable regulations. Contractor shall provide all necessary labor and equipment for such tests.

3) All tests shall be witnessed by all interested agencies unless specifically waived by the agency in writing. Adequate advance notification shall be given in writing to all such parties.

4) All pressure testing and flushing shall be in accordance with NFPA-13 requirements.

5) All defects made evident by the tests shall be properly repaired by the Contractor. Leaks shall be repaired only by means of tightening or replacing the fitting and not resorting to any caulking method. Re-testing of repaired components shall be done.

C. Approvals

1) Submit shop drawings and hydraulic calculations to, and obtain approval from, State Department having jurisdiction, local government agencies and insurance carrier. After the above and prior to construction, the documents shall be submitted to the Architect for review (as required).

2) All devices and materials pertaining to all Fire Protection work shall bear the FM stamp of approval.

1.3 QUALITY ASSURANCE

A. Piping shall be installed per NFPA 13, state and local fire codes.

B. Testing of the piping shall be per NFPA 13.

C. Sprinkler heads shall be UL and FM listed and shall be located on spacing requirements as noted in NFPA 13 according to the hazard designation.

D. Backflow preventers shall meet the current requirements of ASSE 1015.

E. Dual check valve per ANSI/ASSE 1048, CSA B64.6 and UL/FM.

1.4 PERMITS

A. Permits required for fire protection installation shall be obtained and paid for by the Fire Protection Contractor.

1.5 GUARANTEE

A. Guarantee period shall begin on the date the system is placed in beneficial service to the Owner and continue for one (1) year.

1.6 DRAWING INTERPRETATION

A. The number and location of sprinkler heads shall be in accordance with FNPA 13 and FM.

B. The drawings are essentially diagrammatic, routing of pipe, riser and city main capacity shall be field verified.

C. Attention is called to the limited space available for the installation of mechanical services, it is essential for the coordination between all trades that this Contractor be responsible for confirming the location and elevations of his piping and equipment at the job site with other trades.

D. Drawings are not intended to be scaled for roughing in measurement or to serve as shop drawings, installation drawings or sleeve drawings. “Working Plans” for these purposes shall be prepared by this Contractor.

E. Extend coverage system design may be used if approved by state and local authorities.

2. PART 2 - PRODUCTS

2.1 Materials and Equipment

A. Pipe and Fittings

1) The pipe and tube shall be welded or seamless steel or copper as scheduled in table 30-1.1.1 and in accordance with paragraph 3.1 of NFPA-13.

2) Piping joined with threaded fittings or by couplings with pipe having cut grooves shall have a minimum of schedule 10 wall thickness for sizes less than 8″. See NFPA Section 2.5.1 for threaded joints and Section 2.5.5 for grooved joints. Underground piping shall have mechanical joints, and be installed as per NFPA 24.

3) Groove joining shall be done by an approved combination of couplings, gaskets and grooves. Grooves on pipe shall be dimensionally compatible with fittings.

4) Pipe and tube used in sprinkler systems shall be designed to withstand a working pressure of not less than 175 psi.

5) At contractor's option, a flexible connection may be used instead of hard-pipe arm over connection to sprinkler head.

B. Sprinkler System

1) Entire wet piping system, including riser and all components, shall be hydraulically calculated. Contractor may bid based on calculated sizes, but he shall be responsible for approval of his calculations.

2) The entire installation shall be in accordance with the latest edition of NFPA, and all state and local codes which shall be considered to be a part of these specifications. All work shall be subject to approval of the local fire department having jurisdiction and State of Ohio Fire Prevention Bureau.

3) All materials and devices shall be U.L. approved for the particular application.

C. Sprinkler Heads

1) Standard upright and/or pendant sprinklers, except where noted on the drawings or specified herein and where special purpose sprinklers, sprays or nozzles are required or dictated by the hazard to be protected. All such special sprinklers, sprays or nozzles shall be of a type specifically approved for such use.

2) Unfinished exposed spaces and mechanical spaces - brass heads.

3) Finished spaces with ceilings - concealed white head assemblies.

4) Finishes spaces in storage rooms and janitors closets - white pendent heads.

5) Corridors, locker/shower rooms, restrooms - concealed white head assemblies.

6) Temperature ratings shall be suited to the classification and hazard protected. This Contractor is directed to take note of all unit heaters and other heating equipment locations shown and/or called for on the drawings which may require higher temperature rated heads.

7) Furnish 20 gauge steel cabinets for containing spare sprinkler heads and wrenches.

8) Furnish spare sprinklers for all types and temperature ratings installed. One (1) wrench shall be provided for each type of sprinkler installed in riser room.

a) Provide spare sprinklers as follows

[1] Systems under 300 heads - 6 spares.
[2] Systems under 1000 heads - 12 spares.
[3] Systems over 1000 heads - 24 spares.

9) All heads shall be U.L. approved.

10) Equivalent product by Grinnell, Viking, Star, or Central may be furnished at the option of the Contractor.

D. Dual check valve shall have straight line poppet type check modules, replaceable seats, brass construction. Degree of hazard present is determined by the local authority having jurisdiction. The unit shall be a complete assembly including UL listed resilient seated OS&Y shutoff valves and test cocks. The unit shall be UI/FM approved with UL/FM approved OS&Y shutoff valves.

2.2 PROVISIONS

A. The provisions of the Instructions to Bidders, General Conditions, Supplementary Conditions, Alternates, Addenda and Division 01 are a part of this specification. Contractors and subcontracts shall examine same as well as other Divisions of the specifications which affect work under this Division.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Automatic sprinkler system shall be designed to protect all areas of the building.

B. Contractor shall calculate flow data and verify.

C. Installation of automatic sprinkler systems shall be subject to the review of Architect and subject to approval of Owner or his representative. Care shall be taken not to interfere with duct work, plumbing, heating and chilled water lines.

D. Drain lines, riser drain, alarm drain, inspector's test drain, low points, etc. shall terminate with turned down ells, and shall be so located the discharge water will not interfere with existing operations.

E. Locations of sprinkler heads shall be coordinated with ceiling grid pattern, lighting fixtures, columns, HVAC diffusers, mechanical equipment and other possible obstructions. In areas with drywall ceilings, sprinklers shall be positioned such that they are geometrically symmetrical in the space. In areas with finished ceilings, piping shall be concealed.

1) Automatic sprinklers shall be installed in the center of the ceiling tile with 1 inch variance allowed in either direction.

F. Piping shall be adequately supported by pipe clamps and hangers attached to structural members.

G. Hangers

1) Hangers shall comply with applicable NFPA standard for size, type, material and configuration. Special improvised supports or hangers must be approved by Architect prior to installation.

2) Powder actuated anchoring device shall not be permitted.

H. Pipe supports shall be adjustable or properly grouted to sustain full weight of support required.

I. Piping shall be coordinated with all other disciplines to avoid interferences.

J. Escutcheons shall be manufactured wall, ceiling, and floor plates, split-type, and of heavy chrome-plated construction. Omit in concealed locations.

K. Supervisory and water flow switches

1) Fire protection contractor shall provide fire alarm contactor (or those responsible for its design) with exact number, type, and location of valve supervisory switch and water flow switch being provided.

L. Acceptance Test

1) Appropriate tests and flushing procedures shall be conducted as installation progresses, as stipulated by applicable regulations. Contractor shall provide necessary labor and equipment for such tests.

2) Tests shall be witnessed by interested agencies, unless specifically waived by agency in writing. Two-week advance notification shall be given in writing to all such parties.

3) Leakage or performance deficiency evidenced by testing in excess of that allowed shall be repaired satisfactorily at Contractor's expense, by tightening or replacing fitting or equipment only. Caulking, wrapping or other means shall not be permitted.

4) After completion of testing and adjustments, Contractor shall furnish 3 copies each of signed certificates of approval or acceptance of all parts of the system(s), as appropriate, to Owner from authorities having jurisdiction.

M. Install double detector check valve in fire protection system main as shown on drawings.

N. Test backflow device and submit test data.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 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 sanitary drainage as shown on drawings.

2) Compressed air piping system.

3) Domestic hot water heating system.

4) All cold, hot water, gas piping and required insulation. All valves, fittings, hangers, sleeves, etc., required for installing the aforementioned piping.

5) All plumbing fixtures, and floor drains required as hereinafter specified and required to complete the aforementioned systems.

6) All excavation, bedding and backfilling required for the Plumbing work.

7) 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.

8) All test, inspections and permits.

2. PART 2 - PRODUCTS

2.1 BACKFILL DESCRIPTION

A. The bedding and backfill requirements listed in this Section represent a minimum requirement. If Local or State requirements are in excess of listed requirements, such requirements shall supersede.

B. ALL EXCAVATION AND BACKFILL WORK SHALL COMPLY WITH REQUIREMENTS OF THE LATEST STANDARDS OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA).

C. Provide excavation and backfilling for Plumbing Work. Backfill to finish grade or to levels suitable for finish grading.

D. Refer to Section 22 05 00 for cutting and patching responsibilities.

E. Coordinate routing of underground lines with the A/E to minimize disruption and damage to trees, shrubs, walks, drives, and other landscape features.

F. Excavation, backfill, surface repair and traffic control within the public right-of-way shall be in accordance with governing agency rules and regulations. Pay any fee

associated with alteration of the roadway.

G. Remove unusable or surplus excavated material from the site. Deposit any usable excavated material where directed by the A/E.

H. Locate and touch existing underground utilities, if any, in the areas of Work. If utilities are to remain in place, provide adequate means of protection during earthwork operations. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, notify the A/E immediately for instructions before proceeding. Cooperate with all trades, Utility Companies and the Owner in keeping services and the facilities in operation.

I. Excavation damage to, or interruption of service of, any underground utility shall be a liability of the Contractor, whether or not plotted on the Drawings. Promptly repair or replace all damage to any existing utility to the full satisfaction of the Utility Company, the Utility Owner and the A/E.

J. All existing utility service piping, conduits, wiring, etc., which are uncovered, whether within or beyond the property lines, shall be suitably supported, protected and maintained in operation, and shall be protected against settlement when excavations are refilled.

K. Coordinate timing of excavations where required by the Authority Having Jurisdiction or where otherwise specified herein.

L. Provide pipe bedding for all sanitary sewer lines located outside of building.

M. Provide pipe bedding for all sanitary sewer lines located below the floor slab.

N. Obtain approval from the A/E for bearing conditions.

O. Whenever, in the opinion of the A/E, the soil is unsuitable for supporting piping, provisions for proper foundations will be made and the Contract price will be adjusted accordingly.

P. Contact the A/E to obtain copies of Soils reports, if available. Bidders are strongly urged to visit the site and investigate existing soil conditions themselves.

Q. 11 months after Contract Completion, review the excavated areas and add any backfill as required due to settling, etc. Re-seed or re-sod as required.

R. Contractor shall provide seed grass cover to reestablish landscape to existing conditions where disturbed by its Work. This includes replacement of existing plants, shrubs, and related items.

S. Repair and restore plants, shrubs, trees, sodden areas, paving, streets, curbs, and walks to match existing in the area where excavations are made.

T. Maintain seeded lawns not less than 11 months after Contract Completion and add any backfill as required due to settling, etc. If seeded in non-growing season

and not given full 11 months of maintenance, or if not considered acceptable at that time, continue the following growing season until an acceptable lawn is established, as determined by the A/E.

U. Rock excavation is not anticipated. Contractor will be entitled to additional compensation for excavating any rock that is not indicated on the Contract Drawings or in available Soils Reports. Refer to available soil boring data.

1) If rock or boulders are encountered, immediately stop all excavation. Notify the A/E, and submit a cost per cubic yard, over and above Base Bid, for excavation and backfill of rock areas. Rock excavation is defined as the excavation of any buried boulders and rock, in excess of 1/2 cu. yd. in volume, which requires the systematic drilling with jackhammer or use of other special equipment.

2) All other excavation, including soft shale and similar sedimentary soil formations, shall be regarded as “earth” excavation, and shall be included in the Contractor’s Bid.

3) Do not proceed with rock excavation without prior written authorization of the A/E.

4) The use of explosives is expressly prohibited.

V. Provide concrete encasement required for underground piping. Where required, concrete encasement shall extend 6 in. around piping or sleeve, for 1 ft. each side of footings or foundations, and up to footing bearing elevation. Backfill around piping encasement after concrete has properly hardened.

1) All concrete shall be 3,000 PSI minimum and placed in accordance with applicable ACI Standards. Refer to Section 03 30 00.

2.2 Typical backfill conditions:

1) Piping where bedding is not specified or required by Code: Previously excavated material.
2) Piping below slab-on-grade floors and pavement: Crushed stone (ODOT Item 304), pea gravel, or coarse sand from 4 in. below piping to slab.
3) Other piping outside building: Pea gravel from 4 in. below piping to 12 in. minimum above pipe, then previously excavated material.
4) Piping under drives and parking lots: Pea gravel from 4 in. below piping to 12 in. minimum above pipe, then previously excavated material. If pipe is less than 2 ft. below grade to top of pipe, provide 6 in. concrete encasement.
5) Concrete pads and bases: Granular material conforming to Division 02 requirements.
6) Piping under footings and foundations: Provide concrete encasement.
7) Underground oil interceptor: Pea gravel.

B. Materials:
1) Crushed stone: (ODOT Item 304).

2) Pea gravel: 1/8 in. minimum to 3/4 in. maximum diameter.
3) Sand: Clean, dry, coarse or medium.
4) Washed gravel: 3/4 in. size.
5) Concrete encasement: Material conforming to Division 03 requirements.

C. Materials Prohibited from Being Used for Backfill:
1) Material containing large rocks (over 2 in.), building materials, masonry debris, cinders, rubbish, wood, or other material subject to decay.
2) Any material which may cause damage to piping.
3) Frozen earth.

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 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.

3.10 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 introduce into each line or stack. Defects discovered shall be eliminated by resetting the fixture and equipment with new gaskets.

E. Hot and Cold Domestic Water Services - Shall be tested as follows:

1) Upon completion of the roughing-in and before setting fixtures, the entire hot and cold water piping system shall be tested at a hydrostatic pressure of 1-1/2 times the actual working pressure but at less than 100 PSI gauge and proved tight at this pressure for not less than 30 minutes in order to permit inspection of all joints. Where a portion of the water piping system is to be concealed before completion, this portion shall be tested separately in a manner described for the entire system.

F. 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 total 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.

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

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 GUARANTEE

A. Contractor shall guarantee its equipment, workmanship, and materials for a period of (1) year from the date of Contract Completion. Should defects develop within this period, the Contractor shall, at no cost to the Owner, remedy the defects and reimburse the Owner for all damage to other Work caused either by the defects or as a result of the work of correcting the same.

B. Refer also to Division 01 and other Specification Sections that define the starting date of the guarantee period, or that discuss either additional warranty requirements, or extended equipment warranties beyond the standard period.

C. In Drywall, Masonry, or Concrete Wall Construction:

1) Option for above ceiling only: omit block(s) where required for penetrations, and shall provide square finished opening. Do not omit blocks under bearing points or in fire rated or smoke rated walls. Do not omit blocks in walls which serve as sound barriers.

2) Provide openings through metal building walls and roofs, and seal watertight.

D. In precast concrete work, in lieu of sleeves, cut holes after erection of concrete.

E. Sleeve where pipes pass exposed through walls, and where any piping passes through smoke- rated or fire-rated separations, equipment room walls, or above-grade floors.

F. If sleeves are not installed in construction, due to fault of the Contractor, holes through masonry or concrete construction shall be core drilled at the expense of the Contractor.

G. Sleeves are not required in floor slabs on grade or in core-drilled openings not requiring water- proofing or firestopping. EXCEPTION: Sleeves are required at core drilling through hollow core pre-cast slabs and through concrete block walls, to facilitate containment of required firestopping material.

H. Sleeving with absolutely watertight seal is required for piping passing through exterior walls above grade, and underground foundation walls and other below-grade penetrations into building.

2. PART 2 - PRODUCTS

2.1 DESIGN BASE MANUFACTURER STANDARD

A. The Drawings and Specifications are based on the specific equipment requirements and configuration for a Design Base Manufacturer. Design coordination of equipment with the building and with other Trades has been made for this specific Model and Manufacturer of equipment. Where several Manufacturers are listed for an item of equipment or material, the first-named shall be considered the Design Base Manufacturer Standard.

B. Consideration will not be given to any other Manufacturer that the Contractor proposes to use, unless the Manufacturer has been approved by the A/E and specifically named in the Contract Documents or Addenda theretoWelding filler

2.2 OTHER MANUFACTURERS

A. No consideration will be given to any Manufacturer which the Contractor proposes as an "Approved Equal," unless the Manufacturer has been approved by the A/E during the bid period and specifically named in the Contract Documents or Addenda thereto.

B. Recognizing that since no two Manufacturers are "identical," whenever the Contractor elects to furnish specified equipment or material manufactured by other than the Design Base Manufacturer, the Contractor shall be responsible for the cost and coordination of all modifications required to accommodate the elected equipment or material.

C. Where deemed necessary by the A/E, the Contractor shall, at no additional cost to the Owner, prepare new layouts for these other brands of equipment which may have different dimensional or service requirements from the Design Base Manufacturer Standard. Submit these layouts to the A/E for review.

D. Reimburse the A/E for the cost of any design changes incurred by the A/E in the preparation of revised Drawings or Specifications to accommodate the use of any Manufacturer other than the Design Base Manufacturer.

2.3 ALTERNATIVE MANUFACTURERS

A. Contractor shall submit information on any proposed equipment or material that it desires to use as an Approved Equal.

B. If the A/E determines an alternative Manufacturer to be acceptable, it will issue an Addendum adding that Manufacturer to the Specification.

2.4 EQUIPMENT SUITABILITY

A. All equipment provided shall perform as intended. All items listed shall function properly, and as the Manufacturer intended. Install equipment according to the Manufacturer's recommendations. Properly attach equipment to the floor, wall, or structure. Each item of equipment shall be compatible with all other accessories or hook-ups, including piping, controls, wiring, and other equipment that are not furnished by the equipment Manufacturer, but that are required as an accessory or modification, as necessary to achieve its intended function.

2.5 MISCELLANEOUS ACCESSORIES

A. Provide any additional adapters, fittings, trim, structural steel angles, channels, Unistrut, brackets, etc., as necessary to securely mount and install all items of equipment specified or shown on the Drawings. All steel installed outside or exposed to moisture shall be hot-dipped galvanized.

B. These accessories are required even though they may not be shown or detailed on the Drawings.

C. Installation shall be compatible with the building construction on which the item is to be located.

D. Verify the type of construction prior to ordering the equipment item, so that all required accessories are included.

2.6 QUANTITIES

A. Equipment may be referred to in these Specifications, or on the Drawings, as either singular or plural; the Contractor shall verify the exact number of items required to complete its Work.

B. No consideration will be given to any Manufacturer which the Contractor proposes as an “Approved Equal,” unless the Manufacturer has been approved by the A/E during the bid period and specifically named in the Contract Documents or Addenda thereto.

C. Recognizing that since no two Manufacturers are “identical,” whenever the Contractor elects to furnish specified equipment or material manufactured by other than the Design Base Manufacturer, the Contractor shall be responsible for the cost and coordination of all modifications required to accommodate the elected equipment or material.

D. Where deemed necessary by the A/E, the Contractor shall, at no additional cost to the Owner, prepare new layouts for these other brands of equipment which may have different dimensional or service requirements from the Design Base Manufacturer Standard. Submit these layouts to the A/E for review.

E. Reimburse the A/E for the cost of any design changes incurred by the A/E in the preparation of revised Drawings or Specifications to accommodate the use of any Manufacturer other than the Design Base Manufacturer.

2.7 STANDARD SLEEVES

A. Pipe sleeve material:

1) Up to 8 in. diameter: Machine-cut Schedule 40 black steel pipe.

2) Bare copper piping: Copper sleeves.

3) OPTION: In walls: Schedule 40 plastic pipe may be used for pipe sleeves,

except where adjacent ceiling space is used for return air plenum.

B. Sizing: Sleeves shall be large enough for insulation to be continuous, or for watertight or fire-rated sleeve seals to be installed. Size to allow 1/2 in. minimum clearance all around pipe or pipe insulation.

2.8 WATERTIGHT SLEEVE SEALS

A. Oakum Caulking: With lead-pour or elastomeric sealant. Elastomeric sealant shall be 2 component, polysulfide or polyurethane.
B. OPTION: Compression Seals: Stainless steel bolts and nuts. Provide correct size seal, and coordinate with sleeve size.
C. Provide sleeves with waterstop anchor flange at midpoint where penetrating structure at or below grade.

2.9 FIRE-RATED SLEEVE SEALS

A. ASTM E119 and E814 Silicone RTV foam, UL-approved.
B. Plastic drain, waste, and vent stacks, and lines penetrating fire-rated floors, ceilings, and walls shall be fire-blocked and waterproofed using ProSet Systems, Inc., Series 45 or 55 couplings and Series 90 Code Red Firestop devices. All other plastic drain openings, such as closet stubs, and floor drains, shall be fire-blocked and waterproofed using ProSet Systems C, and E Z Flex flexible couplings.

2.10 PAINTING OF PLUMBING SYSTEMS

A. Refer to Division 9 for painting specifics.
B. Plumbing systems shall be painted to match adjacent finishes.

3. PART 3 - EXECUTION

3.1 PLUMBING SYSTEMS - COMMON REQUIREMENTS

A. Install components with pressure rating equal to or greater than system operating pressure.

B. Install all piping at right angles or parallel to the building walls. Diagonal runs are prohibited.

C. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow 8” above removable ceiling panels to allow for panel and light removal.

D. Install all piping specialties to meet manufacturer’s requirements.

E. Maintain fire rating at fire wall penetrations through the use of approved fire sealant materials installed in pipe sleeve. See Section 07 84 00.

F. Install unions in piping 2 inch and smaller adjacent to each valve and at final connection to each piece of equipment.

G. Install flanges in piping 2-1/2 inch and larger adjacent to flanged valves and at final connections to equipment with flanged pipe connections.

H. PVC piping will not be acceptable in return air plenums.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to facilitate service, maintenance, and repair or replacement of components.

B. Maintain lubrication gaskets and packing during construction and assure that at time of acceptance by the Owner, equipment is in first-class operating condition.

3.3 DISINFECTING WATER LINES

A. All domestic water lines shall be tested and disinfected to meet local health agency requirements before being placed into service.

3.4 TESTING AND REPAIR

A. All piping systems shall be throughly cleaned and flushed prior to final testing.

B. Pressure testing shall be completed for the following piping systems:

1) Domestic hot and cold water.
2) Sewer, soil, and waste water.
3) Natural gas piping.
4) Compressed air piping.

C. All testing must be witnessed and accurately recorded noting methods of testing, times, dates, and results.

D. Any damage as a result of tests shall be repaired or damaged materials replaced at no cost to the Owner.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 DISCRIPTION

A. The following instructions apply to all piping systems, except where otherwise noted:

1. Piping Drawings are schematic. Carefully coordinate final locations.

2. Provide unions or flanges at each final connection and at each piece of equipment. Arrange piping, and locate unions and flanges, to permit easy removal of parts and equipment for inspection and cleaning. Welded connections to equipment are prohibited.

3. Where connection size is smaller than piping, make reduction at final connection only. Do not reduce size of pipe drop. Arrange all piping in accordance with the best standards of the Trade, with vertical lines plumb, and horizontal runs parallel or perpendicular to the building walls.

4. Provide valves and specialties as required. Install valves on each piece of equipment.

B. If other means of draining are not provided, install drain valves at all low points to permit complete draining of each of the following systems:

1. Domestic water system.

2. Compressed air system.

C. Contractor shall provide information on chases, sleeves, and openings required for its Work to other trades. Contractor shall assume cost and responsibility for all cutting and patching resulting from improper coordination of its Work.

2. PART 2 - PRODUCTS

2.1 UNIONS

A. In copper pipe: Bronze 150 lb. ground joint, solder end (do not use wrought copper unions).

B. In steel pipe: Black malleable iron, 250 lb. bronze ground ball joint.

C. Dielectric: Material shall be compatible for the type of service.

2.2 DRAIN VALVES

A. Drain Valves: Milwaukee BA 100H or BA150H. 3/4 in. bronze hose-end ball valve, with cap and chain (where concealed).

B. Other Acceptable Manufacturers: Approved equal by Walworth or Nibco.

2.3 JOINTS

A. Flanged: Cast iron or cast bronze, 125 lb. or higher as required.

A. Gaskets: Nonmetallic. 1/8 in. minimum thickness, fibrous type with double coat of graphite, asbestos-free, ASME B16.21, except use Type 304 stainless steel with carbon steel guide on high temperature piping systems. Use dielectric gaskets where joining dissimilar piping material.

B. Bolts and Other Hardware:

1. Bolts for steel, cast iron, brass, and bronze, for 250 lb. SWP, and for 450 deg. F. or below: Carbon steel, with American Standard regular, square heads and American Standard heavy-hexagon, semi-finished nuts.

2. Where equipment is installed outside, all hardware and bolts shall be stainless steel.

3. ASME B18.21, Tee head, high tensile steel bolts and nuts may be used in mechanical joint pipelines.

C. Threaded piping: Use NPT tapered threads. (ASME B1.20.1.)

D. Filler materials:

1. Solder: Shall meet ASTM B32. Alloy Sn94 and Sn95 shall be used
2. Brazing: Shall meet AWS A5.8
3. Welding: Shall comply with AWS D10.12.

E. Nipples:
1. Solder: Shall meet ASTM B32. Alloy Sn94 and Sn95 shall be used
2. Brazing: Shall meet AWS A5.8
3. Welding: Shall comply with AWS D10.12.

3. PART 3 - EXECUTION

3.1 PLUMBING SYSTEMS - COMMON REQUIREMENTS

A. Install components with pressure rating equal to or greater than system operating pressure.

B. Install all piping at right angles or parallel to the building walls. Diagonal runs are prohibited.

C. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow 8” above removable ceiling panels to allow for panel and light removal.

D. Install all piping specialties to meet manufacturer’s requirements.

E. Maintain fire rating at fire wall penetrations through the use of approved fire sealant materials installed in pipe sleeve.

F. Install unions in piping 2 inch and smaller adjacent to each valve and at final connection to each piece of equipment.

G. Install flanges in piping 2-1/2 inch and larger adjacent to flanged valves and at final connections to equipment with flanged pipe connections.

H. PVC piping will not be acceptable in return air plenums.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to facilitate service, maintenance, and repair or replacement of components.

B. Maintain lubrication gaskets and packing during construction and assure that at time of acceptance by the Owner, equipment is in first-class operating condition.

3.3 DISINFECTING WATER LINES

A. All domestic water lines shall be tested and disinfected to meet local health agency requirements before being placed into service.

3.4 TESTING AND REPAIR

A. All piping systems shall be throughly cleaned and flushed prior to final testing.

B. Pressure testing shall be completed for the following piping systems:

1) Domestic hot and cold water.
2) Sewer, soil, and waste water.
3) Natural gas piping.
4) Compressed air piping.

C. All testing must be witnessed and accurately recorded noting methods of testing, times, dates, and results.

D. Any damage as a result of tests shall be repaired or damaged materials replaced at no cost to the Owner.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Valves

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. American National Standards Institute (ANSI).
B. American Society for Testing and Materials (ASTM).
C. American Society of Mechanical Engineers (ASME).
D. American Society of Sanitary Engineers (ASSE).
E. Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).

1.2 MANUFACTURERS

A. Nibco, Crane, Milwaukee or Watts
B. Valve shall be of the same manufacturer throughout project.

2. PART 2 - PRODUCTS

2.1 COMPONENTS

A. BALANCING VALVES (2 IN. AND SMALLER)

1) 200 PSIG, ASTM B-62 bronze body/brass ball, threaded or solder joint ends, differential pressure read-out ports, 1/4 in. drain port, memory stop feature to allow valve to be closed for service and reopened to setpoint without disturbing balance position, and calibrated nameplates to ensure specific valve settings.

2) Acceptable Manufacturers: ITT Bell & Gossett CB Series, Nibco Fig. 1710, or Taco ACUF Series.

B. BALL VALVES (3 IN. AND SMALLER)

1) 150 lb. SWP, bronze body, threaded or solder joint ends, TFE seat and seals, stainless steel ball, blow-out-proof stem, extended handle with vapor seal, adjustable memory stop, and protective sleeve.

a) ONLY Acceptable Ball Valve Manufacturers: Milwaukee Model BA-100 or BA-150 or approved equal by Watts No. B-6000 or B-6001, Apollo 70-100 or 70-200, Hammond 8501 or 8511, Nibco 580-70 or 585-70, or Kitz 68 or 69.

2) With Lockable Handles: 150 lb. SWP, bronze body, threaded ends, TFE seat and seals, stainless steel ball, extended handle with vapor seal, adjustable memory stop, and protective sleeve.

b) Acceptable Manufacturers of ball valves with lockable handles: Milwaukee Model BA-100 LD, Apollo No. 70-100-27, or Nibco 580-70-LH.

C. CHECK VALVES

1) 2 in. and Smaller: Milwaukee Fig. 509 or 1509. 125 lb. SWP, ASTM B-62 bronze body, swing check, threaded or solder joint tubing ends, with renewable bronze disc and integral seat.

2) 2-1/2 in. and Larger (swing): Milwaukee Fig. F-2974. 125 lb. SWP, iron body, bronze trim, with flanged ends.

D. DRAIN VALVES

1) A. Milwaukee Fig. BA-100H or BA-150H (threaded or soldered ends). 3/4 in. bronze hose end ball valve, with cap and chain.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all threaded valves with a union joint on the downstream side of the valve.

B. Provide valves to isolate all equipment in accessible locations

C. Provide valves of like material as the piping systems.

D. Provide dielectric connections between all dissimilar metals.

E. No valve shall be installed with stem pointing down below the horizontal without the approval of the Architect.

F. Name of manufacturer together with the service and pressure markings shall be cast in the body.

G. Fixture stops shall be provided with each fixture and/or piece of equipment. Fixture stops shall be key-operated stops; except for fixture stops for flush valves, which shall be screwdriver stops with protective caps. Groups of fixtures shall be exposed.

◆ END OF SECTION ◆

1. **PART 1 - GENERAL**

1.1 SECTION INCLUDES

A. Hangers, supports, and concrete inserts required for piping and equipment installed under Division 22 00 00.

1) Use corrosion-resistant products in Wash bay

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. All piping supports and parts shall conform to the latest requirements of the Code for Power Piping 9ANSI B31.1 and MSS Standard Practice SP-58 and SP-69.

1.4 MANUFACTURERS

A. Grinnell, Mason, or Kinetics

2. **PART 2 - PRODUCTS**

2.1 HANGERS

A. Insulated Piping:

1) Steel or Copper

a) All sizes: Grinnell Fig. 260, adjustable clevis, carbon steel yoke, U-strap, bolt and hex nuts.

b) Hanger size must be sufficient to accommodate pipe without compressing the insulation.

c) All hangers shall be external of insulation.

2.2 SPRING HANGERS

A. Light duty (250 lb. Max): Grinnell Fig. 247, all-welded construction, enclosed spring.

B. Grinnell Fig. B268, Type A or B, adjustable pre-compressed variable spring, steel construction.

2.3 TRAPEZE HANGERS

A. Unistrut or angle iron of sufficient length to support pipes and insulation on individual hangers, roller supports or saddles with insulation protectors; trapeze hanger rod diameter and quantity as required to support total piping load.

2.4 SUPPORTS

A. Pipe hanger rod sizes shall be 3/8".

B. Beam Clamps

1) Grinnell Fig. 227, top beam clamp, steel jaw, hook rod with nut and spring washer steel eye-bolt.

2) “C” Clamps: Grinnell Figs. 87, 92, 93, or 94, malleable iron body, steel pointed set screw with lock nut and retainer strap. Beam clasps by themselves (C-clamps) are expressly prohibited. Provide retainer straps with all beam (C-Clamps).

3) Consult with MSS SP-58 and SP-69 for C-Clamp identification.

4) Grinnell Fig. 60 steel washer plate and double nutted is used with threaded rod.

5) Wall brackets: Grinnell Fig. 194 (light weight 750 lb. Load) or Fig. 195 (medium weight 1500 lb. Load), carbon steel, back plates and bolts.

2.5 INSERTS

A. In concrete: Grinnell Type CB, Fig. 282, universal mounting, malleable iron construction, lateral adjusting.

B. In precast concrete (2-inch pipe maximum): Grinnell Fig. 117, expansion case, interior standard pipe threads, external helical wedge, malleable iron construction.

3. **PART 3 - EXECUTION**

3.1 PIPING INSTALLATION

A. Install necessary pipe hangers and supports to properly support all piping and to maintain piping uniformly level (3/4" maximum deflection). Hangers to be double nutted.

B. Maximum spacing of piping supports to be as follows:

PIPE SIZE	STEEL PIPE	COPPER PIPE
3/4" or smaller	7'	5'
1"	7'	6'

C. Install wall brackets where required.

D. Support piping at equipment from floor, structure or walls, so that piping weight is not supported by equipment.

3.2 GENERAL INFORMATION

A. Ceiling grid system shall not be used to support ductwork, electrical conduit, heating lines or any other utility lines. Each utility and the ceiling grid system shall be a

separate installation and each shall be independently supported from the building structure. Where interferences occur, in order to support ductwork or piping, the Contractor must install trapeze type hangers or supports which shall be located where they do not interfere with access to fire dampers, valves, and other mechanical equipment items.

B. Where necessary, the Contractor shall furnish and install proper angles or channels between joists for hanger supports. Weld to steel structural members.

C. Avoid cutting concrete or masonry by using inserts. Use top flange beam clips to avoid burning metal deck.

D. Furnish and install any intermediate supporting steel or supports, foundations, and concrete pads required for proper support of all piping and equipment.

◆ END OF SECTION ◆

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

1.1 SECTION INCLUDES

A. Mechanical identification methods, materials and devices.

1.2 DESCRIPTION

A. Identify by labels and tags the following items:

1) Equipment such as pumps and similar items.
2) Piping exposed in accessible service areas.
3) Piping running above accessible ceiling construction.
4) All valves.

B. Install laminated plastic nameplates for equipment, color banding, flow arrows and contents identification for piping.

1.3 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions for identification systems.

B. Submittals are required of valve schedules.

1.4 QUALITY ASSURANCE

A. Identification requirements shall meet ASME A13.1.

1.5 MANUFACTURERS

A. Seton, Brady or MSI

2. **PART 2 - PRODUCTS**

2.1 EQUIPMENT NAMEPLATES

A. Stencils: Standard stencils shall be black enamel on a white background or white enamel on a dark background.

2.2 PIPE IDENTIFICATION

A. Pressure-Sensitive Pipe Markers: Preprinted, color-coded, vinyl type with permanent adhesive.

B. Pipe Markers: Full band type.

C. Plastic Tape: Color-coded, pressure-sensitive, self-adhesive vinyl.

D. Any piping identification that becomes loose or falls off piping during warranty period shall be replaced by installing contractor.

2.3 VALVE IDENTIFICATION

A. 2 inches diameter, 16 gauge, brass tag with brass chain. ¼" high stamped letters over ½" high stamped numbers, both black-filled.

B. Concealed valve locations shall be indicated by color coded tags adhered to the ceiling T-bars.

2.4 PIPING IDENTIFICATION

PIPING IDENTIFICATION	
Stencil	Tag
Dom. Cold Water Dom. Hot Water Dom. Hot Water Ret.	D.C.W. D.H.W. D.H.W.R.
San. Sewer	SAN.
Fire Wat. Sup.	F.W.S.
Fire Risers	Zone served
Nat. Gas	N.G.
Comp. Air	C.A.

2.5 VALVE CHARTS

A. Valve charts shall be furnished by this contractor and shall include the following items:

1) Valve identification
2) Location
3) Purpose
4) Color coded tag legend

B. Valve charts shall be included in the Maintenance and Operating Manuals.

3. **PART 3 EXECUTION**

3.1 INSTALLATION

A. Piping, equipment and valve identification shall be completed prior to above ceiling inspection.

B. Equipment tags shall be attached with screws, except where screws might damage equipment or ductwork, use compatible adhesive.

C. Apply piping identification only after finish painting is completed.

D. Provide service designations, flow arrow around color banding at 25-foot maximum intervals.

E. Identify piping at connections to equipment, at valves, at branches from main, at each riser and at both sides of wall or barrier through which pipe passes.

F. Contractor shall clean piping insulation in area of labeling just prior to labeling of pipe insulation.

G. Labels must be readable from a standing position.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 DESCRIPTION

A. Insulate the following items:

1) Domestic cold water supply, domestic hot water supply and return piping, regardless of length or location.

2) Domestic water supply and waste pipe under all lavatories and sink fixtures accessible to the handicapped.

3) All sanitary vent piping within 10 ft. of an exterior wall or roof penetration.

B. All exposed insulated piping and fittings, from floor up to 7 ft.-6 in. above floor, shall have a PVC cover applied over pipe insulation and solvent welded together. Material shall be same as PVC fitting covers.

1.1 MANUFACTURERS

A. Owens Corning Fiberglas or approved equal by Schuller, Certainteed, Johns Manville, Armstrong, Rubatex, Imcoa, Manson, or Knauf.

B. Manufacturer and Model Number listed under Part 2 shall be considered to be the Design Base Manufacturer and Model Number. Other Acceptable Manufacturers will be permitted, unless specifically excluded.

2. PART 2 - PRODUCTS

2.1 PIPE INSULATION

A. Indoor Piping: Owens Corning Fiberglas 25 ASJ/SSL/II. 1 piece, heavy duty, fiberglass insulation with all-purpose vapor barrier jacket of white kraft bonded to aluminum foil and reinforced with fiberglass yarn, longitudinal pressure-sensitive tape for sealing of lap joint, 0 deg. F. to 800 deg. F. temperature rating. Insulation thicknesses:

1) Domestic cold water, electric water cooler waste trap, above ground waste and vent, and above ground trap primer piping:

a) 1 in. and smaller: 1/2 in. thick, minimum.

b) 1 1/4 in. and larger: 1 in. thick, minimum.

c) OPTION: 3/4 in. thick fire-rated Armaflex may be used in walls (not in chases).

2) Below-ground trap primer piping: 3/4 in. thick fire-rated Armaflex.

3) Domestic hot water and domestic hot water recirculating piping: 1-1/2 in. and smaller: 1 in. thick, minimum

B. In-Wall Piping Domestic Hot Water Pipe: Closed cell, foamed plastic, tubular, 1/2 in. minimum wall thickness, fire-rated, 220 deg. F. temperature rating. Pipe and joints shall be sealed with Manufacturer's approved adhesive.

1) Acceptable Manufacturers: Armstrong fire-rated "Armaflex," Rubatex, or Imcoa.
2) OPTION: Indoor pipe insulation, listed in Paragraph A above, may be used in walls.

C. Pipe Fittings:

1) Insulation: Owens Corning TIW 1. Wrapped 1 lb. density fiberglass blanket with reinforced foil and kraft vapor barrier facing or molded fiberglass segments with pre-molded, 1 piece PVC plastic covers. Wrapped fiberglass blanket shall be installed to same thickness as pipe insulation.

2) Fitting insulation covers: Pre-molded, 1 piece PVC plastic covers, with maximum 25 Flame Spread and 50 Smoke Developed ratings. Shall be listed and certified for installation in ceiling plenum spaces.

a) Acceptable Manufacturers: Ceelco, Johns Manville, Knauf, Speedline, or Proco.

D. Lavatories Accessible to Handicapped: This applies to P trap and hot and cold water supplies for handicapped lavatories and other lavatories in toilet rooms accessible to the handicapped.

1) Offset P traps and angle stop/supply assemblies shall be insulated with smooth, abrasion- resistant vinyl plastisol exterior cover with 1/8 in. minimum thickness over cushioned foam insert. Attach pipe covering with nylon tie fasteners. Nylon tie fasteners shall remain substantially out of sight.

2) Acceptable Manufacturers: Brocar Trap Wrap Protective Kit 500R, McQuire ProWrap, Truebro Lav Guard, or Plumberex Pro Series.

2.2 PVC JACKET OVER PIPE INSULATION

A. PVC jacket, 1 piece, solvent weld joints.

2.3 MASTICS, ADHESIVES, AND FINISHES

A. Mastics, adhesives, and finishes shall be approved for their intended use by the Ins ulation Manufacturers.

B. Acceptable Manufacturers: Benjamin Foster, Vimasco, ICC, or Aerobol.

C. Vegetable or wheat paste is prohibited.

2.4 PIPE-INSULATING SUPPORT

A. Piping 1 1/2 in. and Smaller: Provide 12 in. long, 18 ga. galvanized or stainless steel sheet metal half round piping shield inside clevis hanger.

B. Piping 2 in. and Larger: Pre-compressed fiberglass load-bearing segment, integral fire-retardant vapor barrier jacket and saddle.

2.5 Acceptable Manufacturers: Insul Coustic Co., Insul Shield, or Pipe Shield, Inc

3. **PART 3 - EXECUTION**

3.1 EXAMINATION AND PREPARATION

A. Leak test piping system before installing insulation systems.

3.2 INSTALLATION

A. Install material in accordance with manufacturer's recommendations, in conformance with building codes and industry standards and "commercial and Industrial Insulation Standards."

B. Do not insulate systems or equipment which are specified to be pressure tested or inspected, until testing, inspection and any necessary repairs have been successfully completed.

C. Install insulation with smooth and even surfaces. Poorly fitted joints or use of filler in voids will not be accepted. Cover and seal exposed fiberglass insulation when insulation is terminated, no raw fiberglass insulation is allowed. Provide neat and coated terminations at all nameplates, uninsulated fittings, or at other locations where insulation terminates. Install with longitudinal joints facing wall or ceiling.

D. Install fabric reinforcing without wrinkles. Overlap seams a minimum of 2 inches.

E. Use full-length material (as delivered from manufacturer) wherever possible. Scrap piecing of insulation or pieces cut undersize and stretched to fit will not be accepted.

F. Insulation shall be continuous through sleeves and openings. Vapor barriers shall be maintained continuous through all penetrations.

3.3 PIPING, VALVE, AND FITTING INSULATION

A. GENERAL:

1) Install insulation with butt joints and longitudinal seams closed tightly. Provide minimum 2" lap on jacket seams and 2" tape on butt joints, firmly cemented with lap adhesive. Additionally secure with staples along seams and butt joints. Coat staples with vapor barrier mastic on systems requiring vapor barrier.

2) Water supply piping insulation shall be continuous throughout the building and installed adjacent to and within building walls to a point directly behind the fixture that is being supplied.

3) Install insulation continuous through pipe hangers and supports with hangers and supports on the exterior of insulation. Where a vapor barrier is not

required, hangers and supports may be attached directly to piping with insulation completely covering hanger or support and jacket sealed at support rod penetration. Where riser clamps are required to be attached directly to piping requiring vapor barrier, extend insulation and vapor barrier jacketing/coating around riser clamp

B. INSULATION INSERTS AND PIPE SHIELDS:

1) Provide insulation inserts and pipe shields at all hanger and support locations. Inserts may be omitted on 3/4” and smaller copper piping provided 12” long 24 gauge pipe shields are used.

C. FITTINGS AND VALVES:

1) Fittings, valves, unions, flanges, couplings and specialties may be insulated with factory molded or built up insulation of the same thickness as adjoining insulation. Cover insulation with fabric reinforcing and mastic or where temperatures do not exceed 150 degrees, PVC fitting covers. Secure PVC fitting covers with tack fasteners and 1-1/2” band of mastic over ends, throat, seams or penetrations. On systems requiring vapor barrier, use vapor barrier mastic.
2) The contractor to provide extensions for valve handles to accommodate insulation thickness.

D. PROTECTIVE JACKETS:

1) In addition to insulation jacketing and fitting covers specified above, install PVC jacket over all exposed insulation below 7 ft.-6 in. above floor. Jacket shall have overlapping joints and shall be sealed with suitable adhesive. Butt joints shall be sealed with matching 3 in. wide ASJ pressure sensitive tape.

◆ END OF SECTION ◆

SECTION 22 11 16

DOMESTIC WATER PIPING

1. **PART 1 - GENERAL**

1.1 SECTION INCLUDES

A. Domestic water 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. Welding procedures per ANSI/ASME Section 9, AWS D10.9 and D1.1 and the National Certified Pipe Welding Bureau.

C. Brazing procedures per ANSI B31.5 and the ASME Boiler and Pressure Vessel Code SFA-5.8, Section II.

D. Soldering procedures per ANSI B16.18.

E. Comply with ANSI B31 pressure code for pressure piping.

2. **PART 2 - PRODUCTS**

2.1 PLUMBING PIPING

A. Above ground domestic water piping (hot water, cold water, hot water return) shall be type 'L' copper conforming to ASTM B88. Fittings shall be wrought copper conforming to ASTM B16.22.

1) Grooved copper piping with ductile iron or bronze couplings and EPDM gasket may be used as an option.

2) Copper press fittings may be used as an option per ASTM B16.18 or ASTM B16.22. O-Rings shall be EPDM.

B. Below slab domestic water piping (cold water) shall be type 'k' copper, no couplings, wrap pipes with two layers of PVC adhesive-backed pipe wrap tape. Overlap each turn on tape 50 percent and wrap second layer on opposite angle from the first layer.

3. **PART 3 - EXECUTION**

3.1 ARRANGEMENT AND ALIGNMENT OF PIPING

A. In general, all piping shall be concealed in walls, furred spaces, pipe spaces, tunnels, or above suspended ceilings. Piping shall be installed parallel to building walls and at such heights as not to obstruct any portion of windows, doorways, stairways, pipe, tunnel or passageways. Where interferences develop in the field, pipe shall be offset or routed as required to clear such interferences. In all cases, consult architectural details before installing piping.

B. All piping located in pipe spaces must be located so as to insure maximum accessibility.

C. 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.

D. Piping shall be carefully installed to provide proper alignment, slope and expansion. Provisions shall be made to allow for expansion and contraction, pipe shall be guided and supported in such a manner that pipe lines shall not creep, sag, or buckle. Anchors and supports shall be provided wherever necessary to prevent misalignment of piping.

E. 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.

F. All exposed connections and run-outs to plumbing fixtures shall be brass pipe I.P. size, heavily chromium plated and polished.

G. No piping shall be run over or within three (3) feet of electrical panels or switch gear.

3.2 MECHANICAL COUPLINGS

A. Mechanical couplings shall be limited to steel pipe with wall thickness equivalent to schedule 40 or greater.

3.3 EXPANSION

A. All piping shall be installed throughout the project with due regard for expansion to prevent damage to the building, equipment and piping. Provide anchors, loops or approved type expansion where indicated or required for accurate control of movement.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 GENERAL

A. Provide plumbing piping specialties or accessories as shown or required to complete the installation of all plumbing systems installed on this Project.

1.2 SUBMITTALS

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

2. PART 2 - PRODUCTS

2.1 THERMOMETERS

A. Trerice “Industrial Type.” Blue reading, organic liquid, 9 in. scale, cast aluminum, epoxy powder-coated case, front double-strength window, straight or adjustable angle pattern, brass separable well, range of 30 deg. F. to 180 deg. F. Provide insulation extension.

B. Other Acceptable Manufacturers: Approved equal by Weiss, Ashcroft, Marsh, Weksler, Winters, or Marshalltown.

2.2 BACKFLOW PREVENTERS

A. Watts Series 909M1QT-S. Reduced pressure dual checks, inlet and outlet bronze ball valves, with strainer, air gap drain funnel, line size.

B. Other Acceptable Manufacturers: Approved equal by Ames Co., CMB Industries, Febco Backflow Preventers, Hersey Products, Conbraco Industries, or Watts Regulator Co.

C. Backflow Preventer Manufacturer and Model shall be on the list of accepted equipment published by the U. S. Public Health Service.

D. Note: Before ordering, obtain approval from the Local Water Utility for the specific type and model of backflow preventer to be used.

E. Backflow preventers shall be serviceable without requiring removal from piping.

F. Backflow preventers shall have a permanently attached plate indicating type and listing approvals.

G. Provide ball valve ahead of strainer on inlet side of backflow preventer assembly.

2.3 SHOCK ABSORBERS

A. Wade “Shokstops.” (ASSE Standard 1010, PDI-WH201) shock absorbers (water hammer arresters). Sizes as shown on the Drawings.

B. SA-A: 3/4 in. pipe. ([1] to [11] fixture units.)

C. SA-B: 1 in. pipe. ([12] to [32] fixture units.)

D. SA-C: 1 in. pipe. ([33] to [60] fixture units.)

E. Other Acceptable Manufacturers: Approved equal by Zurn, J. R. Smith.

F. Provide shock absorbers at all locations as required to reduce water hammer.

2.4 STRAINERS

A. Watts Model 777S. 1/2 in. to 3 in., Y-pattern, bronze body, threaded, #20 mesh stainless steel screen, 200 PSI WOG.

B. Other Acceptable Manufacturers: Approved equal by Spirax/Sarco, Armstrong, or Hoffman.

2.5 PRESSURE GAUGES

A. Weiss 4PGA-1. Standard single Bourdon tube, black die cast aluminum case, 4-1/2 in. diameter dial, chrome removable slip ring, gauge cock and pigtail, ±1% accuracy. Range shall be approximately 50% in excess of maximum pressure anticipated. Provide gauge cock.

B. Other Acceptable Manufacturers: Approved equal by Trerice, Marsh, Weksler, Marshalltown, or Ashcroft.

C. Provide spare gauge.

2.6 BUILDING DOMESTIC HOT WATER TEMPERING VALVE

A. Based on Lawler 801 high low water mixer - 50 GPM at 45 psi drop with 3/4” inlet and 1” outlet.

B. Domestic hot water anti-scald thermostatic mixing control valve unit shall include swivel action check stops, removable cartridge with strainer, stainless steel piston, liquid fill thermal motor with bellows element mounted out of water and rough bronze finish.

C. The mixing valve shall control the domestic hot water temperature distributed throughout the building.

D. The mixing valve shall have a thermostatic sensing unit. The mixing valve shall fail to the cold water side.

E. Based on Power’s #ES200 - 45 GPM at 45 psi drop with 3/4” inlet and 1” outlet.

2.7 EMERGENCY EYEWASH TEMPERING VALVE

A. Thermostatic mixing valve for supplying tepid water to emergency fixtures shall have a powerful paraffin filled temperature element, with dual internal cold water by-pass to ensure flow in the event of valve failure or loss of hot water supply. The valve

shall provide precise temperature control over a wide range off low conditions. By-Pass shall respond to changes in temperature and pressure.

B. Based on Speakman SE-370 - 1/2” inlet and 1/2” outlet.

2.8 RECIRCULATION PUMP

A. The basis of design pump is ITT Bell & Gossett NFB series with a capacity of 3.3 GPM at 16 feet of head. Pumps to be suitable for 225°F operating temperature at 150 psig working pressure. The pump’s shall be of the horizontal, permanently lubricated type, specifically designed and guaranteed for quiet operation.

B. The pumps shall have a ceramic shaft supported by carbon bearings. Bearings are to be lubricated by the circulating fluid. Pump body shall be lead-free bronze for NBF circulators. Motor stator to be isolated from circulating fluid through use of stainless steel can. Rotor to be sheathed in stainless steel. Motors shall be non-overloading at any point on the pump curve. All other motors to have built-in impedance protection.

C. The motor shall be non-overloading at any point on the pump performance curve. The motor shall be 1/6 hp, 120 V and 1 phase.

D. Pump shall cycle per combo aquastat and timer

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Install each thermometer and pressure gauge so they may be read from floor.

B. Provide pressure gauges at the following locations at inlet and outlet of the main reduced pressure backflow preventer

C. Provide thermometer on the piping at water heater, on inlet and outlet of mixing valves, and on hot water recirculating pump suction line, where shown on Drawings.

D. Install wall hydrants flush and level with building wall and generally 24 in. above finished grade. Confirm exact height with the Associate Architect.

E. All products of the same type shall be by the same Manufacturer.

F. Provide continuous back pressure type vacuum breakers on all lines to hose bibbs if not furnished with integral vacuum breaker.

G. Provide shut-off valve ahead of each strainer and backflow preventer.

H. Provide drain valve on each strainer drain. Extend to nearest floor drain.

I. Provide ball valve on inlet and outlet connection of inlet connection to each hose bibb.

J. Locate equipment backflow preventers below ceilings in area where spillage of water will not cause damage.

K. Install backflow preventer at an accessible height

L. After installation of backflow preventer, flush water supply line to remove debris. Clean out backflow preventer after flushing.

M. Test backflow preventer at time of installation. A person or firm certified by the Ohio Department of Health shall perform the test and provide the testing equipment. Submit test report to the Associate Architect.

N. Discharge from each reduced pressure backflow preventer shall have an open air gap. Indirect waste full size to nearest floor drain using steel or copper piping.

O. Install ball valves and check valves on mixing valve inlets, if not integral.

◆ END OF SECTION ◆

SECTION 22 11 24

NATURAL GAS PIPING

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Natural Gas Piping.
B. Gas Valves.
C. Gas Regulators.

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.

D. Gas regulators shall be AGA rated.

2. PART 2 - PRODUCTS

2.1 GAS PIPING

A. Columbia Gas installs customer service line, meter setting, regulator & meter. PC to install from outlet of meters.

B. Gas piping below grade shall be PE 2406.

C. 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

B. Gas valves 2-1/2 inches and larger shall be semi-steel, straightway flanged, 125 pounds swp, square head wrench operated, lubricated plug valve.

2.3 GAS REGULATORS

A. Interior: CSA approved ventless line regulator supplied with a brass vent limiter. For proper operation the regulator shall be installed on a horizontal pipe with the vent limiter in a vertical position pointing upwards

B. Exterior: Gas regulators shall be die cast aluminum alloy diaphragm, external vent connection, interchangeable brass orifices, cast iron body, Buna-N with nylon fabric insert diaphragm.

C. (ANSI Z21.18) Sensus. Relief valve and zero governor. Size and capacity as required by equipment.

D. Other Acceptable Manufacturers: American, Emro, or Sprague

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. All concealed piping shall be welded.

B. Piping 1-1/2" inches and smaller shall have threaded joints.

C. Piping 2 inches and larger shall have welded joints.

D. Provide a valve, union, and dirt leg at connection to each appliance. Lubricate all valves before putting the valves into service.

E. Test all piping for 24 hours at 100 psi.

A. Provide approved flexible connectors for radiant heaters, back-up generator, and each furnace.

B. Provide equipment gas regulators, if needed, past the shut-off valve.

C. Provide a valve, union, and dirt leg at connection to each appliance. Lubricate all valves before putting the valves into service.

D. Provide 1/2 inch elastomeric insulation around all piping in walls and through floors.

◆ END OF SECTION ◆

SECTION 22 13 16

SANITARY WASTE AND VENT PIPING

1. **PART 1 - GENERAL**

1.1 SECTION INCLUDES

A. Sanitary waste and vent piping.

A.

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 and storm 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

B. Sanitary and storm piping above finish floor.

1) Schedule 40 PVC with solvent joints per ASTM D2665, D2564, D2665.

2) Cast iron no hub and fittings per ASTM.

C. Indirect wastes not connected to the sanitary shall be extended to drip into a nearby floor drain.

1) Copper Tubing

D. Cleanouts: Floor cleanout, heavy duty cleanout with round scoriated C.I. non-tilt top, adjustable to finished floor, cast iron body, spigot outlet connection, brass plug with tapered head, adjustable housing. Provide with polished bronze cover for all floors without carpeting. Provide with carpet markers for carpeted floors. Wall cleanouts shall be concealed inside the wall with a polished chrome or stainless steel plate wall cover.

1) Heavy duty cleanout with round scoriated C.I. non-tilt top, adjustable to Fin. Grade. Set in 1'-0" x 1'-0" concrete pad.

3. **PART 3 - EXECUTION**

3.1 ARRANGEMENT AND ALIGNMENT OF PIPING

A. In general, all piping shall be concealed in walls, furred spaces, pipe spaces, tunnels, or above suspended ceilings. Piping shall be installed parallel to building walls and at such heights as not to obstruct any portion of windows, doorways, stairways, pipe, tunnel or passageways. Where interferences develop in the field, pipe shall be offset or routed as required to clear such interferences. In all cases, consult architectural details before installing piping.

B. All piping located in pipe spaces must be located so as to insure maximum accessibility.

C. 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.

D. Piping shall be carefully installed to provide proper alignment, slope and expansion. Provisions shall be made to allow for expansion and contraction, pipe shall be guided and supported in such a manner that pipe lines shall not creep, sag, or buckle. Anchors and supports shall be provided wherever necessary to prevent misalignment of piping.

E. 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.

F. All exposed connections and run-outs to plumbing fixtures shall be brass pipe I.P. size, heavily chromium plated and polished.

G. No piping shall be run over or within three (3) feet of electrical panels or switch gear.

H. Terminate vent piping through roof, a minimum of twelve (12) inches above the roof. Paint to match roof color. Insulate to 3'-0" of roof.

I. Location of vent on the roof shall be a minimum of twenty (20) feet away from rooftop or wall louver outside air intake or rooftop HVAC equipment outside air intake.

◆ END OF SECTION ◆

SECTION 22 15 00

COMPRESSED AIR SYSTEMS

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Provide a complete air distribution system, including outlets, piping, and specialties.

1) Confirm exact distribution air pressure with the Owner.

2) Provide shut-off valve and quick disconnects on airline drops where shown on Drawings.

3) Confirm exact location of air drops, configurations, valve locations, and quick disconnect size and type with the Owner before installation

1.1 SUBMITTALS

A. Submittals are required and shall include product data noting capacities at the specified conditions, materials, sizes, and dimensions.

1.2 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 PIPING

A. Type "L" hard drawn copper tubing with wrought copper fittings (ASTM B88). **OPTION:** "T-Drill" mechanically formed connections, brazed joints.

B. Schedule 40 black steel (ASTM A53CW): 2 in. and smaller: 150 lb. malleable iron threaded fittings (ASTM A47).

2.2 SOLDER AND BRAZING ALLOYS

A. Type "L" hard drawn copper tubing with wrought copper fittings (ASTM B88). **OPTION:** "T-Drill" mechanically formed connections, brazed joints.

B. Solder: 95-5 Tin-Antimony (ASTM B32).

C. Copper Brazing Alloys: Silver/phosphorus or silver/zinc alloys having a melting point greater than 1,000 deg. F. (ANSI B 31.1).

1) Sil-Fos filler as manufactured by Handy Harmon.

2) Aircosil filler as manufactured by Airco Welding Products.

3) Stay-Silv filler as manufactured by Harris.

2.3 VALVES

A. Ball Valves, 2 in. and smaller: Milwaukee “Butterball” Model BB2-100 or BB2-350. 150 lb. SWP, bronze body, Viton seat, threaded or solder joint ends, full port, stainless steel disc and stem, and lever handle.

B. Check Valves, 2 in. and smaller: Nibco No. T-413 or S-413. 200 lb. WOG, bronze body, horizontal swing, and threaded or solder joint ends.

C. Other Acceptable Manufacturers: Approved equal by Nibco, Jenkins, Apollo, Keystone, Powell, Crane, Lunkenheimer, Milwaukee, Walworth, or Watts.

D. Each type valve shall be by same Manufacturer.

2.4 CENTRIFUGAL SEPARATOR

A. Kaeser Model KFS-60. High-efficiency in-line separator with separator core and glass fiber filter.

2.5 AIR DRIP TRAPS

A. Armstrong No. 71-A. Snap-action, 3/4 in. connection.

B. Other Acceptable Manufacturer: Approved equal by Spirax/Sarco.

2.6 REGULATORS

A. 3/4 in.: Aro Model 27354-200. Adjustable 10 PSI to 250 PSI range. Aro Model 29077: L type mounting bracket (where required).

B. Pressure gauge: Aro Model 100083. 0 PSI to 300 PSI range.

C. Install filter upstream of regulator.

D. Other Acceptable Manufacturers: Approved equal by Arco, Honeywell Braukmann, A. W. Cash, Cla-Val Co., Parker Hannifin, Lincoln, Wilkerson, Wilkins or Graco.

2.7 FILTERS

A. 3/4 in.: Aro Model 25351-221. 10 oz. plastic bowl with guard, automatic mechanical drain, and 5 micron filter element.

B. Other Acceptable Manufacturers: Approved equal by Arco, Balcrank, Hankison, Parker Hannifin, Lincoln, Milton, or Wilkerson.

2.8 FLEXIBLE CONNECTORS

A. Flexonics 401M Series. Stainless steel hose and braid, 250 deg. F. rating, threaded or solder ends, and flange ends where required.

B. Other Acceptable Manufacturers: Approved equal by Anaconda, Keflex, Metraflex, Proco or Graco.

2.9 QUICK COUPLERS

A. Parker 20 Series, Model 25-F. Steel, 1/2 in. female pipe thread, 3/8 in. body. Verify body size and type with the Owner before ordering. Provide (1) companion male quick coupler per female quick coupler to the Owner.

B. Other Acceptable Manufacturers: Approved equal by Aero, Aeroquip, Aro, Balcrank, Breco, Dyna-Quip, Foster, Hansen, Hoffman, Lincoln, Milton, Schrader or Graco.

2.10 SD SERIES HEAVY DUTY AIR REEL GRACO #HPL56X

Hose length:	65’ x 3/8” ID
Reel outlet:	3/8”"
Reel inlet:	1/2” npsm
Pressure rating:	300 psi

The following accessories are to be installed at each reel:

Hose Inlet Kit	Graco #218549
Air Shutoff Valve	Graco #110225
Air Coupler	Graco #110199
Nipple	Graco #110196

1) MISCELLANEOUS EQUIPMENT

Note: Provide any additional structure as required to mount reels.

2.11 AIR COMPRESSOR

A. Ingersoll Rand model 2475N5 with premium package, two stage electric powered, 5 HP motor, 208 volts, 3-phase, 17.2 CFM at 90 PSI delivery, 80 gallon vertical receiver tank, complete with compressor, motor, and accessories.

1) Air-cooled after-cooler.

2) Air intake silencer-filter.

3) Full-time low oil level shutoff control with manual reset to prevent restarting while oil is being added.

4) OSHA-approved, totally enclosed belt guard.

5) Compressor-mounted magnetic starter with thermal overload protection.

6) Relay and 120 volt coil for wall-mounted pilot switch.

7) Pressure switch.

8) Equal by Champion, Emdgo or Gardner Denver

B. Vibration isolators or inertia pads shall be provided under air compressor.

2.12 AIR DRYER

A. Ingersoll Rand model DA31EC, 18 SCFM at 100 PSI at 100 deg. F., 26 in. high x 19 in. wide x 15 in. deep, 1/3 HP, 120 volts, cycling refrigerated model.

B. Equal by General Air, Hankison, Kahn, Kel Air, Kellog-American, Pure Air, Nash, Van-Air, Wilkerson, or Worthington.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Slope air lines 1 in. to 40 ft. down toward air drip. Drip shall consist of a valve, terminated at 4 ft. above floor on nearest acceptable wall.

B. Make all branch connections off of top of main supply line.

C. Install valve, dirt leg filter, and quick coupler at each air drop.

3.1 TESTS

A. Perform tests before concealing any pipe.

B. Test compressed air piping at 150 PSIG for (6) hours with no pressure drop.

C. Should leaks occur, remove the defective sections of pipe and/or defective fittings and replaced them with new materials. Repeat test until no defects occur.

D. The date(s) and result(s) of tests shall be recorded, witnessed, and submitted to the A/E.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fully condensing non asme water heater.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. Underwriter's Laboratories (UL), Inc., according to ANSI Z21.10.3 - CSA 4.3 standards governing storage type water heaters;

B. Meet or exceed the thermal efficiency and standby loss requirements of the U. S. Department of Energy and current edition ASHRAE/IESNA 90.1. Complies with

C. SCAQMD Rule 1146.2 and other air quality management districts with similar requirements.

1.4 WARRANTY

A. 3 year limited tank warranty.

1.5 MANUFACTURERS

A. A.O. Smith, Bradford White, or Lochinvar.

2. PART 2 - PRODUCTS

2.1 GAS WATER HEATER

A. Natural gas water heater shall be A. O. Smith Cyclone Xi Modulating model # BTH-199 or equal, with up to 97% thermal efficiency, a storage capacity of 100 gallons, an input rating of 199,000 btus per hour, a recovery rating of 235 gallons per hour (gph) at 100°F rise and a maximum hydrostatic working pressure of 160 PSI.

B. Water heater shall

1) Have seamless glass-lined steel tank construction, with glass lining applied to all water-side surfaces after the tank has been assembled and welded

2) Meet or exceed the thermal efficiency and/or standby loss requirements of the U. S. Department of Energy and current Edition of ASHRAE/IESNA 90.1

3) Have foam insulation and a CSA Certified and ASME rated T&P relief valve;

4) Have a down-fired power burner designed for precise mixing of air and gas for optimum efficiency, requiring no special calibration on start-up.

5) Be approved for 0″ clearance to combustibles.

C. Heater shall be supplied with maintenance-free powered anode.

D. The control shall be an integrated solid-state temperature and ignition control device with integral diagnostics, graphic user interface, fault history display, and shall have digital temperature readout.

E. Power Direct Venting: Water heater shall be suitable for power direct venting using a 4” diameter PVC pipe for vent piping and intake air piping.

1) Provide with concentric vent kit.

F. Water heater should incorporate the icommtm system for remote monitoring, leak detection and fault alert.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. The heater shall be designed to produce the required gallons per hour at the temperature required based on the Btu input.

B. Follow manufacturers recommendations for installation, space requirements, and piping sizing.

C. Coordinate location with General Contractor.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Plumbing fixtures

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. Meet requirements of OBBC, Plumbing Code, Section 4101:2-59.

B. Water closets shall meet ANSI A112.19.1M.

C. Trim shall meet ANSI A112.19.5.

D. Urinal shall meet ANSI A112.19.1M. Trim shall meet ANSI A112.19.5.

E. Lavatories shall meet ANSI A112.19.1M and Z 124.3.

F. Mixing valve shall meet ANSI Z 124.2.

G. Drinking water coolers shall meet ANSI A112.19.2M.

H. Sink shall meet ANSI A112.19.1M and A112.19.2M.

I. Sinks shall meet ANSI A112.19.1M and A112.19.2M.

J. Pressure reducing valve shall meet ASSE 1003.

K. Interior wall hydrants shall meet ASSE 1019.

L. All fixtures shall meet the governmental regulations for low-flow operation.

1.4 MANUFACTURERS

A. Refer to individual product item

2. PART 2 - PRODUCT

2.1 FIXTURES

1) <u>WC: ADA FLOOR MOUNT WATER CLOSET</u>

a) <u>Water closet Basis of design:</u> (ADA-compliant, floor-mounted, flush valve, bottom outlet): American Standard Model

3043.001 “Madera”, 16.5” height, low consumption, 1.6 GPF, siphon jet, elongated bowl, vitreous china, with bolt caps, and 1-1/2 in. top spud

b) Equal by American Standard, Eljer, or Kohler

c) Flush valve basis of design: Flush valve basis of design: ZURN ZER6000AV-CPM AquaSense 'AV' Exposed Closet Flush Valve - Exposed, quiet diaphragm-type, chrome plated flushometer valve with a polished exterior. Complete with Zurn's 1.6 AquaVantage TPE, chloramine resistant, dual seal diaphragm with a clog resistant, triple filtered by-pass. The unit features a 6VDC motor actuator with automatic infrared sensor, user-in view L.E.D., low battery indicator light, switchable 24 hour auto-flush and three second delay flush to deter false flushing, 10 degree angled sensor for optimum user detection, courtesy flush button, high impact resistant polycarbonate housing, impact resistant glass lens and chrome plated metal cover. The unit comes complete with 4 "C" size batteries, wrench for installation and allen key for the battery compartment. The E-Z Flush electronics are ultra energy efficient for optimal battery life. This unit incorporates a high back pressure vacuum breaker, one piece hex coupling nut, adjustable tailpiece, spud coupling and flange for top spud connection. Control stop has internal siphon-guard protection, vandal resistant stop cap, sweat solder kit, and a cast wall flange with set screw. Internal seals are made of chloramine resistant materials.

d) Equal by Sloan, Zurn or Delany

e) Seat Basis of design : Church Model# 9500SSCT Commercial, extra heavy duty white solid plastic, elongated, open front w/o cover and self sustaining hinges. Equal by Bemis or Olsonite.

2) WC-1: FLOOR MOUNT WATER CLOSET

a) Water closet Basis of design: (floor-mounted, flush valve, bottom outlet): American Standard Model 2234.001 “Madera”, 15” height, low consumption, 1.6 GPF, siphon jet, elongated bowl, vitreous china, with bolt caps, and 1-1/2 in. top spud

b) Equal by American Standard, Eljer, or Kohler

c) Flush valve basis of design: Flush valve basis of design: ZURN ZER6000AV-CPM AquaSense 'AV' Exposed Closet Flush Valve - Exposed, quiet diaphragm-type, chrome plated flushometer valve with a polished exterior. Complete with Zurn's 1.6 AquaVantage TPE, chloramine resistant, dual seal diaphragm with a clog resistant, triple filtered by-pass. The unit features a 6VDC motor actuator with automatic infrared sensor, user-in view L.E.D., low battery indicator light, switchable 24 hour auto-flush and three second delay flush to

deter false flushing, 10 degree angled sensor for optimum user detection, courtesy flush button, high impact resistant polycarbonate housing, impact resistant glass lens and chrome plated metal cover. The unit comes complete with 4 "C" size batteries, wrench for installation and allen key for the battery compartment. The E-Z Flush electronics are ultra energy efficient for optimal battery life. This unit incorporates a high back pressure vacuum breaker, one piece hex coupling nut, adjustable tailpiece, spud coupling and flange for top spud connection. Control stop has internal siphon-guard protection, vandal resistant stop cap, sweat solder kit, and a cast wall flange with set screw. Internal seals are made of chloramine resistant materials

d) Equal by Sloan, Zurn or Delany

e) Seat Basis of design : Church Model# 9500SSCT Commercial, extra heavy duty white solid plastic, elongated, open front w/o cover and self sustaining hinges. Equal by Bemis or Olsonite.

3) UR: URINAL

a) Basis of design: Zurn Z5798.206 AquaSense® High Efficiency Urinal (HEU) System

b) China and Valve equal by American Standard, Sloan or Kohler

c) Flush valve basis of design: ZURN ZER6003AV-EWS-CPM AquaSense 'AV' Exposed Urinal Flush Valve - Exposed, quiet diaphragm-type, chrome plated flushometer valve with a polished exterior. Complete with Zurn's 0.5 AquaVantage TPE, chloramine resistant, dual seal diaphragm with a clog resistant, triple filtered by-pass. The valve incorporates a 6VDC motor actuator, a battery powered automatic sensor, high impact resistant polycarbonate housing and chrome plated metal cover with manual override push button and 10 degree angled sensor, high back pressure vacuum breaker, one piece hex coupling nut, adjustable tailpiece, spud coupling and flange for top spud connection. Control stop has internal siphon-guard protection, vandal resistant stop cap, sweat solder kit, and a cast wall flange with set screw. Internal seals are made of chloramine resistant materials

d) Equal by Sloan, Zurn or Delany

e) Color: White

f) Mounting height - see Architectural drawings.

g) Carrier: Zurn commercial grade floor mounted. Equal by Wade, Smith or Watts.

4) LAV: ADA CHINA LAVATORY

a) American Standard Lucere 0355.012 with 4" centers for concealed support brackets equal by Crane, Kohler or Eljer

b) Faucet shall be American Standard Model # 6055.205-XTMV battery operated sensor faucet with cast spout, 1.5 GPM vandal resistant aerator, thermostatic mixing valve, flex hoses 3/8" compression 20" hose length. Shall feature vandal resistant all brass body with single inlet, built-in check valve, and in-line strainer. Supply with grid drain. Equal by Chicago Faucet, Delta or Kohler.

c) Supply lavatory with an ASSE 1070 listed thermostatic valve.

d) Mounting height - see Architectural drawings.

e) Provide each lavatory with seamless insulation on waste and water lines.

f) Carrier: Zurn commercial grade floor mounted. Equal by Wade, Smith or Watts

5) <u>LAV-1: LAVATORY AUTO FAUCET/TRIM</u>

a) Counter with integral bowl by General Contractor.

b) Faucet shall be American Standard Model # 6055.205-XTMV battery operated sensor faucet with cast spout, 1.5 GPM vandal resistant aerator, thermostatic mixing valve, flex hoses 3/8" compression 20" hose length. Shall feature vandal resistant all brass body with single inlet, built-in check valve, and in-line strainer. Supply with grid drain. Equal by Chicago Faucet, Delta or Kohler.

c) Supply lavatory with an ASSE 1070 listed thermostatic valve.

d) Mounting height - see Architectural drawings.

6) <u>LAV-2: PUBLIC ADA CHINA LAVATORY</u>

a) American Standard Lucere 0355.012 with 4" centers for concealed support brackets equal by Crane, Kohler or Eljer

b) Faucet shall be American Standard Model # 6055.205-XTMV battery operated sensor faucet with cast spout, 0.5 GPM vandal resistant aerator, thermostatic mixing valve, flex hoses 3/8" compression 20" hose length. Shall feature vandal resistant all brass body with single inlet, built-in check valve, and in-line strainer. Supply with grid drain. Equal by Chicago Faucet, Delta or Kohler.

c) Supply lavatory with an ASSE 1070 listed thermostatic valve.

d) Mounting height - see Architectural drawings.

e) Provide each lavatory with seamless insulation on waste and water lines.

f) Carrier: Zurn commercial grade floor mounted. Equal by Wade, Smith or Watts

7) EWC: ADA WATER COOLER WITH ELECTRONIC BOTTLE FILLER

a) Oasis split-level barrier-free Model PG8EBFSL, 7.8 GPH - 50° drinking water, 1/5 H.P. - 400 watts.

b) Provide with Electronic Bottle Filler

c) Carrier: Zurn commercial grade floor mounted. Equal by Wade, Smith or Josam.

d) Equal by Elkay, Haws, or Sunroc

8) EWC-1: ADA WATER COOLER WITH ELECTRONIC BOTTLE FILLER

a) Oasis barrier-free Model PG8EBF, 7.8 GPH - 50° drinking water, 1/5 H.P. - 400 watts.

b) Provide with Electronic Bottle Filler

c) Carrier: Zurn commercial grade floor mounted. Equal by Wade, Smith or Josam.

d) Equal by Elkay, Haws, or Sunroc

9) MS: RECTANGULAR MOP SINK

a) Mustee Model 65M, 24x36 floor mop sink. Unit to be one-piece molded fiberglass made with matched metal molds using extreme heat and pressure. Height shall be 10” with not less than 1” wide shoulder. Size 24” x 36” with integrally molded, self-draining shelf. Drain shall be integrally molded, complete with drain seal for installation of 3” ABS, PVC (Sch. #80) and iron pipe. Removable stainless steel strainer

b) Faucet set with vacuum breaker, drain grid, hose and wall hook.

c) Equal by Fiat, Swanstone or Florestone.

10) MS-1: MOP SINK FAUCET

a) Faucet set with vacuum breaker, drain grid, hose and wall hook.

b) Equal by Fiat, Swanstone or Florestone.

11) SK: COUNTERTOP SINK

c) Elkay LR-1316, single bowl, 18 gauge, 302 stainless steel self rimming sink with three holes for faucet.

d) Gooseneck faucet LK800LGN08T4 and L-8 Grid Strainer.

e) Equal by Just or Kohler

12) SK-1: COUNTERTOP SINK

a) Elkay LR-1919, single bowl, 18 gauge, 302 stainless steel self rimming sink with three holes for faucet.

b) Gooseneck faucet LK-2432 and L-8 Grid Strainer.

c) Equal by Just or Kohler

d) Aquapure (CS-S) #56179-05 drinking water system complete with faucet and filter.

13) SK-2: COUNTERTOP SINK

e) Elkay LRAD-1919-65, single bowl, 18 gauge, 302 stainless steel self rimming sink with three holes for faucet.

f) American Standard Model # 4332.350.F15. Single control kitchen faucet shall feature a forged brass body with pull-down spray. Shall also feature washerless ceramic disc valve cartridge, flexible supply hoses and two integral check valves.

g) Equal by Just, Elkay or Kohler

h) Food waste grinder: In-Sink-Erator Model Badger 5 XP. InSinkErator Badger 5XP®, continuous feed, with 3/4 H.P. motor, galvanized steel grinding elements with two stainless steel 360° swivel lugs. Self-service wrench.

14) SK-3: COUNTERTOP SINK

i) Elkay DLR-3322-10, double bowl, 18 gauge, 302 stainless steel self rimming sink with three holes for faucet.

j) American Standard Model # 4332.350.F15. Single control kitchen faucet shall feature a forged brass body with pull-down spray. Shall also feature washerless ceramic disc valve cartridge, flexible supply hoses and two integral check valves.

k) Equal by Just, Elkay or Kohler

l) Food waste grinder: In-Sink-Erator Model Badger 5 XP. InSinkErator Badger 5XP®, continuous feed, with 3/4 H.P. motor, galvanized steel grinding elements with two stainless steel 360° swivel lugs. Self-service wrench.

m) Cup sink on other drain.

15) SK-4: COUNTERTOP LAUNDRY SINK

a) Proflo PFLT2522 single basin laundry sink.

b) Created from Sheet Molding Compound (SMC)—a plastic composite containing filler, fire retardant, thickener and mold release that have been mixed and molded under extreme heat and pressure. Drain size: 1-1/2" • Inside dimensions: 22-1/8" x 17" x 12-3/4" • Self-rimming design • Internal basin depth: 13"

c) Color: white.

d) Faucet: Chrome finish, 4” center set brass faucet. 6” swing spout with aerator, level handles, replaceable seats and stems

e) Equal by Swan or Fiat

16) SK-5: DECON SINK

a) Advance Tabco custom sink, 16 gauge 304 stainless steel, 8'-0" x 2'-0", free standing, 2-compartment, 16"x18"x12" each bowl, 5" integral backsplash, right hand side pitched drain board, 3.5" centered drain opening, flat chrome plated brass grid strainer, 3" high raised counter ledges.

b) Faucet: Chicago faucets model 2305-VB613AABCP faucet, wall mount, with foot operated remote valve model #625-SLOABCP at front of sink connected to faucet.

[1] Cast brass, wall mount, wall bracket, hang down metal reinforced stainless steel braided hose with stainless steel protector coil, chromed plated brass body, L type swing spout, lever handles, compression cartridges, integral check valves, spring loaded pre-rinse valve sprayer with open and hold mechanism.

c) Equal by Just, Amtecko or Acorn.

17) LS: LAUNDRY SINK

a) Mustee model 19F ULTRATUB. Floor mounted, structural themoplasic, 20 in. x 24 in. x 14 in. deep,

single bowl, 3 hole punching, 4” centerset, one piece molded construction using structural thermoplastics with matched meatal molds under extreme heat and pressure. Tub to include integrally molded drain assembly for connection to standard 1-1/2” P trap. Include stopper, wall mounting hardware, heavy gauge steel legs with built-in leveler. Shall meet ANSI specification Z 124.6. Color: white.

b) Faucet: Chrome finish, 4” center set brass faucet. 6” swing spout with aerator, level handles, replaceable seats and stems

c) Drain: 2” in. chrome 17 ga. tailpiece, chrome cast brass trap with cleanout plug, and chrome 17 ga. drain to wall.

d) Equal by Swan or Fiat

18) PF: KITCHEN POT FILLER

a) Elkay Avado Wall Mount Single Hole Pot Filler Kitchen Faucet with Lever Handles. Faucet has a flow rate of 4.0 GPM, and is made of Brass material, with a Ceramic Disc valve. Faucet requires 1 faucet holes.

b) Equal by Just or Kohler

19) HB: INTERIOR WALL HYDRANT

e) Zurn narrow wall hydrant #Z-1350.

f) Encased in key operated hinged cover.

g) Supply with vacuum breaker

h) Mounting height = 3'-0" A.F.F.

i) Equal by Jonespec, Smith or Watts

20) HB-1: EXTERIOR WALL HYDRANT

c) Zurn Z1321 exposed Ecolotrol anti siphon freeze proof, exterior wall hydrant.

d) Stainless steel face with operating key.

e) Equal by Jonespec, Smith or Watts.

21) SH ADA SHOWER

a) Aquatic Products, ADA shower model 1603CFS. White AcrylX applied acrylic surface, 60x36x76”, 1-3/4” skirt, ½” interior threshold, barrier free when properly installed. Smooth wall, slip resistant textured bottom, center drain.

[1] WITHOUT seat – provided by others

b) Options:

[1] Grab bars on both side walls and on back wall and soap dish.

[2] Shower Valve, Hand Held and Head System: Powers 910 faceplate and metal handle pressure balancing mixing valve, Deluxe hand held shower assembly (item 3) with 30” slide bar and 60” metal hose, concealed diverter valve with metal handle (item Y) and deluxe chrome plated brass shower head and arm (item M1)

c) Equal by Fiat, Clarion and Freedom

22) SH-1 SHOWER

a) Clarion Bathware, model 6035SD. White AcrylX applied acrylic surface, 60x36x76”, 4” skirt. Smooth wall, integral toiletry shelves, slip resistant textured bottom, drain.

b) Options:

[1] Shower Valve and Head System: Powers 910 faceplate and metal handle pressure balancing mixing valve, deluxe chrome plated brass shower head and arm (item M1)

c) Equal by Fiat, Aquatic and Freedom

23) WB: WASHER BOX

a) Guy Gray Model No. BB200TS for 2” drain washer box.

b) ½” hot and cold water valve connections

c) Equal by Oatey or IPS Corporation

24) WB-1: WASHER MACHINE WATER SUPPLY

a) Zurn 1341 wall faucet with 3/4” inlets.

b) Install two wall faucets with washing machine water hammer arrestors on outlets.

c) Equal by Oatey or IPS Corporation

25) WB-2: ICE MAKER BOX

a) Water Tite box model 87971 with quarter turn brass valve in plastic box.

b) Equal by Oatey or IPS Corporation

26) FD: FLOOR DRAIN

a) Zurn Z-415 body assembly with 3" outlet and 5" type "B" nickel bronze strainer.

b) Provide with trap sealer.

c) Equals: Smith, Watts, MIFAB.

27) FD-1: MECHANICAL FLOOR DRAIN

a) Jay R. Smith Figure 2320. Duco cast iron body and flashing collar with nominal 8" ductile iron grate and slotted sediment bucket.

b) Provide with trap seal.

c) Equals: MIFAB, Watts or Zurn.

28) FS: FLOOR SINK 8" x 8"

a) Zurn FD2378- 8" x 8" - 6" depth with 1/2 grate as shown on kitchen plan with white A.R.E. anti-splash bottom dome.

a) Equals: Smith, Watts, MIFAB.

29) WM: WATER METER

a) 1-1/2" Badger water meter with remote readout purchased from Oregon Water Department and installed by contractor.

b) Install meter setting with strainer and reduced pressure as required by Water Dept. Reduced pressure backflow preventer per specification 22 11 20.

30) WH: GAS WATER HEATER

a) See Section 22 34 36 of these specifications.

31) MV: MASTER MIXING VALVE

b) See Section 22 11 21 of these specifications.

32) CP: HOT WATER CIRCULATION PUMP

c) See Section 22 11 23 of these specifications.

33) EEW: EMERGENCY EYE WASH

a) Speakman SE1000, barrier free accessibility. Eyewash operates by highly visible push handle. Steady water flow under varying water supply conditions from 30-90 psi and integral flow control in spray head.

b) Provide with emergency mixing valve for tempered water model Speakman SE370.

c) Equal by Bradley or Haws

34) TD: TRENCH DRAINS AND CATCH BASINS

a) Provide trench drains and catch basins at indicated locations.

b) Manufacturers:

[1] Trench Drains and Catch Basins are based on ACO Polymer Products Inc. Subject to compliance with the requirements, equal products by one of the following manufacturers will be acceptable:

[a] ABT Inc.

[b] Polycast Hubbel Incorporated

[c] NDS Inc.

c) Materials:

[a] General: Subject to compliance with requirements, provide polymer concrete insert trench drain assemblies and indicated catch basin assemblies (sand/sump boxes), with covers, fasteners, accessories, stiffeners and other items as needed for complete cast-in-place installation. All trench drains, catch basins, sumps and drain covers shall be heavy duty capable of supporting class “E” loads (trucks and fork lifts.) All drain covers and frames shall be cast iron.

d) Models:

[1] Trench Drain (6” wide) Assembly: S100K

[2] Catch Basin (14”x19”) Assembly: SK1-621

35) TD-1: EXTRACTOR DRAIN TROUGH

a) Drain trough with lint filter: 1 required.

b) Provided and installed by the Contractor.

[1] Available Products:

[a] H-M Company Extractor Drain Trough

c) Description:

[1] Capacity: Sized as required to accommodate existing Washer Extractor.

[2] Body Material: ¼" Polypropylene

[3] Lid Material: 3/8" Polypropylene

[4] Lint Filter Material: ¼" PVC

[5] Lint Filter Holes: 3/8" Diameter

[6] Chemical Resistant: Yes

[7] Maximum Water Temperature: 200°

[8] Lid Attached to Body with: Stainless Steel Screws

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Wall mounted lavatories and electric water coolers shall have carriers attached to the floor.

1) Manufacturers Zurn, Smith, Wade or Watts.

B. All ADA fixtures shall be installed in accordance with latest ADA codes and standards, complete lavatories with seamless insulation on waste and water lines.

C. Caulking Fixtures: All joints between china plumbing fixtures and wall surfaces shall be caulked with polysulfide sealant. See Section 07 92 00 of the specifications.

D. Fixture stops for lavatories, sinks and similar fixtures shall have a key operated stop valve installed. Stop valves shall be of the same manufacturer and heavy duty type.

E. All piping penetrations shall be covered with chrome escutcheons.

F. Upon acceptance and turnover of project thoroughly clean all plumbing fixtures in their entirety.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 HVAC SECTIONS

A. SECTION 23 00 00 – GENERAL PROVISIONS

B. SECTION 23 05 29 – HANGERS AND SUPPORTS FOR HVAC PIPING

C. SECTION 23 05 93 – TESTING, ADJUSTING AND BALANCING FOR HVAC

D. SECTION 23 07 00 – HVAC INSULATION

E. SECTION 23 09 00 – CO/NO2 GAS DETECTION SYSTEM

F. SECTION 23 09 33 –ELECTRONIC CONTROL SYSTEM FOR HVAC

G. SECTION 23 23 00 – REFRIGERANT PIPING

H. SECTION 23 31 13 – LOW-PRESSURE DUCTWORK

I. SECTION 23 33 00 – DUCTWORK ACCESSORIES

J. SECTION 23 34 00 – HVAC FANS

K. SECTION 23 34 39 DIRECT DRIVE HSLV PROPELLER FANS

L. SECTION 23 37 13 – Diffusers, Registers, and Grilles

M. SECTION 23 38 00 – KITECHEN HOOD VENTILATION SYSTEM

N. SECTION 23 54 16 – WARM AIR FURNACE

O. SECTION 23 62 13 – REFRIGERANT CONDENSING UNITS

P. SECTION 23 81 26 – SPLIT SYSTEM HEAT PUMP

Q. SECTION 23 83 00 – RADIANT TUBE HEATERS

R. SECTION 23 83 42 – ELECTRIC WALL HEATER

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) The complete installation of the heating, ventilating and air conditioning system.

2) The installation of furnaces and condensing units.

3) The installation of infrared heaters and flue vent/intake.

4) The installation of heat pump split systems.

5) The installation of CO/NO2 gas control system and associated fans.

6) Sheet metal ductwork, diffusers and return air grilles.

7) Duct insulation.

8) Certified Air balance.

9) All test inspections and permits.

2. PART 2 - PRODUCTS

2.1 SLEEVES

A. In Drywall, Masonry, or Concrete Wall Construction:

1) Provide sleeves for piping, refrigerant piping, and duct penetrations

2) Option for above ceiling only: Contractor shall omit block(s) where required for penetrations, and shall provide square-finished opening. Do not omit blocks under bearing points or in fire-rated or smoke-rated walls. Do not omit blocks in walls which serve as sound barriers.

3) Contractor shall provide openings through metal building walls and roof, and seal watertight.

B. In precast concrete work, in lieu of sleeves, cut holes after erection of concrete.

C. Sleeve where pipes and ductwork pass exposed through walls, and where any piping or ductwork passes through smoke-rated or fire-rated separations, equipment room walls, or above-grade floors.

D. Verify which walls, ceilings, or floors are fire-rated, if any, and provide approved fire-blocking or fire-protective devices as required.

E. Carefully coordinate and check locations of sleeves immediately before and after each concrete pour and masonry installation.

F. Sleeves are not required in floor slabs on grade or in core-drilled openings not requiring water-proofing or fire suppression. **Exception:** Sleeves are required at core drilling through hollow core pre-cast slabs and through concrete block walls, to facilitate containment of required fire-stopping material.

G. Sleeving with absolutely watertight seal is required for piping passing through exterior walls above grade, and underground foundation walls and other below-grade penetrations into building.

2.2 STANDARD SLEEVES

A. Material:

1) Pipe sleeves:

a) Up to 8 in. diameter: Machine-cut Schedule 40 black steel pipe.

b) Bare copper piping: Copper sleeves.

c) **Option** In walls: Schedule 40 plastic pipe may be used for pipe sleeves, except where adjacent ceiling space is used for return air plenum. Refer to Drawings.

2) Duct sleeves: 14 ga. steel.

B. Sizing: Sleeves shall be large enough for insulation to be continuous, or for watertight or fire-rated sleeve seals to be installed. Size to allow 1/2 in. minimum clearance all around pipe or pipe insulation, and ductwork.

2.3 WATERTIGHT SLEEVE SEALS

A. Oakum Caulking: With lead-pour or elastomeric sealant. Elastomeric sealant shall be 2-component, polysulfide or polyurethane.

2.4 FIRE-RATED SLEEVE SEALS

A. ASTM E119 and E814 Silicone RTV foam, UL-approved.

2.5 MOTOR CONTROL

A. For all motors furnished as part of this contract, the Electrical Contractor shall furnish and install all fused disconnects, combination disconnects and starters, and push button stations as required for the control of these motors unless noted otherwise.

2.6 ACCESSIBILITY AND ACCESS PANELS

A. Install work so as to be readily accessible for operation, maintenance and repair. Where valves or other specialties are concealed in the construction or behind a wall or ceiling surface, contractor shall furnish and install an access panel of adequate size to permit adjustment or service or a concealed panel of adequate size to permit adjustment or service of concealed device. Panels shall be of a design suitable for installation in the material forming the finished surface in which each is mounted.

2.7 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

2.8 DESIGN BASE MANUFACTURER STANDARD

A. The Drawings and Specifications are based on the specific equipment requirements and configuration for a Design Base Manufacturer. Design coordination of equipment with the building and with other Trades has been made for this specific Model and Manufacturer of equipment. Where several Manufacturers are listed for an item of equipment or material, the first-named shall be considered the Design Base Manufacturer Standard.

B. Consideration will not be given to any other Manufacturer that the Contractor proposes to use, unless the Manufacturer has been approved by the A/E and specifically named in the Contract Documents or Addenda thereto.

2.9 OTHER MANUFACTURERS

A. Any specified Equipment Manufacturer furnished by the Contractor other than the Design Base Manufacturer shall be, in the opinion of the A/E, equivalent in quality, design, features, performance, arrangement, and appearance to that of the Design Base equipment or material, including any special features or requirements.

B. No consideration will be given to any Manufacturer which the Contractor proposes as an “Approved Equal,” unless the Manufacturer has been approved by the A/E during the bid period, and specifically named in the Contract Documents or Addenda thereto.

C. Recognizing that since no two Manufacturers are “identical,” whenever the Contractor elects to furnish specified equipment or material manufactured by other than the Design Base Manufacturer, the Contractor shall be responsible for the cost and coordination of all modifications required to accommodate the elected equipment or material.

D. Where deemed necessary by the A/E, the Contractor shall, at no additional cost to the Owner, prepare new layouts for these other brands of equipment which may have different dimensional or service requirements from the Design Base Manufacturer Standard. Submit these layouts to the A/E for review.

E. Reimburse the A/E for the cost of any design changes incurred by the A/E in the preparation of revised Drawings or Specifications to accommodate the use of any Manufacturer other than the Design Base Manufacturer.

2.10 ALTERNATIVE MANUFACTURERS

A. Contractor shall submit information on any proposed equipment or material that it desires to use as an Approved Equal.

B. If the A/E determines an alternative Manufacturer to be acceptable, it will issue an Addendum adding that Manufacturer to the Specification.

2.11 EQUIPMENT SUITABILITY

A. All equipment provided shall perform as intended. All items listed shall function properly, and as the Manufacturer intended. Install equipment according to the Manufacturer's recommendations. Properly attach equipment to the floor, wall, or structure. Each item of equipment shall be compatible with all other accessories or hook-ups, including flues, piping, controls, wiring, and other equipment that are not furnished by the equipment Manufacturer, but that are required as an accessory or modification, as necessary to achieve its intended function.

2.12 MISCELLANEOUS ACCESSORIES

A. Provide any additional adapters, fittings, trim, structural steel angles, channels, Unistrut, brackets, etc., as necessary to securely mount and install all items of equipment specified or shown on the Drawings. All steel installed outside or exposed to moisture shall be hot-dipped galvanized.

B. These accessories are required even though they may not be shown or detailed on the Drawings.

C. Installation shall be compatible with the building construction on which the item is to be located.

D. Verify the type of construction prior to ordering the equipment item, so that all required accessories are included.

2.13 QUANTITIES

A. Equipment may be referred to in these Specifications, or on the Drawings, as either singular or plural; the Contractor shall verify the exact number of items required to complete its Work.

2.14 PAINTING OF HVAC SYSTEMS

A. Refer to Division 9 for painting specifics.

B. HVAC systems shall be painted to match adjacent finishes where noted.

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
13)	L.E.E.D.	Leadership in Energy and Environmental Design

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. Permanent HVAC equipment can only be used for used for temporary heating if permission is granted by architect. A minimum of MERV8 filters shall be installed at return air grilles and in air handler if approved for use. Protect HVAC equipment from odors and dust.

C. Seal all duct and equipment openings with plastic in storage and installed

D. Protect stored on-site and installed absorptive material from moisture damage.

E. Smoking will not be permitted inside the building or within 25 feet of entrances.

F. 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.

G. 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.

H. 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.

I. At the time of completion, this contractor shall clean thoroughly all the apparatus and equipment furnished by him.

J. 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 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. 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.

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 in approved format.

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 a minimum of 6 hours total 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.

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. Hangers, supports, and concrete inserts required for piping and equipment installed under Division 23.

1.2 QUALITY ASSURANCE

A. All piping supports and parts shall conform to the latest requirements of the Code for Power Piping 9ANSI B31.1 and MSS Standard Practice SP-58 and SP-69.

B. All Hangers and supports in wash bay shall be corrosion resistant.

1.3 MANUFACTURERS

A. Pipe Hangers, Beam Clamps, Wall Brackets: Anvil International, Inc., B-Line Systems, Inc., Carpenter & Patterson, Inc., Globe Pipe Hanger Products, Inc., Erico/Michigan Hanger Co., Inc., National Pipe Hanger Corp., PHD Manufacturing, Inc., or Klo-Shure.

B. Channel Support Systems: B-Line Systems, Inc., GS Metals Corp., Erico/Michigan Hanger Co., Inc., National Pipe Hanger Corp., Unistrut Corp., Wesanco, Inc., or Powerstrut.

C. Thermal Hanger Shield Inserts: Buckaroos, Inc., Carpenter & Patterson, Inc., PHS Industries, Inc., Pipe Shields, Inc., Rilco Manufacturing Co., Inc., or Value Engineered Products, Inc.

2. PART 2 - PRODUCTS

2.1 HANGERS

A. Un-insulated Piping:

1) Steel, cast iron, or plastic: 1/2 in. to 8 in.: Anvil Fig. 69. Galvanized carbon steel, adjustable swivel ring.

2) Copper, 1/2 in. to 4 in.: Anvil Fig. CT-99. Copper-plated hangers, adjustable tubing ring, carbon steel ring, and malleable iron adjusting nut.

B. Insulated Piping:

1) Steel, plastic, or copper; all sizes: Anvil Fig. 260. Adjustable clevis, carbon steel yoke, U-strap, rod, and hex nuts.

2) Thermal protector:

a) 2 in. and smaller: 12 in. long segment of rigid pipe insulation

supported by Anvil Fig. 167, 18 ga. galvanized steel protection shield.

3) Hanger size shall be sufficient to accommodate pipe and insulation without compressing the insulation.

4) For insulated refrigerant piping use insulated couplings by Klo-Shure.

C. Vertical Piping: Anvil Fig. 261. Friction riser clamp with 2-point bearing. Use Anvil Fig. CT-121 copper-plated riser clamp for copper pipe. Shorten legs as required to conceal riser clamp within pipe chase and still provide adequate support.

2.2 SPRING HANGERS

A. Light duty (250 lb. Max): Grinnell Fig. 247, all-welded construction, enclosed spring.

B. Grinnell Fig. B268, Type A or B, adjustable pre-compressed variable spring, steel construction.

2.3 TRAPEZE HANGERS

A. Unistrut P1000 or Superstrut A1200. Angle iron, or channel of sufficient length to support pipes and insulation on individual hangers, roller supports or saddles with insulation protectors, support capacity, support spacing, trapeze hanger rod diameter, and quantity as required to support total piping load.

B. Provide individual piping attachment to each Unistrut hanger, angle, or channel.

C. Design support system and obtain approval of a Structural Engineer licensed in Ohio. Submit details to the A/E for approval.

2.4 SUPPORTS

A. Pipe hanger rods shall be solid steel, threaded ends or all-thread rods of diameter listed below, with double nut attachment to the hanger and at the hanger attachment. 3/8 in. rod diameter for pipe sizes up to 2 in.

B. Beam Clamps (up to 8 in. diameter pipe):

1) Anvil Fig. 227. Top beam clamp, steel jaw, hook rod with nut, and spring washer steel eye-bolt, with Anvil Fig. 157 for appropriate rod diameter.

2) Option: Anvil Fig. 86. Malleable iron clamp, hardened steel cup point set screw with Fig. 89 steel retaining clip. C-CLAMPS WITHOUT RETAINING CLIPS ARE EXPRESSLY PROHIBITED.

C. Purlin Clamps: PHD Fig. 290 Purlin Clamp. Malleable iron with jam nut, and pointed steel set screw.

D. Wall Brackets: Carbon steel, back plates, and bolts.

1) Anvil Fig. 194. Lightweight 750 lb. load.

2) Anvil Fig. 195. Medium-weight 1,500 lb. load.

3) Option: Unistrut Superstrut A1200.

2.5 PIPE-INSULATING SUPPORT

A. Piping 1-1/2 in. and Smaller: Anvil Fig. 167. Provide 12 in. long, 18 ga. sheet metal half round piping shield inside clevis hanger.

2.6 CONCRETE INSERTS

A. In Pre-cast Concrete: Anvil Fig. 117. Hilti or Philips. Malleable iron, expansion case, interior standard pipe threads, external helical wedge.

B. Refer to Manufacturer's recommendations for correct selection as to pipe size and loading.

2.7 FINISH

A. Unless otherwise noted, all steel hangers and supports shall be standard black. Exception: Hangers and supports for exposed exterior applications shall be galvanized.

2.8 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A36 / ASTM A36M, steel plates, shapes, and bars, black and galvanized.

3. PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Install necessary pipe hangers and supports to properly support all piping and to maintain piping uniformly level (3/4" maximum deflection). Hangers to be double nutted.

B. Maximum spacing of piping supports to be as follows:

PIPE SIZE	STEEL PIPE	COPPER PIPE
3/4" or smaller	7'	5'
1"	7'	6'

C. Install wall brackets where required.

D. Support piping at equipment from floor, structure or walls, so that piping weight is not supported by equipment.

3.2 GENERAL INFORMATION

A. Ceiling grid system shall not be used to support ductwork, electrical conduit, heating lines or any other utility lines. Each utility and the ceiling grid system shall be a separate installation and each shall be independently supported from the building

structure. Where interferences occur, in order to support ductwork or piping, the Contractor must install trapeze type hangers or supports which shall be located where they do not interfere with access to fire dampers, valves, and other mechanical equipment items.

B. Where necessary, the Contractor shall furnish and install proper angles or channels between joists for hanger supports. Weld to steel structural members.

C. Avoid cutting concrete or masonry by using inserts. Use top flange beam clips to avoid burning metal deck.

D. Furnish and install any intermediate supporting steel or supports, foundations, and concrete pads required for proper support of all piping and equipment.

E. Provide hangers, supports, and inserts required for piping, ductwork, flue vents, and equipment installed under the HVAC Contract.

F. Provide all necessary inserts, expansion shields, beam clamps, pipe floor supports, and auxiliary steel.

G. For Precast Flexicore Concrete: Provide concrete inserts, toggle bolts, etc., as required for HVAC Work.

H. Hangers for all insulated piping shall be sized for outer diameter of insulation.

I. Provide any additional supports, auxiliary steel, or fasteners required for attaching to structure.

J. Hangers and supports in wash bay shall be galvanized or otherwise corrosion resistant.

◆ END OF SECTION ◆

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The testing, adjusting, and balancing of the HVAC air systems.
B. The performing contractor's certification requirements.

1.2 SUBMITTALS

A. Submittals are required and shall include the complete certified report for all air and water system pressure testing and balancing including all electrical performance of each piece of HVAC equipment.

B. Prior to commencement of the work described in this Section, the testing, adjusting, and balancing contractor shall submit verification of his AABC or NEBB certification to the Design Professional for acceptance.

C. Prior to commencement of the work described in this Section, the testing, adjusting, and balancing contractor shall submit proposed forms to be used for recording.

1.3 QUALITY ASSURANCE

A. The testing, adjusting, and balancing contractor shall be either AABC or NEBB certified for the work described herein.

2. PART 2 - PRODUCT

2.1 COMPONENTS

A. The Contractor shall provide his own properly calibrated equipment to pressure test, air balance, water balance and to measure electrical characteristics of each piece of HVAC equipment.

3. PART 3 - EXECUTION

3.1 The Balancing Contract shall incorporate the following:

A. Adjust and balance the complete mechanical system as hereinafter specified.

B. Record all test data from the latest available revised set of mechanical plans and submit four copies upon completion of the balancing contract.

C. At the completion of the balancing contract, instruct the Owner's personnel in the proper operation and maintenance of each piece of equipment.

3.2 AIR BALANCE

A. The Balancing Contractor shall adjust dampers to obtain approximate balance of system. Check CFM, adjust each supply, return and exhaust damper to design

CFM. Continue progressive refinement of adjustment, and furnish the Architect with test data showing CFM's progressively obtained and final CFM. Final payment will not be made until test data has been delivered to the Architect.

B. The test procedure shall be as follows:

1) Test and adjust fan RPM to design requirements. At AHU's replace or adjust sheaves to obtain scheduled maximum CFM at actual static pressure. At variable speed AHU's replace or adjust sheaves to obtain the scheduled supply CFM. Scheduled CFM shall not be exceeded with Variable drive at 100% where present.

2) Test and record motor full load amperes.

3) Make Pitot Tube traverse of main supply ducts and obtain design CFM at fans.

4) Test and record system static pressures, suction and discharge.

5) Test and adjust system for design recirculated air, CFM.

6) Test and adjust system for design CFM outside air.

7) Test and adjust system for design exhaust CFM.

8) Test and adjust system for design CFM in full economizer mode.

9) Test and record energy recovery system in full by pass during morning warm up.

10) Test and record entering D.B. cooling air temperature.

11) Test and record entering W.B. cooling temperature.

12) Test and record leaving D.B. cooling temperature.

13) Test and record leaving W.B. cooling temperature.

14) Adjust all main supply and return air ducts to proper design CFM.

15) Adjust all areas to proper design CFM, supply and return.

16) Test and adjust system for design at all exhaust fans.

17) Test and adjust each diffuser, grille, control unit, control terminal, etc. to within 5% of design requirements. Total air quantities for a zone or floor shall be from 0 to a maximum +10%.

18) Identify each grille, diffuser, control unit, control terminal, satellite, etc., as to location area, size, type and manufacturer.

19) Readings and tests of diffusers, grilles, control units, control terminals, satellites, etc., shall include requirement FPM velocity and test resultant velocity, required CFM and test resultant CFM after adjustments, all in accordance with manufacturer's ratings.

20) In cooperation with the control manufacturer's representative, set adjustments of automatically operated dampers to operate as specified, indicated, and noted.

21) Adjust diffusers, grilles, satellites, etc., to minimize drafts in all areas.

22) The Heating, Ventilating, and Air Conditioning Contractor shall make all changes in the sheaves, belts and dampers, and the addition of dampers as required for correct balance as required by Air Balance Agency, at no additional cost to the Owner.

C. Upon completion of detailed balance, all information shall be inserted on a sheet listing all items required by specifications and be included in a complete test and balance report. All sheets shall be neatly typed.

D. The Balancing Subcontractors shall, as a part of his work, perform a "spot" re-check of balancing conditions between 30 to 90 days after balancing, operations - at which time a representative of the Temperature Control Manufacturer capable of performing adjustments to his system shall accompany the representative of the balancing contractor. The operations shall include a check of space temperatures, calibration of controls, fan performance and the necessary adjustments thereto. A written report, in triplicate, shall be furnished to the Architect.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Exterior and interior duct insulation and accessories.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, thickness for each service or piece of equipment, aged thermal qualities, and accessories.

1.3 QUALITY ASSURANCE

A. Fire performance characteristics in accordance with ASTM E 84 for flame spread of 25 and smoke developed of 50.

B. Materials and installation in accordance with NFPA 255 and UL 723.

C. ASHRAE Standard 90.1-2010

1.4 MANUFACTURERS

A. Owens Corning, Johns-Manville, Schuller or Knauf.

2. PART 2 - PRODUCTS

2.1 MATERIALS

A. Foam: Shall only be used for air conditioning condensation drain piping and refrigerant suction piping.

1) Closed cell, foamed plastic, tubular, 3/4 in. minimum wall thickness, fire-rated, 220 deg. F. temperature rating. Pipe and joints shall be sealed with Manufacturer's approved adhesive.

2) Acceptable Manufacturers: Armstrong fire-rated "Armaflex," Rubatex, or Imcoa.

B. HVAC Ductwork:

1) Concealed rectangular and round ducts: Owens Corning All Service Wrap. 1-1/2 in. thick, 1 lb. density flexible fiberglass blanket, with reinforced foil and kraft vapor barrier facing, 250 deg. F. temperature rating.

2) Exposed round ducts: Flexible, 1 in. thick, 6 lb. density, fiberglass board with "AP" vapor barrier facing, 250 deg. F. temperature rating.

3) Exposed rectangular ducts: Owens Corning 703 ASJ. Semi-rigid, 1-1/2 in. thick, 3 lb. density, fiberglass board with ASJ vapor barrier facing, 250 deg. F. temperature rating.

4) Outside air intake ducts: 2 in. thick, 3 lb. density, fiberglass, with reinforced foil and kraft vapor barrier facing, 250 deg. F. temperature rating.

C. Insulating Cements

1) Mineral fiber.

2) Expanded or exfoliated vermiculite.

3) Mineral fiber, hydraulic-setting insulating and finishing cement.

D. TYPE 1 GREASE DUCT

1) Equivalent to Thermal ceramics fire master

2) 2 layers-encapsulate duct wrap double layered fire barrier shall be overlapped at all joints and be banded with steel banding at intervals of not exceeding 10.5 feet on center.

3) At changes in direction and as shown on plans the duct shall include UL listed grease duct access doors which shall be insulated with the same fore barrier material sealed with foil tape.

4) Approved for zero clearance to combustibles.

E. Adhesives: MIL-A-3316C, Classes 1 and 2, Grade A.

Jackets shall be adjusted for the application.

1) Exterior Piping: PVC jacket

2) Equipment: Foil

3. PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Leak test piping and ductwork system before installing insulation systems.

3.2 INSTALLATION

A. Install material in accordance with manufacturer's recommendations, in conformance with building codes and industry standards and "commercial and Industrial Insulation Standards."

B. A continuous vapor barrier is required.

C. Provide 24-gauge insulation shields at piping hanger systems.

D. Ductwork insulation shall be wrapped in lieu of liner for all applications except for specific sound attenuation means.

E. Sagging duct insulation will be unacceptable.

F. All duct sizes are net.

G. Insulation shall be continuous through sleeves and hangers, except through fire rated walls.

◆ END OF SECTION ◆

SECTION 23 09 00

GAS DETECTION SYSTEM

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Gas Detection Systems

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting materials, sizes, and dimensions and a proposed location of sensors.

1.3 QUALITY ASSURANCE

A. Standards:

1) National Electrical Manufacturers Association (NEMA).

2) National Fire Protection Association (NFPA).

3) Underwriters Laboratories, Inc., (UL).

1.4 ACCEPTABLE MANUFACTURERS

A. Armstrong, Haloguard, ACME, Toxalert, or Brasch

2. PART 2 - PRODUCTS

2.1 GAS DETECTION SYSTEMS

A. Supply and install Armstrong digital monitor AMC-1DBx series Multigas Centralized Detection and Control System capable of controlling fan motors and consisting of the following: NEMA 12 central monitoring panels with status lights, double- pole double-throw fan relays, CO sensors and NO2 sensors. Panels and remote sensors/transmitters shall be by the same manufacturer.

B. Refer to the drawings for location of the monitoring panels. Number of panels is as indicated on the drawings.

C. The contractor is responsible for providing a complete and operable system including all hardware, material, wiring, etc. All interlocking wiring with mechanical equipment is the responsibility of the contractor.

D. Refer to drawings for complete sequence of operation for interlocking requirements with makeup air units and exhaust fans.

E. It is the responsibility of the contractor to provide and install the recommended number of sensors required by the manufacturer

F. All wiring to be in conduit

2.2 CONTROL PANEL

A. The system shall use an addressable RS485 communication protocol. Each sensor shall be sequentially polled by the Control Panel. Sensor data shall be acquired and stored in the Control Panel memory.

B. The ACME CEL Series Multipoint System shall use only a common 4-wire 14 gauge communication link between the Control Panel and the local sensor stations.

C. The Control Panel shall have an LED display with an indicating light for each sensor location. This light shall blink slowly for low-level indication, blink quickly for high-level indication and be solid ON for alarm level indication. A liquid-crystal alphanumeric 4-line display shall provide PPM levels for each sensor station, shall indicate the gas being sampled at that location and its alarm status.

D. The Control Panel shall have a keypad for programming purposes and the programming shall be password protected.

E. The system shall have all of its components, including the controller, RS-485 communication module and relay outputs boards in a single enclosure. Multiple enclosures requiring inter-wiring are not acceptable.

F. The equipment shall be CSA and/or ETL certified.

G. "ON - OFF" : The Control Panel shall incorporate the necessary logic circuits to operate the exhaust/supply fans and the motorized dampers for fresh air and/or exhaust according to the specified logic of ventilation. For example, if the equipment operated by the 100 PPM CO contacts does not reduce the CO level below this value within 30 minutes (3 to 60 minutes adjustable), the Control Panel shall go on visual and audible alarm and also provide a contact for remote alarm indication or supervision.

H. CONSTRUCTION: The CEL Control Panel shall be of solid ventilated 16 gauge steel construction. All electronic components shall be behind a locked door. There shall be no accessible switches or knobs on front of panel (except for override if specified). All electrical connections should be made to clearly identified terminals.

I. SELF-CHECKING: Integrity of the system shall be under constant checking. Should a remote station not confirm a response, a fault condition will be displayed at the Control Panel with indication of faulty station location. A common alarm shall be locked in.

J. TIME DELAY: The Control Panel shall include a time delay of approximately 30 minutes scheduled between the time a High Level is detected and the time visual display on unit cover or panel, audible alarm and closure of alarm contacts. This time delay is introduced in order to avoid nuisance alarms produced by short temporary conditions. The time delay also allows the ventilation equipment, previously started at a lower gas level below alarm conditions, a reasonable length of time to reverse the gas trend.

K. Control Panel shall be capable of monitoring up to 20 sensors and controlling up to six ventilation zones (outputs signals). Each sensor shall be capable of controlling the activity of a specific zone, all zones or any combination of zones.

2.3 SENSOR STATIONS

A. The wall or column mounted metal or PVC gasketed enclosure with vandal proof cover screws or a lockable clasp and shall not have any parts accessible from outside

2.4 RESPONSE

A. The local reaction time of the remote stations shall be in the order of a few minutes therefore avoiding unnecessary start-stops of ventilation equipment every time a car happens to stop in the vicinity of the sensor.

B. The sensor's response to ambient conditions shall be interpreted by the detection circuitry according to selected levels. Information is converted for transmittal to Control Panel at scanning time.

C. CO Sensor/Transmitter stations shall have LED's for visual indication of "Power-On", and an LED bar graph indicating concentration levels.

D. Removing or disconnecting a local sensor station from the system shall not affect its operation as long as the "daisy-chain" connection to the other sensor stations is maintained.

E. There shall be no maintenance required except for periodic simple calibration checks performed by introducing a known gas mixture into the sensor and verifying or adjusting the electronic response at the sensor location.

F. CO Metal Oxide Semiconductor (MOS) sensors shall have a life expectancy of 5 years. NO2 and other Electrochemical Cell sensors shall have a life expectancy of two years.

2.5 OPTIONS

A. Provide on Control Panel selector switches with pilot lights to manually override all of the fans controlled by the system.

B. Provide in CEL Control Panel a battery back-up to maintain the system in operation during a power failure. A compact rechargeable battery shall be used because of the reduced power requirement of the CEL system.

C. Provide a Remote Alarm Station furnished with Audible/Visual alarm with silencing button.

D. Provide a 4-20 ma or 0-10V DC analog output signal based on the highest condition or on the average of conditions detected.

E. After complete installation, a manufacturer's representative shall check the installation before the system is started. A written report shall be submitted to the Architect, contractor & owner

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Wiring : The interconnections between the Control Panel and Sensors shall be made by a required number of branches consisting of 4 conductor 14 gauge wires. Each branch shall support a total length of 800ft and a maximum of eight (8) sensors. For CO remote sensor stations must be mounted vertically according to the arrow on the sensor. Heights between 4 ft. (1.20 m) and 6 ft.(1.80 m) are usual. For NO2 (Diesel Fumes): remote sensor stations must be mounted vertically according to the arrow on the sensor. Install NO2 sensors at heights between 1 foot and 18 inches below the ceiling.

B. CEL systems should be energized at all times. Supply 120/1/60 - 15A from dedicated circuit. It should be impossible to disconnect power to a CEL system in order to service other equipment.

C. All equipment shall be interconnected at the factory and shipped factory calibrated after a 7-day operational test. The logic of the system shall be factory tested by simulated field conditions as specified. A report shall be furnished with the equipment.

D. All electrical connections shall be made by the contractor according to diagrams shown on drawings furnished with the equipment by the manufacturer. Use 4-wire coded cable from station to station, maintaining color code. All wiring is low voltage (24V). All wiring to be in conduit.

◆ END OF SECTION ◆

1. PART 1 GENERAL

1.1 DESCRIPTION

A. Provide a complete operating control system for all heating, ventilating, and air conditioning systems.

B. Contractor shall coordinate all controls and wiring thereof, regardless of who furnishes the item. Contractor is responsible for all wiring diagrams, and writing all Sequences of Operation.

1.2 WARRANTY

A. Labor and materials for the control system specified shall be warranted free from defects for a period of (12) months after contract completion and acceptance. Control system failures during the warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to the Owner. Contractor shall respond to the Owner's request for warranty service within (24) hours during normal business hours.

B. All work shall have a single warranty date, even when the Owner has received beneficial use due to an early system start-up.

C. At the end of the final start-up, testing, and commissioning phase, the A/E shall sign certificates certifying that the control system's operation has been tested and accepted in accordance with the terms of this Specification. The date of contract completion shall be the start of the warranty.

2. PART 2 PRODUCTS

2.1 MISCELLANEOUS PRODUCTS

A. Heating/Cooling Thermostats:

1) Gas furnaces: Honeywell Model TH8320. Electronic, 7-day programmable thermostat that can control the condensing unit and gas fired furnace

2) Radiant heaters: Thermostats furnished with equipment by Manufacturer shall be programable with password protection.

3) Thermostats shall be wall-mounted, programmable, unless noted otherwise.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide a complete operating control system for all heating, ventilating, and air

conditioning systems.

B. Contractor shall coordinate all controls and wiring thereof, regardless of who furnishes the item. Contractor is responsible for all wiring diagrams, and writing all Sequences of Operation.

END OF SECTION

SECTION 23 23 00

REFRIGERANT PIPING

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Refrigerant piping and accessories.

1.2 QUALITY ASSURANCE

A. ASME B31.5 Refrigeration Piping latest edition.

B. UL 207 Refrigerant Containing Components and Accessories.

2. PART 2 - PRODUCTS

2.1 REFRIGERANT PIPING

A. Hard drawn, Type “ACR” copper tubing (ASTM B88), cleaned, and capped. **Option:** Pre- charged, pre-insulated line set.

B. Insulation: Refer to Section 23 07 00

2.2 FITTINGS

A. Wrought copper or wrought bronze fittings, (ANSI B16.22) with joints brazed.

2.3 BRAZING ALLOYS

A. 45% silver/phosphorous or silver/zinc alloys with a melting point greater than 1,000 deg. F.

B. Acceptable Manufacturers: Sil-Fos by Handy Harmon, Aircosil by Airco Welding Products, or ESAB Allstate.

2.4 SERVICE VALVES

A. Henry Type 203.

2.5 ACCESSORIES

A. Liquid line dryer, expansion valve, sight glass, charging valves, if not packaged with units.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Route suction and liquid lines from condensers to respective equipment. All lines shall be concealed unless noted otherwise.

B. Line sizes shall be per manufacturer’s recommendations.

C. Provide sight glass, filter/dryer assemblies, moisture indicators, thermal expansion valve and solenoid valves for each refrigeration circuit.

D. Pressure test refrigerant piping system at 300 psi for high side and 150 psi for low side.

E. Maintain pressure for a minimum of 24 hours.

F. Leak test piping and joints with an electronic or halide leak detector.

G. Evacuate entire system with an approved high vacuum pump system to 500 microns.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Low pressure supply (2-inch wg pressure class) sheet metal ductwork.

B. Low pressure return, relief and exhaust (2-inch wg pressure class negative) sheet metal ductwork.

1.2 QUALITY ASSURANCE

A. SMACNA HVAC Duct Construction Standards-Metal and Flexible.

B. UL181.

C. NAIMA AH124-94: Fibrous Glass Duct Liner Standard.

D. NFPA 90A and 90B.

E. ASHRAE Handbook, HVAC Systems and Equipment.

2. PART 2 - PRODUCTS

2.1 STEEL DUCTWORK

A. SMACNA Section I. Galvanized steel, 24 ga. through 16 ga., intermediate reinforcing bracing, slip joints, mechanical formed seams, beaded, and cross-broken.

B. Elbows, Branches, Transitions, Offsets: SMACNA Section II. Round duct fittings shall be conical with scoops at branch takeoffs. Round elbows shall be 3-piece type.

C. Turning Vanes: Tuttle & Bailey “Duct-Turns.” SMACNA Section II, Fig. 2-3. Double- thickness airfoil.

1) Other Acceptable Manufacturers: Approved equal by Titus or Anemostat.

D. Equipment Casings, Flexible Connections, Curbs, Plenum Access Doors: SMACNA Section VI.

1) Hangers, Attachments, and Supports: SMACNA Section IV.

2.2 FLEXIBLE DUCTWORK AND FLEXIBLE DUCT CONNECTIONS

A. Flexible Ductwork:

1) Contractor-fabricated insulated round rigid sheet metal ductwork for branch runouts with insulated flexible duct connections to diffusers (maximum 5 ft. long flexible duct).

2) Option to insulated rigid round ductwork: Flexmaster Type TL-V. Pre-insulated, semi- rigid, triple-lock, aluminum, flexible, round ductwork for branch runouts and connections to diffusers. 6 in. pressure rating.

3) Flexible duct connections to diffusers (maximum 5 ft. long): Flexmaster Type 3M. Insulated with a trilaminate of aluminum foil, fiberglass, and aluminized polyester. Fire-retardant-reinforced aluminum outer jacket. 12 in. positive pressure rating.

4) UL 181 Class I, shall not exceed 25 Flame Spread and 50 Smoke Developed.

B. Flexible Duct Connections: Ventfabrics "Ventglas." 30 oz. neoprene-coated glass fabric.

2.3 DUCT SEALER

A. Acceptable Manufacturers: United McGill Corporation "United Duct Sealer" or approved equal by Hardcast or Foster.

2.4 DAMPERS

A. Refer to Section 23 33 00 for extractors, splitter-dampers, volume dampers, backdraft dampers, and motorized control dampers.

2.5 DUCT ACCESS DOORS

A. Ward Industries. Constructed of corresponding metal, minimum 22 ga. with felt stripping or foam rubber gasketing, and completely airtight. Provide QUICK-OPENING LATCHES OR WING NUTS.

1) Rectangular door equal to width of duct minus 1 in. in one direction, and at least 12 in. in the other direction for access to motorized, or fire dampers. Larger size, if noted.

2.6 FINISHING

A. Exposed round or rectangular ductwork in finished spaces shall be coated with Glidden #5229 galvanized primer or provided with "paint grip" primed by the Contractor for field painting. Provide (primed) sheet metal escutcheons wherever ductwork penetrates a finished wall surface.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. This contractor shall furnish and install the complete low pressure ducting system, return air and exhaust air systems, outside air intake ducting, required flashing, hangers, etc. as specified herein, shown on the drawings, as may be required to complete the work.

B. Provide ductwork, including turning vanes, extractors, splitter-dampers, volume dampers, access doors, and flex connections, for the following:

1) Outside air.

2) Supply air.

3) Return air.

4) Exhaust air:

C. Ductwork layout is schematic; provide risers, drops, offsets around obstructions, flattened sections, etc., and all fittings as necessary to install the ductwork.

D. Contractor shall coordinate size and location of ductwork with structure, piping, lighting, equipment, cable trays and clear height above ceiling and other areas of potential conflict.

E. All duct sizes are net.

F. Round duct may be substituted for rectangular duct where space permits.

G. Duct work shall not be run over electrical switch gear or panel boxes.

H. Keep ductwork tight to underside of structure. Maintain at least 7" clearance between ceiling and duct work.

I. Provide the flexible connections at ductwork connections to vibrating or rotating equipment, including fans.

J. Install flexible ducts only at supply diffusers with no 90° bend. Use sheet metal for 90 degree bends.

1) Provide balance damper at each flexible connection at duct main.

2) Flexible ducts shall not sag more than ½" per linear foot.

K. Flexible ducts shall not be pinched with hangers or supports

◆ END OF SECTION ◆

SECTION 23 33 00

DUCTWORK ACCESSORIES

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Backdraft dampers, manual volume dampers and balance dampers.

1.2 SUBMITTALS

A. Submittals are required and shall include material, sizes, quantities, and dimensions.

1.3 QUALITY ASSURANCE

A. SMACNA HVAC Duct Construction Standards-Metal and Flexible

B. UL181

C. NFPA 90A and 90B

D. ASHRAE Handbook, HVAC Systems and Equipment

E. ASTM E 477.

1.4 MANUFACTURERS

A. Ruskin or approved equal by P r i c e , American Warming and Ventilating, Air Balance, Arrow, National Controlled Air, Inc., Cesco, Flexmaster, Honeywell, Johnson Controls, Louvers and Dampers, Tamco, Vent Products, or Airstream.

B. Manufacturer and Model Number listed under Part 2 shall be considered to be the Design Base Manufacturer and Model Number. Other Acceptable Manufacturers will be permitted, unless specifically excluded.

2. PART 2 - PRODUCTS

2.1 CONICAL TAKE-OFF (FOR ROUND BRANCH DUCTS)

A. Combination Conical Take-Off / Butterfly Damper: Flexmaster Model FLDE. Spin collar 45 deg. scoop, with butterfly damper with adjustable operator.

B. Option: Flexmaster Model CBDE. Conical Bellmouth fitting, with butterfly damper with adjustable operator.

2.2 EXTRACTORS (FOR RECTANGULAR BRANCH DUCTS)

A. Tuttle and Bailey “Vectrols.” Steel frame and parallel diverting blades, angle bracket, pivot bearing assembly, worm gear operator, and control shaft.

B. Other Acceptable Manufacturer: Approved equal by Titus or Amnemostat.

2.3 SPLITTER DAMPER (FABRICATED)

A. Steel frame and adjustable diverting blades, angle bracket, pivot bearing assembly, worm gear operator.

2.4 BALANCING DAMPERS (VOLUME DAMPERS)

A. Galvanized steel, steel blades, molded synthetic bearings, locking quadrant with stand-off bracket.

1) Rectangular for ducts larger than 12 in.: Ruskin Type MD35.

2) Rectangular for ducts 12 in. and smaller: Ruskin Type MD25, single-blade.

3) Round: Ruskin Type MDRS25, single-blade.

2.5 CONTROL DAMPERS (OUTSIDE AIR INTAKE AND EXHAUST ONLY)

A. Low leakage type, aluminum frame, 6 in. heavy-gauge extruded aluminum airfoil blades, concealed linkage, 1/2 in. hexagonal steel axles, vinyl blade edge seal, molded synthetic bearings, extended 1/2 in. control shaft, motor operator bracket, maximum leakage less than 4 CFM per sq. ft. at 4 in. W.G.

1) Acceptable Manufacturers: Ruskin Type CD-50, American Warming Type VC-29, Vent Products Model 5900, or approved equal by Louvers and Dampers.

B. Furnish motor-operable dampers. All linkages for operators shall be furnished with dampers.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide all Manual Volume Dampers dampers for adjusting air flow.

B. Install motor-operable control dampers. Provide low-voltage transformers as necessary.

C. Provide gravity backdraft dampers where indicated.

D. Motor operable dampers for exhaust fans shall be furnished with the units.

E. Provide duct mounted access for all control dampers for inspection and maintenance.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Ceiling mounted and propeller exhaust fans.

1.2 SUBMITTALS

A. Submittals are required and shall include material capacities, quantities, and accessories.

1.3 QUALITY ASSURANCE

A. Sound Power Level Rating: AMCA 301.

B. Performance Requirements: AMCA 210.

1.4 MANUFACTURERS

A. Greenheck, Acme, Penn, or Cook.

2. PART 2 - PRODUCTS

2.1 GNERAL EXHAUST FANS

A. PROPELLER EXHAUST FANS

1) Direct drive, axial type sidewall fans shall be provided as follows: Propellers shall be constructed with fabricated aluminum blades and hubs. A standard square key and set screw bushing shall lock the propeller to the motor shaft. All propellers shall be statically and dynamically balanced to AMCA Standard 204-05.

a) Motors shall be permanently lubricated, heavy duty type, carefully matched to the fan load and furnished at the specified RPM, voltage, phase, and enclosure.

2) Motor drive frame assemblies and fan panels shall be galvanized steel. Drive frame assemblies shall be welded wire and fan panels shall have prepunched mounting holes, formed flanges, and a deep formed inlet venturi. Drive frames and panels shall be bolted construction or welded construction (level 2 & 3 fans only).

3) Options: Gravity Shutters: interlocked blades with nylon bearings. Motor-Side Back Guard: Galvanized steel, complying with OSHA specifications, removable for maintenance. Wall Sleeve: Galvanized steel to match fan and accessory size and any options listed on drawings.

4) Disconnect Switch: Non-fusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.

B. CEILING/INLINE EXHAUST FANS

1) Galvanized steel housing, acoustical lining, control/junction box, field-adjustable discharge duct connection with backdraft damper. Inlet duct connection on inline fans.

a) Fans: Forward curved centrifugal blower wheel(s) shaft-mounted to permanently lubricated motor. Blower and/or motor resiliently mounted to fan housing.

b) Controls: Motor power cord with receptacle plug, fan control as scheduled, unit mounted variable speed controller, or other devices as shown on the Exhaust Fan Schedule.

c) Options: Wall cap or brick vent as scheduled.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Supply as scheduled on drawings.

B. Install per manufacturer's instructions.

C. Install all fans with flexible connection from fan to ductwork.

D. Provide vibration isolators on all suspended fan housings.

E. Install in accessible locations for maintenance.

◆ END OF SECTION ◆

SECTION 23 34 39

DIRECT DRIVE HIGH VOLUME, LOW SPEED (HVLS) PROPELLER FANS

1. PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: High-Volume, Low-Speed Propeller Fans

1.2 REFERENCES

A. Air Movement and Control Association Inc. (AMCA), American National Standards Institute (ANSI):

1) 204-05 - Standard Balance Quality and Vibration Levels for Fans

2) 210-99 - Standard Laboratory Methods of Testing Fans for Aerodynamic Performance Rating

3) 230-15 - Standard Laboratory Methods of Testing Air Circulating Fans for Rating and Certification

1.3 SUBMITTALS

A. Provide dimensional drawings and product data on each fan.

B. Provide A-weighted total sound pressure levels in decibels for each fan.

C. Strictly adhere to QUALITY ASSURANCE requirements as stated in section 1.4 of this specification.

D. Installation, Operation, and Maintenance Manual (IOM): Provide manufacturer's installation, operation, and maintenance manual, including instructions on installation, operation, maintenance, receiving, handling, storage, and cleaning. A troubleshooting guide, parts list, safety information and electrical wiring diagrams shall also be included.

1.4 QUALITY ASSURANCE

A. Entire fan assembly shall be UL/cUL-Listed to Underwriters Laboratory (UL) Standard 507 and CSA Standard 22.2 No. 113 to ensure compliance with the most current international testing standards. Intertek/ETL certification to UL Standard 507 and CSA Standard 22.2 No. 113 shall not be accepted.

B. Entire fan assembly shall bear the CE mark to ensure compliance with the most current international testing standards.

C. Fans shall be compliant with NFPA 13 – Standard for the Installation of Sprinkler Systems, NFPA 72 – National Fire Alarm and Signaling Code, and NFPA 70 – National Electrical Code (NEC).

D. Fan controls shall comply with the National Electrical Code (NEC) and Underwriters Laboratory (UL) standards.

E. Good workmanship shall be evident in all aspects of the fan's construction. Field balancing of the fan's airfoils and hub shall not be required.

F. All fan motors and variable frequency drives (VFDs) shall be factory-tested prior to shipment.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer, material, products included, and location of installation.

B. Storage: Store materials in a dry area indoor, protected from damage, and in accordance with manufacturer's instructions. For long term storage follow manufacturer's Installation, Operation, and Maintenance Manual.

C. Handling: Handle and lift fans in accordance with the manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage. Follow all safety warnings posted by the manufacturer.

1.6 WARRANTY

A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

1) The warranty of this equipment is to be free from defects in material and workmanship for a period of ten years from the purchase date. Any units or parts which prove defective during the warranty period will be replaced at the Manufacturer's option when returned to Manufacturer, transportation prepaid.

2) Motor and variable frequency drive (VFD) are warranted by the motor & VFD manufacturer for a period of one year.

1.7 MAINTENANCE

A. Refer to Manufacturer's Installation, Operation and Maintenance Manual (IOM), to find maintenance procedures.

2. PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Greenheck, Big Ass Fans or Sky Blade

2.2 DIRECT DRIVE HIGH VOLUME, LOW SPEED (HVLS) PROPELLER FANS -

A. General Description:

1) Entire fan assembly shall be UL/cUL-Listed to Underwriters Laboratory (UL) Standard 507 and CSA Standard 22.2 No. 113 to ensure compliance with the most current international testing standards. Intertek/ETL certification to UL Standard 507 and CSA Standard 22.2 No. 113 shall not be accepted.

2) Entire fan assembly shall bear the CE mark to ensure compliance with the most current international testing standards.

3) Fans are available in four sizes with nominal impeller diameters ranging from 8 feet through 14 feet (8 - 14 unit sizes).

4) Performance capabilities up to 54,900 cubic feet per minute (cfm).

5) Maximum continuous operating temperature of 104° Fahrenheit (40° Celsius).

6) Designed for forward (counter-clockwise when viewed from floor) and reverse (clockwise when viewed from floor) operation capabilities, for comfort cooling and destratification applications.

7) Each fan shall bear a permanently affixed manufacturer's mylar nameplate containing the model number, individual serial number, and electrical requirements of the fan.

B. Impeller:

1) Impeller shall be constructed of aerodynamic 6005A-T6 extruded aluminum airfoil blades connected to a single-piece, laser-cut 5/16 inch steel hub for structural strength. Multi-piece hubs shall not be permitted. All connections shall be made using a minimum of SAE Grade 5 hardware.

2) Airfoil blades shall be interlocked with one another and the impeller hub via a heavy-duty steel airfoil retaining ring for safety. Airfoil retaining ring shall be constructed of heavy gauge steel and installed at the factory to ensure proper function. Field-installed airfoil retainers shall not be accepted.

3) Airfoil blades shall be provided with a mill aluminum finish as standard. Optional finishes shall include industrial powder coatings, anodize finishes, wood grain finishes, or custom color matched coatings.

4) Airfoil blades shall be optimized for maximum airflow, fan efficiency, and coverage area.

5) Airfoil blades shall be internally reinforced to minimize blade deflection while the fan is in standby or in operation. Blade deflection shall not exceed ±2.4 inches in either situation.

6) Airfoil blades shall be designed for minimal weight in order to maximize fan efficiency. Individual blade weight shall not exceed 10 pounds.

7) Impeller hub shall be secured to the face of the motor by a minimum of 6 bolts. Impeller hub shall also be connected to the building structure via a safety restraint cable and hub retaining ring. Hub retaining ring shall be constructed of heavy gauge steel and installed at the factory to ensure proper function.

C. Motor:

1) Motor enclosure: [IP54]

2) Motors shall be of the high torque, low speed direct drive type, carefully matched to the fan load and furnished at the specified voltage and phase. High speed motors provided with a gearbox to reduce the operating speed of the fan shall not be permitted.

3) Motors shall be an external rotor design. Internal rotor motors shall not be permitted.

4) Motors shall be of the brushless DC type for maximum efficiency and speed controllability. No other motor type shall be accepted.

5) Motors shall include plug-and-play connectors for all wiring to the variable frequency drive. Motors that require these wiring connections to be stripped and terminated in the field shall not be permitted.

6) Motors shall include an internally-mounted thermistor for continuous monitoring of the motor's internal temperature.

7) Motors shall include Class B insulation.

D. Variable Frequency Drive (VFD):

1) VFD enclosure: [IP50]

2) VFD shall be factory programmed and designed for Modbus RS-485 communication with control devices via the Modbus RTU communication protocol.

3) VFD shall be UL Listed for single phase input at the specified voltage.

4) VFD shall include two thermistors for continuous monitoring of VFD's internal and external temperature.

5) VFD shall include sensors for continuous monitoring of voltage and current.

6) VFD shall include intelligent protection systems to prevent failures caused by over/under-voltage, over-current, over-temperature, over-speed, and fan impact. VFDs without these protection features shall not be permitted.

7) VFD shall include the most current firmware version as of the product's manufacturing date to ensure optimal performance. As a result of continuous development, the manufacturer reserves the right to update VFD firmware without notice.

E. Universal Ceiling Mount & Downtube:

1) Fans shall be provided with a universal ceiling mount that is designed for fast and secure installation on a variety of building structures. Universal ceiling mount shall be constructed of heavy gauge, bolted steel and shall include a pivoting knuckle joint with one axis of rotation to accommodate any ceiling pitch.

2) Downtube shall be constructed of heavy gauge steel to provide a structural connection between the universal ceiling mount and fan motor. Downtube shall also include a welded guy wire connection ring for fast and secure installation of guy wires when required based on downtube length.

3) Universal ceiling mount and downtube shall be powder-coated for corrosion resistance and aesthetic appearance.

4) Standard drop length between top of universal ceiling mount and top of airfoil blades shall be 2 feet. Optional drop lengths are also available in one foot increments between 3 and 10 feet.

5) All hardware shall be a minimum of SAE Grade 5.

F. Safety Retention Cables

1) Fans shall include a braided galvanized steel safety retention cable that is rated for a load of 495 pounds or greater. Safety retention cable shall be installed on the fan motor at the factory to ensure proper function. Field construction or installation of safety retention cables shall not be permitted.

2) Safety retention cable shall be secured around the building structure via a minimum of 2 u-bolt steel cable clamps as standard. Optionally, safety retention cable may be secured via a No. 4 Gripple® connector for ease of installation.

G. Guy Wires

1) Guy wires shall be included for fans with drop lengths equal to or greater than 4 feet in length. Guy wires shall be constructed of braided galvanized steel and designed to prevent lateral movement of the fan when installed.

2) If included, guy wires shall be secured to the building structure via the supplied beam clamps and quick links for ease of installation.

3) If included, guy wires shall be secured to the fan and tensioned via high-strength steel turnbuckles with quick links. Turnbuckles shall be connected to each guy wire via a minimum of 2 u-bolt steel cable clamps per guy wire as standard. Optionally, guy wires may be secured to the fan and tensioned via 1 UG2 Gripple® turnbuckle per guy wire for ease of installation.

H. Fire Control Panel Integration

1) Fans shall include a normally closed relay for integration with a building's fire control panel. Normally closed relay shall be compatible with 24 VDC/VAC and 115 VAC control signals.

I. Options/Accessories:

a) Type: Hi-Pro Polyester

[1] Fan Components: Universal Ceiling Mount, Downtube, Impeller Hub, Airfoil Blades, Winglets

[2] Colors: Flat Black or as selected by owner

b) Type: -Purlin Kit

2) Disconnect Switches:

a) NEMA Rated: 1R

b) Protection: None

c) Positive electrical shut-off.

d) Shipped loose for field mounting.

3) Fan Controls:

a) Type: Touchscreen Control

b) Controls shall be capable of operating one or multiple HVLS fans as standard. Controls shall provide start/stop, speed, and rotation direction control capabilities as well as diagnostic and fault history information for each connected fan.

c) Controls shall include RJ45 ports for plug-and-play connection to HVLS fans via CAT-5e communication cable in the field.

4) CAT-5e Cable Length:

a) Type: 100 feet

b) CAT-5e cable must be shielded 26 gauge cable with a drain wire and must be compliant with ISO 11801 to prevent network communication issues. Cable must use shielded RJ45 connectors with a soldered drain and wiring configuration must follow EIA/TIA T568B wiring pinout.

5) Extended Warranties:

a) Type: 11 Yrs.

3. PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including technical bulletins, product catalog, and installation instructions.

3.2 EXAMINATION

A. Examine areas to receive fans. Notify the Engineer of conditions that would adversely affect installation or subsequent utilization and maintenance of fans. Do not proceed with installation until unsatisfactory conditions are corrected.

3.3 PREPARATION

A. Verify that the fan is to be installed in a location where the airfoils will be a minimum of 10 feet above the finished floor with a minimum of 3 feet of clearance to any obstructions.

B. If the building has a mezzanine or other elevated spaces that may be occupied by people, verify that no component of the fan can be reached from the highest level or deck. The fan must be positioned so that the tips of the airfoils are a minimum of 3 feet away from the furthest point that a person could extend an appendage outward.

C. If the fan is to be mounted in an area where materials or equipment may be elevated into its path, ensure that the floor is marked or painted to alert personnel of the overhead location of the fans.

D. If the building is equipped with a fire sprinkler system, verify that the placement of the fan will not interfere with correct sprinkler operation and that the fan installation complies with all national, state and local codes. For NFPA 13 compliance, fans must be installed in the center of four adjacent sprinklers with at

least 3 feet of vertical clearance between the fan and sprinkler deflectors. Fans must also be interlocked to shut down upon receiving a waterflow signal from the building's alarm system.

E. Check to see if the intended placement of the fan is directly below any building lights or skylights. Avoid installing fans directly below a light source to prevent a strobing effect that can be caused by fan rotation.

F. For best performance, fans must be installed with a two fan diameter minimum clearance between the center of the fan and radiant heaters or HVAC system discharges or intakes.

G. Verify that the mounting surface will bear the operating weight and maximum torque (twisting force) of the unit. The Structural Engineer of Record (SEOR) must perform a thorough evaluation of the mounting structure and determine all final mounting requirements before the fan is installed.

3.4 INSTALLATION

A. Install fan system as indicated in the Installation, Operation and Maintenance Manual (IOM) and contract drawings.

B. Install fans in accordance with manufacturer's instructions.

3.5 SYSTEM STARTUP

A. Refer to Installation, Operation, and Maintenance Manual (IOM).

3.6 CLEANING

A. Clean as recommended by manufacturer. Do not use material or methods which may damage finish surface or surrounding construction.

3.7 PROTECTION

A. Protect installed product and finished surfaces from damage during construction.

B. Protect installed fans to ensure that, except for normal weathering, fans will be without damage or deterioration at time of substantial completion.

◆ END OF SECTION ◆

SECTION 23 37 13

DIFFUSERS REGISTER AND GRILLES

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Supply air registers

B. Supply air diffusers

C. Return air grilles

1.2 SUBMITTALS

A. Submittals are required and shall be scheduled by room number to include performance material, sizes, quantities, finishes, and accessories.

1.3 QUALITY ASSURANCE

A. ASHRAE Standard 70 for performance testing

B. NFPA 90A for installation

1.4 MANUFACTURERS

A. Price, Titus, Kruger or approved USA manufactured equal.

2. PART 2 - PRODUCTS

2.1 COMPONENTS

A. Supply Air Registers

1) Rigid steel construction

2) Double deflection louvers

3) Front and rear louvers individually adjustable, horizontal to the front

4) Baked white enamel finish or powder paint white finish

5) Options as listed on drawings and schedules.

B. Supply Air Diffuser

1) All 18 gauge steel diffuser

2) Solid face panel with curved back pan designed for VAV usage

3) Low profile flange for flush appearance.

4) Baked white enamel finish

5) Insulate back pan above ceilings in areas with ducted return.

6) Options as listed on drawings and schedules.

C. Eggcrate Grille Return Air Grille or Transfer Grille

1) 1/2 inch by 1/2 inch by 1/2 inch aluminum grid

2) Aluminum border

3) Provide frame for appropriate ceiling mounting

4) Baked white enamel finish or powder paint white finish

5) Options as listed on drawings and schedules.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Install at each location shown on the drawings and as scheduled.

◆ END OF SECTION ◆

SECTION 23 38 00

KITCHEN HOOD VENTILATION SYSTEM

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Kitchen canopy hood exhaust complete with ductwork, controls, fire suppression system, and related accessories.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacity, materials, controls, dimensions, accessories, detailed ductwork and electrical layouts specific to each system.

B. Certified fire suppression system including number and spacing of protection nozzles.

1.3 QUALITY ASSURANCE

A. Canopies shall be labeled and listed in accordance with UL 710.

1) Listing shall be for installation without exhaust dampers.

B. Fabrication shall be in accordance with NFPA 96.

C. Assembly shall bear the National Sanitation Foundation (NSF) Seal of Approval.

D. Fan performance rating shall comply with AMCA 210.

E. Fan systems shall be UL listed and labeled for transfer of grease laddened vapors.

F. Canopies shall comply with the requirements approved by BOCA, SBCC, and ICBO.

G. Balance of air systems shall be by an independent air balancing firm certified as NEBB or AABC.

H. Hood shall be UL listed.

1.4 WARRANTY

1) Manufacturer shall warrant this equipment to be free from defects in materials and workmanship, under normal use and service, for a period of 12 months from date of acceptance.

2) Should any part of the equipment prove to be defective in material or workmanship within the 12 month warranty period, upon examination such part will be repaired or replaced at no charge. This Contractor shall pay all labor costs incurred in connection with such repair or replacement.

1.5 MANUFACTURERS

A. Accurex, Captive Aire, or Kees

2. PART 2 - PRODUCTS

2.1 EXHAUST HOOD

A. Kitchen Ventilation hood(s) shall be of the Type I, exhaust only wall canopy suitable for all types of cooking applications. The hood(s) shall be U.L. 710 Listed without a fire damper (with optional) for 400°F, 600°F, or 700°F rated cooking appliances. Please visit www.ul.com for U.L. 710 listing for performance and size options. Make-up air shall be independently provided.

B. The hood(s) exterior shall be constructed of a minimum of 18 gauge 400 series stainless steel (300 series optional). The hood(s) shall be constructed using the standing seam method for optimum strength and with a Performance Enhancing Lip (PEL) to improve capture efficiency by turning air back into the hood. An integral 3 inch air space is provided to meet NFPA® 96 clearance requirements against limited combustible walls. Integral 3 inch air space may be omitted for non-combustible construction. All seams, joints and penetrations of the hood enclosure shall be welded and/or liquid tight. Lighter material gauges, alternate material types and finishes are not acceptable. All unexposed interior surfaces shall be constructed of a minimum 18 gauge corrosion resistant steel including, but not limited to ducts, plenum, and brackets.

C. The hood(s) shall include a filter housing constructed of the same material as the hood. The Grease-X- Tractor high efficiency stainless steel filters shall be U.L. 1046 Classified and NSF Certified as manufactured by Accurex, in sufficient number and size to ensure optimum performance. Grease-X- Tractor filters shall direct the exhaust airflow through individual cyclone chambers, utilizing centrifugal impingement grease extraction technology. The filter housing shall terminate in a pitched, full length grease trough which shall drain into a removable grease container. These filters shall have a grease removal efficiency of 69% at 8 microns (51% from 3-10 microns) and static pressure drop of 0.7-0.8 inWC.

D. Vapor proof, U.L. Listed LED light fixtures shall be pre-wired to a junction box located at the top of the hood for field connection. Wiring shall conform to the requirements of the NFPA® 70.

E. The canopy hood(s) shall be built in accordance with the NFPA® 96, IMC, UMC, and bear the NSF Seal of Approval. The hood manufacturer shall provide, on request, the necessary data that confirms compliance with the code authorities listed above.

2.2 OPTIONAL FEATURES

A. Integral to the hood a utility cabinet shall house fire protection agent tanks and prewired fan and switch package.

B. The wall, including ends, where the hood attaches to shall be covered from floor to ceiling with stainless steel metal to match hood. Maximum width of panels shall be 4'-0". All panels shall be of equal length.

C. Side skirt panels.

2.3 EXHAUST FAN

A. Provide Exhaust Fan as shown on plans and in accordance with the following specification.

B. Roof exhaust fans shall be upblast centrifugal belt driven type. The fan wheel shall be centrifugal backward inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced. The fan housing shall be constructed of heavy gauge aluminum with a rigid internal support structure. Wind bands shall have a rolled bead for added strength and shall be joined to curb caps with a leak proof, continuously welded seam.

C. Motors shall be heavy duty ball bearing type, carefully matched to the fan load, and furnished at the specified voltage, phase and enclosure. Motors and drives shall be mounted on vibration isolators, out of the airstream. Fresh air for motor cooling shall be drawn Into the motor compartment from an area free of discharge contaminants. Motors shall be readily accessible for maintenance. Drive frame assemblies shall be constructed of heavy gauge steel and mounted on vibration isolators.

D. Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged operating speed. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be of the fully machined cast iron type, keyed and securely attached to the wheel and motor shafts.

E. Motor pulleys shall be adjustable for final system balancing. A disconnect switch shall be factory installed and wired from the fan motor to a junction box installed within the motor compartment. A conduit chase shall be provided through the curb cap to the motor compartment for ease of electrical wiring.

F. All fans shall bear the AMCA Certified Ratings Seal for sound and air performance.

G. Each fan shall bear a permanently affixed manufacturer's engraved metal nameplate containing the model number and individual serial number for future identification.

H. Fans shall be listed by Underwriters Laboratory for UUcUL 762 Listed for all electrical components and grease removal.

2.4 FIRE PROTECTION SYSTEM

E. Manufacturer

1) Tyco Fire Suppression & Building Products, One Stanton Street, Marinette, Wisconsin 54143-2542, Telephone (715) 735-7411.

F. Components

1) The basic system shall consist of an ANSUL AUTOMAN regulated release assembly which includes a regulated release mechanism and a wet chemical storage tank housed within a single enclosure. Nozzles, blow-off caps, detectors, cartridges, agent, fusible links, and pulley elbows shall be supplied in separate packages in the quantities needed for fire suppression system arrangements. Additional equipment shall include remote manual pull station, mechanical and electrical gas valves, and electrical switches for automatic equipment and gas line shut-off, and building lire alarm control panel interface.

2) Wet Chemical Agent: The extinguishing agent shall be a specially formulated, aqueous solution of organic sails with a pH range between 7.7 - 8.7, designed for flame knockdown and foam securement of grease related fires.

3) Agent Tank: The agent tank shall be installed in a stainless-steel enclosure or wall bracket. The tank shall be constructed of stainless steel. Tanks shall be avail- able in two sizes; 1.5 gallon (5.7 L) and 3.0 gallon (11.4 L).The tank shall have a working pressure ol 110 psi (7.6 bar), a lest pressure of 330 psi (22.8 bar), and a minimum burst pressure of 660 psi (45.5 bar). The lank shall include an adaptor/tube assembly containing a burst disc union.

4) Regulated Release Mechanism: The regulated release mechanism shall be a spring-loaded, mechanical pneumatic type capable of providing the expellant gas supply to one or two agent tanks depending on the capacity of the gas cartridge used or three 3.0 gallon (11.4 L) agent storage tanks in certain applications. It shall contain a factory installed regulator deadset at 110 psi (7.6 bar) with an external relief of approximately 180 psi (12.4 bar).

a) It shall have the following actuation capabilities: automatic actuation by a fusible link detection system and remote manual actuation by a mechanical pull station.

b) The regulated release mechanism shall contain a release assembly, regulator, expellant gas hose, and agent storage tank housed in a stainless-steel enclosure with cover. The enclosure shall contain knock-outs for 1/2 in. conduit. The cover shall contain an opening for a visual status indicator.

c) It shall be compatible with mechanical gas shut-off devices; or, when equipped with a field or factory- installed switch(es), it shall be compatible with electric gas line or appliance shut-off devices, or connections to a building lire alarm control panel.

5) Regulated Actuator Assembly: When more than two agent tanks or three agent tanks in certain applications are required, the regulated actuator shall be available to provide expellant gas for additional tanks. It shall be connected to the cartridge receiver outlet of the regulated release mechanism providing simultaneous agent discharge. The regulator shall be deadset at 110 psi (7.6 bar) with an external relief of approximately 180 psi (12.4 bar). The regulated actuator assembly shall contain an actuator, regulator, expellant gas hose, and agent lank housed in a stainless steel enclosure with cover. The enclosure shall contain knockouts to permit installation of the expellant gas line

6) Discharge Nozzles: Each discharge nozzle shall be tested and listed with the R-102 system for a specific application. Nozzles tips shall be stamped with the flow number designation (1/2, 1, 2, or 3). Each nozzle shall have a metal or rubber blow-off cap lo keep the nozzle tip orifice free of cooking grease build-up

7) Distribution Piping: Distribution piping shall be Schedule 40 black iron, chrome-plated, or stainless steel conforming to ASTM A120, A53, or A106.

8) Detectors: The detectors shall be the fusible link style designed to separate at a specific temperature.

9) Cartridges: The cartridge shall be a sealed steel pressure vessel containing either carbon dioxide or nitro- gen gas. The cartridge seal shall be designed to be punctured by the releasing device supplying the required pressure to expel wet chemical agent from the storage tank.

10) Agent Distribution Hose: An optional agent distribution hose shall be available for kitchen appliances manufactured with or resting on casters (wheels/rollers) This shall allow the appliance to be moved for cleaning purposes without disconnecting the appliance fire suppression protection. Hose assembly shall include a restraining cable kit to limit the appliance movement within the range (length) of the flexible hose.

11) Flexible Conduit: The manufacturer supplying the Restaurant Fire Suppression System shall offer flexible conduit as an option to rigid EMT conduit for the installation of pull stations and/or mechanical gas valves. The flexible conduit shall be UL Listed and include all approved components for proper installation.

12) Pull Station Assembly: The Fire Suppression System shall include a remote pull station for manual system actuation. The pull station shall be designed to include a built-in guard to protect the pull handle. The pull station shall also be designed with a pull handle to allow for three finger operation and shall be red in color for quick visibility.

2.5 CONTROLS

E. Provide Controls as shown on plans and in accordance with the following;

1) The Control system shall be a UL listed outlet center which shall standardly consist of a NEMA·1 Stainless Steel Enclosure within a Stainless Steel Utility Cabinet, Programmable Logic Controller (PLC), User Interface (keypad with LCD display or touchscreen),

2) The user interface shall be either a keypad or touchscreen provided in accordance with the following specifications.

a) Keypad: The user interface shall be a membrane keypad with a graphic overlay and LCD display consisting of, but not limited to, a Lights On/Off button, Fan On/Off button, and Fan 100% button. The control interface shall also include a temperature interlock indicator and system fault Indicator light.

b) Touch Screen: The user interface shall be a touch screen with independent fan and light control,

[1] In a fire condition, the control panel shall be capable of forcing the exhaust to maximum speed, shutdown of supply air, and shutdown of lights regardless of current fan speeds via integration with a fire system.

[2] Controls are also standardly provided with a remote enable, fire system interface, and shunt trip breaker control.

3. PART 3 – EXECUTION

3.4 INSTALLATION

E. Install in accordance with manufacturers requirements.

F. Manufacturer’s service representative shall provide compete check, test, and start-up on the system.

G. Locate the manual pull station a minimum of 10'-0" from the kitchen canopy in the path of egress from the cooking area as shown on drawings.

3.5 DUCTWORK AND ACCESSORIES

E. Exhaust ductwork shall be constructed of 16 gauge carbon steel, welded liquid tight.

F. Duct shall be wrapped with 2 layers-encapsulate duct wrap double layered fire barrier.

G. Cleanouts are required in changes of direction of exhaust ductwork.

◆ END OF SECTION ◆

SECTION 23 54 16

WARM AIR FURNACES

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. High efficiency warm air gas fired furnaces and accessories

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting the following:

1) Product data indicating dimensions, capacities, and materials.
2) Fan performances including curves.
3) Filter data, mounting method, and performance.

1.3 QUALITY ASSURANCE

A. Construction standard shall meet NFPA 90A.

B. Product certification shall comply with AGA/CGA.

C. Fan performance rating shall comply with AMCA 210.

D. Coil performance shall comply with ARI 410.

E. Safety code for mechanical refrigeration shall comply with ASHRAE 15.

F. Filtration shall comply with ASHRAE 52.

1.4 MANUFACTURERS

A. Trane, Daikin, York or Lennox

1.5 Equipment Warranty

A. Primary heat exchangers shall be stainless steel and have a limited lifetime warranty. All other covered components shall have a limited warranty for one year.

2. PART 2 - PRODUCTS

2.1 COMPONENTS

A. General

1) Gas fired furnaces shall include models and energy efficiencies (AFUE) OF 95%. Compact cabinet with either side or bottom return air entry shall allow installation in locations specified. Units shall be shipped factory assembled with all controls installed and wired. Each unit shall be factory test operated to insure proper operation.

B. Heat Exchanger Assembly

1) Main 3-pass clamshell type heat exchanger shall be constructed of heavy gauge aluminized steel and is designed for normal expansion and contraction without metal fatigue. Crimped seam design and construction shall provide long service life, maximum efficiency and minimum resistance to airflow. Condenser coil shall be constructed of aluminum fins fitted to stainless steel tubes. Coils shall be factory tested for leaks. Combined flue vent and condensate drain header box assembly shall be located on front of coil. Compact size of complete heat exchanger assembly shall permit low overall design of furnace cabinet. All components shall be mounted in a heavy gauge steel frame. Heat exchanger assembly shall be laboratory life cycle tested.

C. Automatic Gas Control

1) Silent operating gas controls shall provide 100% safety shut off. 24 volt redundant combination gas control valve combines automatic safety pilot, manual shut off option (on-Off), pilot filtration, automatic electric valve (dual) and gas pressure regulation into a compact combination control. Dual valve design shall provide double assurance of 100% close off of gas to the pilot and main burners on each off cycle. Gas valve shall be automatically regulated with pressure switch to maintain even gas flow regardless of type of venting installation. Design also shall compensate for variations in altitude.

D. Induced Draft Blower

1) Factory installed induced draft blower shall prepurge heat exchanger and shall safely vent combustion products. Shaded pole motor shall be thermally protected. It shall operate only during heat demand cycle. A pressure switch shall prevent unit operation in case of blockage of combustion air, flue outlet or condensate drain.

E. Cabinet

1) Cabinet shall be constructed of heavy gauge cold rolled steel. Cabinet shall be subject to five station metal wash process resulting in a perfect bonding surface for paint finish of baked-on enamel. The paint solution and metal shall be given opposite electrical charges resulting in positive adhesion and even coverage of the paint to the metal surfaces. Cabinet surface temperatures shall be low due to foil faced fiberglass insulation on vestibule panel, side panels and on back panel. Blower compartment sides and rear shall be completely lined with black matt faced fiberglass insulation, assuring quiet operation. Complete service access shall be accomplished by removing heating section and blower compartment access panels. Blower assembly and filter shall be completely removed from unit for service. Blower deck shall have rails that angle down for easy blower removal. Safety interlock switch located in the control box shall automatically shut off power to the unit when blower compartment access door is removed. Intake and exhaust air openings shall be furnished on top of furnace. Gas piping and electrical inlets shall be provided in both sides of the cabinet. Return air entry shall be possible on either side or bottom of cabinet. For bottom return air, cabinet shall have a perforated knockout pattern for easy removal.

F. Field Wiring Make-up Box

1) Make-up box shall be furnished for line voltage wiring. Box may be installed on either side of furnace, internally or externally to unit. Box shall contain plug-in connection for power supply wiring, wire for 120 volt accessory connection and all necessary hardware for installation.

G. Transformer

1) 24 volt control transformer shall be furnished as standard equipment and shall be factory installed in control box. Transformer shall have circuit breaker wired in series for added protection.

H. Blower

1) Units shall be equipped with quiet multi-speed direct drive blowers. Each blower assembly is statically and dynamically balanced. Multiple-speed leadless motor shall be resiliently mounted. Blower speeds shall be easily changed at the harness connector on the blower motor. See blower performance tables.

I. Concentric Vent/Intake Air Roof/Wall Termination Kit

1) Kit shall facilitate installation of combustion air intake pipe and flue exhaust pipe. Kit shall contain concentric termination assembly, mounting clamp, roof flashing, reducer bushing and 45° elbow. Kit shall require single hole penetration of roof or wall for installation. Kit is A.G.A./C.G.A. certified and must be ordered extra for field installation.

J. Air Cleaner

1) Air filter shall be equal to Air Bear 5” media MERV 8 with metal housing for bottom or horizontal furnace return.

3. PART 3 - INSTALLATION

3.1 Install furnaces in locations as shown on the drawings.
3.2 Set on ribbed or waffled neoprene pad. Mason Industries Type W.

3.3 Provide duct required for 5” filter system.

3.4 Provide 7 day programmable thermostat for heating and cooling and fan cycle function.

◆ END OF SECTION ◆

SECTION 23 62 13

REFRIGERANT CONDENSING UNITS

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Air-cooled refrigerant condensing units with single 2-stage compressor.

1.2 SUBMITTALS

A. Submittals are required and shall include product data noting capacities at the specified conditions, materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

A. ASHRAE Standard 15.
B. Certified performance to ARI 210/270/340.
C. UL construction.
D. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1-2010.

1.4 WARRANTY

A. Compressors shall include an extended 5-year parts warranty.

1.5 MANUFACTURERS

A. Trane, Daikin, York or Lennox.

2. PART 2 - PRODUCTS

2.1 COMPONENTS

A. AIR-COOLED UNITS

1) This Contractor shall furnish and install condensing unit as shown on the drawings and as specified herein.

B. CASING

1) Unit casing is constructed of heavy gauge, galvanized steel, and painted with a weather-resistant powder paint.

C. GENERAL

1) The condensing unit shall be fully charged from the factory for matched indoor section and up to 15" of piping. Unit is designed to operate at outdoor ambient temperatures as high as 115 Degrees Fahrenheit cooling capacities are matched with a wide selection of air handlers and furnace coils that are AHRI certified.

2) Refrigeration system controls include condenser fan and compressor

contactor. High and low pressure protection are inherent to the compressor. A factory installed liquid line drier and low pressure switch are standard. Field braze connections are externally accessible multi-use liquid and gas line valves, with service pressure gauge ports.

3) Neoprene-in-shear vibration isolators will be included to reduce transmission of noise and vibration to building structures, equipment and adjacent space.

4) The outdoor coil provides low airflow resistance and efficient heat transfer. The coil is protected on all four sides by louvered panels.

A. COMPRESSOR

1) Refrigeration System - Single Unloading

a) The Climatuff® 2-stage compressor features internal over temperature and pressure protection and hermetic motor. Other features include: centrifugal oil pump and modular plugs for electrical connections.

b) Unit shall have a single refrigeration circuit. Each refrigeration circuit has an integral subcooling circuit. A refrigeration filter drier shall be provided as standard. Unit shall have both a liquid line and suction gas line service valve with gauge port.

B. CONDENSER COIL

1) The Spine Fin coil is continuously wrapped, corrosion-resistant, all aluminum with minimum brazed joints. This coil is 5/8″ O.D. seamless aluminum, glued to a continuous aluminum fin. The coil is protected on all four sides by louvered panels.

C. CONDENSER FAN AND MOTOR

1) Direct-drive, statically and dynamically balanced 26 or 28 inch propeller fan with aluminum blades and electro-coated steel hubs shall be used in draw-through vertical discharge position. Either permanently lubricated totally enclosed or open construction motors shall be provided and shall have built in current and thermal overload protection. Motor shall be either ball or sleeve bearing type.

2. PART 3 - EXECUTION

2.1 INSTALLATION

A. Install unit as shown on drawings in strict accordance with manufacturer's instructions including refrigerant piping.

B. Install refrigerant piping and specialties to evaporator coil.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SYSTEM DESCRIPTION

A. The variable capacity, heat pump air conditioning system shall be an Inverter Driven series (heat/cool model) split system. The system shall consist of a wall mounted evaporator matched to outdoor direct expansion (DX), air-cooled, inverter driven compressor using R-410A refrigerant. The outdoor unit is a horizontal discharge, variable speed, single fan unit using a single phase power supply. The system shall have a self-diagnostic function, 3-minute time delay mechanism and have a factory pre-charge of R-410A adequate for 33 feet of total length. The system shall have automatic restart capability after a power failure has occurred and a low voltage cut-off feature to prevent stalling during power supply issues.

1.2 SUBMITTALS

Submittals are required and shall include product data noting capacities at the specified conditions, materials, sizes, and dimensions

1.3 QUALITY ASSURANCE

A. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL), in accordance with ANSI/UL 1995 – Heating and Cooling Equipment and bear the Listed Mark.

B. All wiring shall be in accordance with the National Electric Code (NEC).

C. Each combination shall be rated in accordance with Air Conditioning Refrigeration Institute's (ARI) Standard 210/240 and bear the ARI label.

D. The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.

E. The outdoor unit will be factory charged for a length of 33 feet of refrigerant with R-410A refrigerant.

F. A holding charge of dry nitrogen shall be provided in the evaporator.

G. System efficiency shall meet or exceed 18 SEER and 8.5 HSPF.

1.4 DELIVERY, STORAGE AND HANDLING

A. Unit shall be stored and handled according to the manufacturer's recommendations.

1.5 Manufacturers

A. DIAKIN, Trane, LG OR MITSUBISHI

1.6 WARRANTY

A. LIMITED WARRANTY

1) Warrants to the customer will be free from defects in material or workmanship. This warranty applies to parts only and is limited in duration to two (2) years from the earlier to occur of the date of original installation, whether or not actual use begins on that date,

B. EXTENDED WARRANTY

1) For compressors only provides the above warranty (which is applicable to parts only) for a six (6) year period. This extended warranty for compressors is limited in duration to six (6) years from the earlier to occur of (a) the date of original installation, whether or not actual use begins on that date.

1.7 INSTALLATION REQUIREMENTS

A. The system shall be installed by a Daikin factory trained contractor/dealer.

1.8 PERFORMANCE

A. The system performance shall be in accordance with ARI 210/240 test .

B. The cooling performance is based on 80°F DB / 67°F WB for the indoor unit and 95°F DB / 75°F WB for the outdoor unit and 25 feet of piping. The heating performance is based on 70°F DB / 60°F WB for the indoor unit and 47°F DB / 43°F WB for the outdoor unit and 25 feet of piping.

C. The operating range in cooling will be 14°F DB ~ 115°F DB, and 0°F DB ~ 115°F DB when used with an optional wind baffle.

D. The operating range in heating will be 5°F DB ~ 64°F WB

E. The system shall be capable of maximum refrigerant piping of 98 feet, with 66 feet maximum vertical difference, without any oil traps or additional components.

2. PART 2 – PRODUCTS

2.1 INDOOR UNIT

General:

The indoor unit shall be factory assembled and pre-wired with all necessary electronic and refrigerant controls. Both liquid and suction lines must be individually insulated between the outdoor and indoor units.

A. Unit Cabinet:

1) The indoor unit shall have a white, “flat screen” finish.

2) The drain and refrigerant piping shall be accessible from six (6) positions for flexible installation (right side, right back, and right bottom; and left side, left back, and left bottom.

3) The cabinet shall be supplied with a mounting plate to be installed onto a wall for securely mounting the cabinet.

B. Fan:

1) The evaporator fan shall be an assembly consisting of a direct-driven fan by a single motor.

2) The fan shall be statically and dynamically balanced and operate on a motor with permanent lubricated bearings.

3) An auto-swing louver for adjustable air flow (vertically) is standard via the wireless remote control furnished with each system.

4) The indoor fan shall offer a choice of five speeds, plus quiet and auto settings.

C. Filter:

1) The return air filter provided will be a mildew proof, removable and washable filter. Optional photo catalytic, air purifying filters are available.

D. Coil:

1) The evaporator coil shall be a nonferrous, aluminum fin on copper tube heat exchanger.

2) All tube joints shall be brazed with silver alloy or phoscopper.

3) All coils will be factory pressure tested.

4) A condensate pan shall be provided under the coil with a drain connection.

E. Electrical:

1) The outdoor unit shall be powered with 208-230 volts, 1 phase, and 60 hertz power. The indoor unit shall receive 208-230 volt, 1 phase, 60 hertz power from the outdoor unit.

2) The allowable voltage range shall be 187 volts to 253 volts.

F. Control:

1) The unit shall have a backlit, wireless remote infra-red controller capable to operate the system. It shall have Cooling Operation, Heating Operation, Automatic Operation, Dry Operation and Fan Only Operation.

2) The controller shall consist of an On/Off Power switch, Mode Selector, Fan Setting, Swing Louver, On/Off Timer Setting, Temperature Adjustment, °C or °F Temperature Display, and Powerful Operation.

a) On/Off switch powers the system on or off.

b) Mode selector shall operate the system in auto, cool, heat, fan or dry operation

c) Fan setting shall provide five fan speeds, plus quiet and auto settings.

d) Swing louver shall adjust the airflow (horizontal and vertical) blades.

e) On/Off timer is used for automatically switching the unit on or off.

f) Temperature adjustment allows for the increase or decrease of the desired temperature.

g) Powerful operation allows quick cool down or heating up in the desired space to achieve maximum desired temperature in the shortest allowable time period.

3) The remote control shall perform Fault Diagnostic functions which may be system related, indoor unit or outdoor unit related depending on the fault code.

4) Temperature range on the remote control shall be 64°F to 90°F in cooling mode and 50°F to 86°F in heating mode.

5) The indoor unit microprocessor has the capability to receive and process commands via return air temperature and indoor coil temperature sensors enabled by commands from the remote control.

2.2 OUTDOOR UNIT

General:

The outdoor unit shall be specifically matched to the corresponding indoor unit size (e.g. FTXN15KVJU/RXN15KEVJU). The outdoor unit shall be complete factory assembled and pre-wired with all necessary electronic and refrigerant controls.

A. Unit Cabinet:

1) The outdoor unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-proofed mild steel panels coated with a baked enamel finish.

B. Fan:

1) The fan shall be a direct drive, propeller type fan.

2) The motor shall be inverter driven, permanently lubricated type bearings, inherent.

3) The fan shall be capable of operating in “silent operation” which lowers the outdoor fan speed in either cool, heat or auto modes.

4) A fan guard is provided on the outdoor unit to prevent contact with fan operation.

5) Airflow shall be horizontal discharge.

C. Coil:

1) The outdoor coil shall be nonferrous construction with corrugated fin tube.

2) The fins are to be covered with an anti-corrosion acrylic resin and hydrophilic film type E1.

3) Refrigerant flow from the condenser will be controlled via a metering device.

D. Compressor:

1) The compressor shall be a Daikin swing inverter-driven compressor.

2) The outdoor unit shall have an accumulator and four-way reversing valve.

3) The compressor shall have an internal thermal overload.

4) The outdoor unit can operate with a maximum vertical height difference of 66 feet and overall maximum length of 98 feet without any oil traps or additional components.

E. Electrical:

1) The electrical power requirement is 208-230 volt, 1-phase, and 60 Hz power.

2) The voltage range limitations shall be a minimum of 187 volts and a maximum of 253 volts.

3) The outdoor shall be controlled by a microprocessor located in the outdoor and indoor units via commands from the infrared remote controller.

4) Dedicated EEV’s shall be provided for capacity control during part load of the indoor unit.

3. PART 3 – EXECUTION

3.1 Unit shall be stored and handled according to the manufacturer’s recommendation.

3.2 The wired controller shall be shipped inside the carton with the indoor unit and able to withstand 105° F storage temperatures and 95% relative humidity.

3.3 Set condensing unit on pad.

3.4 Equipment shall be of the sizes and capacities shown on the schedule.

◆ END OF SECTION ◆

SECTION 23 83 00

RADIANT TUBE HEATERS

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. Soloronics, Roberts Gordon or Detroit Radiant.

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 2-stage operation to include:

B. Operation: 2-stage control Both Gas and Air.

C. Input differential: 30% between low-fire and high-fire rates.

D. Purge Control: 30-second pre-purge and 120-second post-purge to remove products of combustion.

E. Power Thermostat: Provide 24-volt power supply for 2-stage thermostat at heater terminal board.

F. Recycle: Automatic recycle after inadvertent shutdown.

G. Self-diagnostics: Ignition module include self-diagnostics and external LED readout. independent sensing rod and circuit.

H. The main burner shall be constructed of stainless steel.

I. The control assembly shall be Design Certified by CSA, shall provide main burner regulation, and shall be of the redundant type.

J. 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.

K. 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.

L. The heater's blower motor shall be thermally protected and the blower motor's impeller shall be balanced.

M. The heater's air flow control system shall provide a 45 second pre-purge prior to initiating burner operation.

N. No condensation shall form as a result of combustion in the combustion chamber or radiant tubes while at operating temperatures.

O. The heater shall incorporate moisture and corrosion resistant circuitry.

P. 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

K. All wiring from thermostat to heater shell be ran in ½" diameter electrical conduit concealed in walls..

◆ END OF SECTION ◆

SECTION 23 83 42

ELECTRIC WALL HEATERS

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electric wall heaters

1.2 SUBMITTALS

A. Submittals are required and shall include material capacities, quantities, and accessories.

1.3 QUALITY ASSURANCE

A. Underwriters Laboratories, Inc. (UL) Label.

1.4 RATINGS AND CAPACITY

A. Size, capacity, arrangements, and location as indicated on the Drawings

B. Wattage and voltage ratings shall be as indicated on the drawings.

1.5 MANUFACTURERS

A. Trane, Q-MARK, SINGER, NUTONE OR MARKEL.

2. PART 2 - PRODUCTS

A. ELECTRIC WALL HEATERS

1) Q-Mark Type AWH. UL-listed, semi-recessed, heavy-duty, fan-forced, totally enclosed fan cooled motor, built-in disconnect switch, nickel-chrome heating elements, high temperature cutouts, tamper-resistant integral thermostat, 16 ga. steel housing, baked enamel finish, satin aluminum trim. The Associate Architect will select the finish.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount unit no closer than 12” to floor or adjacent wall surface.

B. Electrical contractor shall provide power wiring.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The Instructions to Bidders, General Conditions, Supplemental General Conditions, Special Conditions, Addenda, 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 and Divisions 8,10, 21, 22, and 23 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 Division 26, 27, and 28 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 OUT 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

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, structural, mechanical drawings, and Divisions 8, 10, 21, 22, and 23of the specification 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

√ Switch Gear

√ Safety Switches

√ Automatic Transfer Switch

√ Voice and Data System

√ Motor Starters

√ Surge Suppressors

√ Sound Equipment

√ Occupancy Sensors

√ Panel Boards

√ Fire Alarm Equipment

√ Lighting Controls

√ Lighting Protection

√ Circuit Breakers

C. Actual scaled drawings are required for the following items:

1) Fire Alarm System

D. Any devices that require color selection shall have approval drawings complete with color charts.

E. The Electrical Contractor shall verify, stamp and initial all shop drawings "approved."

F. 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.

G. Upon review and approval of the drawings, the Architect will retain one copy and return the remaining copies back to the Contractor.

H. 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 - EXECUTION

3.1 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. Contractor shall pay for and obtain any other local permit.

3.2 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.

3.3 GUARANTEE AND WARRANTY

A. This Contractor shall guarantee is 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.

3.4 EQUIPMENT IDENTIFICATION

A. Provide name plates on all equipment on the type listed in the following schedule:

√ Switchgear	√ Control Panels
√ Control Devices	√ Safety Switches
√ Motor Starters	√ Automatic Transfer Switch

B. Lettering shall include name of equipment, the specific unit number, and any reference to on-off or other instructions that are applicable.

C. The space between lines shall be equal to the width of the letters. Use ¼" minimum height letters which occupy four to the inch.

3.5 PERSONNEL INSTRUCTION

A. Provide a minimum of 8 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.

3.6 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. All signaling systems, such as fire alarm, variable speed drives, and intercom shall be checked out and tested by qualified field representative or equipment vendor. A report shall be submitted to the Architect by vendor representative indicating results of such final check out and tests. Final payment will not be approved until such report is submits.

3.7 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.

◆ 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 015000 of the specifications.

C. Temporary lighting.

1) Provide temporary lighting in accordance with Section 015000 of the specification.

D. 120 volt receptacles with overcurrent protection.

1) Provide temporary power outlets in accordance with Section 015000 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 015000 for additional information.

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 ◆

SECTION 26 05 00

ELECTRIC UTILITY SERVICES

1. PART 1 - GENERAL

1.1 SCOPE

A. The Electrical Contractor shall coordinate his efforts with Toledo Edison Company in order to install a new 120/208v 3-phase underground electrical services.

B. Provide new 1000 Amp 120/208v Volt – 3 phase – 4 wire underground electrical service.

2. PART 2 - PRODUCTS

2.1 MATERIALS

A. See appropriate specification sections.

3. PART 3 - EXECUTION

3.1 WORK BY ELECTRICAL CONTRACTOR

A. Underground secondary feeder conduits will be by the Electrical contractor and shall be placed approximately 24" below ground level unless noted otherwise. All 90° sweeps shall be steel. Conduits under paved surfaces shall be concrete encased. Provide weather tight cap at exposed ends of conduits until ready for use.

1) Electrical contractor shall install (2) 4" conduits from utility pole to transformer. Place conduits 36” below grade with warning tape.

2) Electrical contractor shall provide and install new CT cabinet meeting Toledo Edison specifications.

3) Provide and install 4 – 400 MCM feeders in each of (3) secondary conduits from transformer setting to new 1000 amp main disconnect switches.

4) The Electrical contractor shall provide two (2) bolt NEMA lugs for terminating primary and secondary feeders at pad mount transformer.

5) Concrete encase raceway under new pavement.

6) Provide rigid 90's.

7) The Electrical contractor shall provide and install concrete transformer pad as shown on drawings.

8) Install meter cabinet and conduit per Toledo Edison requirements.

3.2 WORK BY TOLEDO EDISON COMPANY

A. Toledo Edison Company shall provide and install primary service feeders and pad mount transformer.

◆ END OF SECTION ◆

SECTION 26 05 11

EQUIPMENT HOOK-UP AND FINAL CONNECTION

1. PART 1 GENERAL

1.1 DESCRIPTION

A. Coordinate the electrical requirements of equipment with the Supplying Contractor or Manufacturer.

B. Provide plug-in or rough-in and final connection for each piece of equipment requiring power, including, but not limited to, the following:

1) Electric cord reels.

2) Overhead doors

3) Owner furnished equipment.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

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

B. Connectors for power systems 600V and 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 WC70.

D. Copper conductors NEMA WC 70.

E. Conductor Connection Torque Valve UL 486A.

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, blue and red. 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/THWN, 90° C for lighting branch circuits and general use.

H. 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.

I. 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.

2.2 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

2.3 MANUFACTURED WIRING SYSTEMS

A. Pre-manufactured, re-locatable, integrated electrical branch wiring system for lighting in accessible ceilings.

B. Minimum No. 12 AWG copper wire with 600-volt, 90 degree insulation.

C. Minimum No. 12 AWG insulated copper ground wire.

D. Pin and socket contacts connected to branch circuit conductor.

E. Metal constructed cable heads with corrosion-resistant heads.

F. Designated so no interconnection can occur between different electrical voltages.

G. System shall be completely modular in construction incorporating conversion modules, pre-fabricated receptacles located in top of light fixtures, modular selector cables for connecting to light fixtures, and cable extenders.

H. System shall be capable of being manufactured to conforming to light switching arrangements required.

2.4 PLUG CONNECTED CABLE

A. Flexible cord for short connection to equipment shall be 600 volt, heat-resistant, rubber insulated portable cable with neoprene jacket, UL Type “ST” on “SRDT.” Cord shall be extra-flexible stranded copper with ground conductor. Provide termination plug as required.

B. Flexible cable is NOT permitted for motor connections.

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.

3.2 COPPER CONDUCTOR PERFORMANCES

A. Type THHN/THWN or XHHW in raceway for service entrance wiring.

B. Type THHN/THWN in raceway for feeders and branch circuits.

C. Type THHN/THWN for exterior branch circuits.

D. Minimum conductor size shall be #12 AWG for power circuits, #14 AWG for controls.

E. Feeders and branch circuits shall be concealed above accessible ceilings, in walls, chases, and below slab-on-grade.

F. Manufactured wiring system installation shall be limited to wiring between light fixtures located in accessible acoustical tile ceilings and from junction box located above ceiling to fixtures. Conduit shall be provided from light fixture switch location to junction box located above ceiling.

3.3 CONNECTION 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 nsulation..

◆ END OF SECTION ◆

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRIAL 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. Stranded cable grounding electrode conductors.

C. Bare copper conductors.

D. Grounding bus consisting of bare annealed 1/4 inch by 2-inch copper bars of rectangular cross section.

1) All panelboards and disconnects switches shall be equipped with grounding bus bars, sized in accordance with manufacturers recommendations.

E. Braided No. 30 AWG bare copper wire bonding jumpers.

F. Copper clad steel ¾ inch grounding rods.

1) New ground rods shall consist of two ¾” diameter by 10’-0” long copper weld ground rods. New ground rods shall be bonded together to form a grid. New ground rods shall be spaced 6’-0” apart and 3’-0” from building.

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.

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.

H. Ground main service entrance equipment to main water line in mechanical room. The grounding conductors shall be #3/0 copper run in 1½" conduit.

I. Also furnish and install a new #6 copper grounding conductor from main service entrance equipment to new ground rod located three feet outside of building foundation, east of building.

J. Ground new telephone service to electrical building ground with a #2 copper grounding conductor.

K. Bond new service ground to reinforcing bars in foundation.

3.2 BUILDING GROUND

A. Ground building steel. Connect copper grounding conductor to building steel.

B. New ground rods shall consist of ¾" diameter by 10'-0" long copper weld ground rods. New ground rods shall be connected to grounding conductor utilizing cad weld connectors.

◆ END OF SECTION ◆

SECTION 26 05 29

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 GENERAL

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.

2.2 MATERIALS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fitting, designed for types and sizes of raceway or cable to be supported.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

E. Mounting, anchoring, and attachment components:

1) Powder-actuated fasteners: threaded-steel stud

2) Mechanical-expansion anchors; Insert-wedge-type, zinc-coated steel

3) Concrete inserts: steel or malleable-iron

4) Clamps for attachments to steel structural elements

5) Through bolts; structural type, hex head, and high strength

6) Toggle bolts; all-steel springhead type

7) Hanger rods; threaded steel

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. Intermediate vMetal Conduit (IMC) ANSI C80.6

E. Electrical Metallic Tubing (EMT) ANSI C80.3.

F. Liquidtight Flexible Metal Conduit UL 360.

G. Underground Non-Metallic Conduit (RNC) NEMA TC9, type EPC-40-PVC

H. NEMA OS 2 and UL 514A

1.3 GENERAL

A. Provide boxes for devices, lighting fixtures, motors and equipment connections, system equipment connections, and special outlets. Provide pullboxes where more than (2) 90 deg. Bends are required or if conductors are pulled further than 100 ft.

B. Unless otherwise noted, all conductors shall be enclosed in a continuous, grounded, steel conduit or raceway.

C. The conduit system shall be made mechanically tight and electrically continuous throughout. Conduit system shall be grounded at the service entrance.

D. Use galvanized steel conduit. Exception: Conduit exposed outside shall be rigid aluminum. No aluminum conduit is permitted inside or encased in concrete.

E. Schedule 40 PVC and coilable Schedule 80 HDPE conduit is permitted underground with limitations or, under certain conditions, below slabs.

F. Minimum Size: ½ in. for control and low voltage wiring only; ¾ in. for line voltage wiring; 1 in. minimum below slab or underground, except as otherwise indicated.

2. PART 2 - PRODUCTS

2.1 RACEWAYS MATERIALS

A. Rigid Metal Conduit.

1) Rigid galvanized heavy wall conduit, ¾" minimum size.

B. Intermediate Metal Conduit (IMC)

C. Electrical Metallic Tubing (EMT)

1) Electrical Metallic Steel shall be galvanized steel, ¾" minimum size unless noted otherwise.

D. Underground Polyvinyl Chloride (PVC) Schedule 40.

1) Underground polyvinyl chloride (PVC) conduit shall be heavy wall Schedule 40 with glued fittings.

2) Use schedule 80 PVC where noted on plans.

E. Liquidtight Flexible Metal

1) Liquidtight flexible conduit shall be watertight and equal to "Sealtite." ½" minimum size.

F. Set screw or compression fittings.

1) All EMT connections may be with compression type of set screw type fitting.

2.2 TECHNOLOGY RACEWAY

1) From technology outlet box provide one 1" conduit to tech cabinet or 6" above ceiling. Turn toward tech cabinet with plastic bushing. Provide raceways above in accessible ceiling spaces and in rooms that do not have lay-in ceilings.

B. Utility Entrances

1) Provide two 4 inch for telephone service from service pole to main technology equipment room.

2.3 OUTLET AND DEVICE BOXES

A. All outlet boxes shall be galvanized pressed steel of standard knockout type.

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 device boxes in drywall shall be equipped with extension rings.

F. Exposed boxes shall be cast type FS or FSA.

G. 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.

2.4 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.

2.5 FITTINGS

A. NEMA FB 1 listed.

B. Rigid or intermediate conduit fittings shall be threaded. EMT conduit fittings shall be compression type only. Conduit bodies shall be malleable iron, threaded for heavy wall conduit and compression type for EMT, with cadmium finish and cadmium-plated sheet steel covers. Provide neoprene cover gaskets for conduit body covers exposed to the weather.

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:

	Max Spacing of Support in Feet	
Conduit Sizes in Inches	Horizontal	Vertical
¾″	7′	7′
1″ & 1¼″	10′	8′
1½″ & 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 above suspended ceilings	x	x	x				
Misc. low voltage systems (fire alarm) up to 4”C size. (EMT not allowed underground or as otherwise limited above)	x	x	x				
Interior above ceiling conduits 3 ½” and larger except as otherwise permitted.	x	x	x				

* With 3 inch concrete envelope under drives and sidewalks.
** Not approved for exterior or exposed below 8 feet AFF.

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 ¾″ at the following locations only:

1) Drywall interior partitions
2) Above suspended ceilings.
3) May be exposed above 8 feet
4) In mechanical rooms
5) For voice and data system raceways

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 ¾" 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 ½″ 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 (1½″) 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. Lighting outlet boxes shall be standard 4 in. octagonal, 1 1/2 in. minimum deep boxes with 3/8 in. fixture-mounting stud. Outlet boxes having more than (2) conduits, or when 3/4 in. conduit is used, shall be standard 4 in. square boxes 1 1/2 in. deep or deeper as might be required to accommodate the wiring contained therein.

E. Flush device boxes in plaster or drywall construction shall be 4 in. square, 2 1/8 in. deep boxes or gangable 2 1/2 in. deep boxes. Shallow 1 1/2 in. deep gangable boxes may be used only in demountable partitions and in other walls too thin for standard depth boxes.

F. All boxes shall be rigidly supported from building structure independent of the conduit system.

G. Boxes shall be large enough to accommodate the size and number of conduits secured thereto and the size and number of wiring conductors.

H. All fittings, covers, and hardware shall be galvanized steel.

I. Install pull box cabinets as required by the NEC and/or where shown on plans.

J. No "tangle boxes" shall be used without the expressed consent of the Architect.

K. Boxes shall be NEMA type approved for the prevailing environmental conditions.

◆ END OF SECTION ◆

SECTION 26 05 34

WIREWAYS

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Metal Duct Wireways.

1.2 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code

1) All work shall comply with NEC requirements.

B. Underwriter's Laboratory

1) All material shall bear UL labels.

2. PART 2 – PRODUCTS

2.1 METAL DUCT WIREWAY

A. 16-gauge galvanized construction with ANSI-49 epoxy gray paint.

B. 2 ½" x 2 ½" and larger to have hinged top.

C. NEMA 3R raintight rating in exterior applications.

D. NEMA 1 general purpose rating on interior of building.

E. Sufficient size to accommodate all cables and wires installed.

F. Wireways or wire duct shall be of sufficient size to accommodate all cables, and wires installed and/or as noted on plans for use in unfinished areas for feeders, etc., where specifically noted and in accordance with NEC Article 362.

G. All wireways shall be complete with proper fittings, etc., to form a closed wireway system including end caps, covers, trees, ells, etc.

H. Wireways shall be Square D Co. "Square-duct" or equal as made by Keystone or Hoffman and shall be complete with full length hinged screw type cover.

3. PART 3 - EXECUTION

3.1 GENERAL

A. Bond each length together with No. 12 green grounding conductor.
B. Type and sizes shall be as required by the application.

3.2 METAL DUCT WIREWAY

A. Provide wireways in mechanical rooms and other rooms, as shown on plans or required to complete project. Install in accordance with manufacturer's recommendations.

◆ END OF SECTION ◆

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

1. PART 1 GENERAL

1.1 DESCRIPTION

A. Identify each piece of electrical equipment, such as switchboard, automatic transfer switch, disconnects, starters, power and lighting panels, and auxiliary systems, on the front cover or trim with its designated name or number/letter shown on the Drawings and with the voltage available within the panel and the source from where it is fed. Identify panelboards in finished areas on the inside cover.

B. Install laminated plastic nameplates for equipment. Identification shall be as indicated on the following examples:

PANEL A

208Y/120 volt, 3-phase, 4-wire
From SWBD MDP via XFR T-1

2. PART 2 PRODUCTS

2.1 EQUIPMENT IDENTIFICATION

A. Laminated plastic nameplates, sized for minimum 1/4 in. high white letters or numbers engraved into a black background, Gothic style.

B. “Dymo” or similar tape type labels shall **NOT** be used.

C. Type written panelboard schedules shall be included and installed inside panelboard covers.

D. Identify the covers of each junction and pull box with self-adhesive vinyl labels indicating the circuit numbers which are concealed within.

E. Provide labels for electrical conduits after painting is complete.

◆ END OF SECTION ◆

SECTION 26 09 00

INSTRUMENTATION AND CONTROL FOR ELECTRICAL SYSTEMS

1. PART 1 GENERAL

1.1 SCOPE

A. Provide all power, control, and interlock wiring and conduit, relays, control power transformers, auxiliary contacts, and fuses as required to provide complete and operating control systems and effect the proper sequence of operation of each equipment subsystem.

B. Unless otherwise noted, provide all line voltage and low voltage wiring and conduit.

1.2 DESCRIPTION OF CONTROL WIRING REQUIREMENTS

A. Split-System Air Conditioning Condensing Units: Provide weatherproof fused disconnect switch, fuses, power, and control wiring.

B. Exhaust Fans: Wire to magnetic starter, wall switch, wall switch with pilot light, reverse- acting thermostat located at the exhaust fan as indicated on the Drawings. Interlock with gas sensors as required.

C. Gas-Fired Infrared Heating System: Provide 120 volt power and low voltage wiring to thermostats and burners as required.

D. Thermostats: Unless noted otherwise, provide rough-in boxes, control wiring, and conduit.

E. Air Compressor: Provide disconnect switch and power wiring. Provide pilot light switch and wire to compressor starter.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Distribution Panelboard

B. Panelboards

1.2 QUALITY ASSURANCE

A. Distribution panel boards UL 50 and NEMA PB1

B. 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/DISTRIBUTION 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 and panelboard switch 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.

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) Panels with feed through lugs shall be suitable for use with conductor material. Locate at opposite end of incoming lugs on main device.

11) Equipment meeting all requirements of the specifications by General Electric, Siemens or Square D Company are approved.

2.2 DISTRIBUTION PANELS

A. Main - MDP

1) Provide and install new 120/208 volt – 3 PH – 4 wire distribution panel. Bolt new panel to wall. New panels shall be equal to Square D model I-Line Combo unless noted otherwise. Panel shall include 1000 Amp – 3 pole main circuit breaker.

2) Provide 1-400 amp- 2 pole; 2-200 amp – 3 pole; 1-100 amp – 3 pole; 1-90 amp – 3 pole; 1-60 amp – 3 pole; 1- 35 amp – 3 pole; 1-30 amp – 3 pole; 1-25 amp – 3 pole; 2-45 amp – 2 pole; 1-35 amp – 2 pole; 1-30 – 2 pole; and 1-25 amp – 2 pole circuit breakers.

2.3 BRANCH CIRCUIT PANEL BOARDS

A. Power Panels – 120/208 V – 3ø – 4 wire.

1) New power panels shall be equal to Square D type NQOD. See schedule at end of this section.

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 switchgear and 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. Wall Switch Occupancy Sensors
D. Dimmer Switches
E. Device Cover Plates
F. High Capacity Floor Boxes

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. Wall Switch Occupancy Sensors

1) Shall be UL listed.

D. Dimmer Switches – NEMA WD 1 and UL 1472

E. Device Cover Plates - Underwriter's Laboratory 514

1) All device cover plates shall bear a UL label or be UL listed.

F. Floor Box – Underwriter's Laboratory 514A.

1) Technology floor boxes shall bear a UL label.

G. 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 selected by Architect in consultation with owner.

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. Trippins values shall conform: UL 1436 and UL 943.

D. Receptacles shall be as made by Hubbell, Pass & Seymour, Leviton, Eagle, or Arrow Hart.

E. Receptacles shall be:

Simplex convenience outlet	Hubbell 5361X	Pass & Seymour 5361X
Duplex convenience outlet	Hubbell 5362	Pass & Seymour 5362X
GFI Receptacle	Hubbell GF TR20X	Pass & Seymour 2095X
Weather Proof Receptacle	Hubbell GF20	Pass & Seymour 2095 TRWRX
Duplex Surge Suppression	Hubbell 5362SA	Pass & Seymour TR5362XSP
30 AMP – Insolated Ground Receptacles	Hubbell IG 9308	
Ceiling Mounted Receptacle	Hubbell 5361	
Duplex Combination Receptacle	Hubbell 5492	

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 20AC4
Single Pole Key Type	Hubbell 1221L	Pass & Seymour 20AC1-L
Three Way Key Type	Hubbell 1223L	Pass & Seymour 20AC3-L
Four Way Key Type	Hubbell 1224L	Pass & Seymour 20AC4-L
Pilot Light	Hubbell 1221PL	Pass & Seymour 20AC1RPL
Momentary Three Position	Hubbell 1557	Pass & Seymour 1251
Door Jamb Switch	Hubbell RDS50	Pass & Seymour 1200

2.3 WALL SWITCH OCCUPANCY SENSORS

A. Provide passive infrared occupancy sensor switches with adaptive technology and adjustable time delay. Devise shall include "on" – "off" occupant switch. Sensor shall have 180° degree field of view.

B. Sensor switches shall be made by Hubbell, Pass & Seymour, Wall Stopper or Sensor Switch.

2.4 WALL DIMMERS

A. Wall box dimmers for LED lights shall be 0-10 volt dimming. Verify compatibility with LED fixtures..

B. LED dimmer switches shall be equal to SYNERGY ISD BC 120/277; Lutron NTFTV + PP-120H; or LEVITON ILLUMATECH-IP710-DLX or sensor switch equal. Color dimmer face plates will be selected from manufacturer's standard colors.

2.5 WALL PLATES

A. Stainless steel with U.S. 23D finish with matching head screws. Provide standard size cover plates for all surface mounted boxes and jumbo size cover plates for all flush mounted boxes.

B. Configuration of plates to match devices.

C. Weatherproof type stainless steel with U.S. 23D finish on exterior mounted.

2.6 FLOOR BOX

A. Floor boxes shall include load bearing steel plate door with finish floor recess. Separate rough in compartments shall be provided for low voltage and power wiring. Boxes shall be 2 gang, constructed of stamped steel and fully adjustable.

B. Provide all required service plates to facilitate required devices.

C. Floor boxes shall be equal to Walker RFB Series, Steel City 664 Series, ProCo or Hubbell Model SIR6PTFITCHI.

D. Provide carpet flanges as required with carpet insert.

E. Provide blank aluminum plate where floor finish is not carpet.

Room No.	Description	Quantity
105	Duplex Power	5
115	Duplex Power/CAT6/HDMI	1
116	USB Duplex Power	6

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 selected by Architect in consultation with owner

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.

B. Switches in public areas such as corridors and large restrooms shall be key operated type switches.

3.5 WALL SWITCH OCCUPANCY SENSORS

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

3.6 WALLBOX DIMMERS

A. Furnish and install incandescent dimmers as shown on plans. Wire and install in accordance with manufacturer’s recommendations. Dimmer switches shall be mounted 4’-0” above floor to bottom of box.

3.7 FLOOR BOXES

A. Contractor shall field verify location of all recessed floor devices with Architect prior to rough in.

B. Cast metal water tight floor boxes shall be used in slabs on grade level or below.

C. After positioning the box, conduit is installed in accordance with local codes.

D. Box shall be secured and pre-pour adjustments made.

E. Grease shall be applied to outside of cement cover and exposed portion of adjusting collar.

F. Cover shall be duct taped prior to pour.

G. Locate boxes after pour and cement cover shall be removed.

H. Wires shall be pulled and receptacles installed per local and national codes.

I. Pedestal type surface mount floor boxes for kitchen area shall be equal to Hubbell

SA688 Series.

◆ END OF SECTION ◆

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fuses
B. Fuse Holders

1.2 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code

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

B. 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.

2) Fuses shall be equal to Bussmann Type LPNR

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

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

E. Spare Fuse Cabinet: Wall-mounted 18 gauge steel unit.

1) Provide space fuse cabinet located in main switchgear room for storage of spare fuses.

F. 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 ◆

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. NEMA Heavy-duty Type HD, steel enclosure, dual-cover interlocks, HP rated plated contacts, indicating handle and provisions for padlocking. Switches shall be NEMA Type approved for the environmental conditions prevailing. Provide Class R rejection fuse clips. Toggle operated disconnect switches equal to Square D Class 2510 shall be acceptable for unfused loads less than 16 amps.

B. Rating suitable for use.

1) Switch rating size shall be as noted on plans.

C. Totally enclosed with external operating handle and mechanical cover interlock.

1) Switches shall be in NEMA 1 enclosure, unless noted otherwise.

2) Provide NEMA 4 stainless steel enclosures when noted on plans.

D. Padlockable handle in the OFF position.

E. Fusible type switches.

1) Provide properly sized fuses.

F. Non fusible type

1) Non-fused type shall be equipped with solid copper links.

G. Integral ground lug

1) Provide integral ground lug

H. NEMA 3R in weatherproof locations.

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

I. Heavy duty type

1) Safety switches shall be heavy duty type.

J. Acceptable Manufacturers

1) Square D Company

2) General Electric

3) Siemens

2.2 SWITCHBOARDS AND DISTRIBUTION PANEL BOARDS

A. MDP – Main Breaker

1) Provide electronic trip molded case circuit breakers with a molded case made of glass-reinforced insulating material that provides high dielectric strength. Circuit breakers shall

a) Share common tripping of all poles

b) Meet the requirements of NEC Section 240-6 by providing a means of seal the rating plug and trip unit adjustments

c) Be equipped with an externally accessible test port for use with a universal test set.

B. MDP Distribution Breakers

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

2) Molded case circuit breakers shall have common tripping of all poles and be equipped with a Push-to-Trip button to manually trip the circuit breaker.

2.3 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 and shall be bolt-on type

C. Ground Fault Protection

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

2) Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (5-mA trip).

3) Ground-Fault, Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).

4) Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered or remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.

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.

F. Features and Accessories:

1) Lugs: Compression type, suitable for number, size, trip ratings, and conductor material.

2) Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.

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

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 ◆

SECTION 26 29 13

ENCLOSED CONTROLLERS

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Manual Motor Starters

B. Combination Magnetic Motor Starter

1.2 DESCRIPTION

A. Provide starters, contactors, control stations, and feeder and branch circuits to motors and equipment.

B. Coordinate rough-in with equipment supplied. Wiring diagrams shall be furnished with the equipment supplied.

C. Provide thermal overload protection for all motors. No thermal protection shall exceed 115% of motor nameplate amperes. Overloads shall be sized in accordance with motor nameplate rating and service factor.

D. Furnish minimum NEMA Size 0 starter. Furnish magnetic starter for each motor that is automatically controlled or interlocked with another motor or device.

E. All 3 phase motor starters shall include overload protection for each phase and single-phase protection.

F. Provide motor short-circuit protection as required.

2. PART 2 - PRODUCTS

2.1 ACROSS-THE-LINE MANUAL CONTROLLERS

A. Manual motor starters (1/2 HP and smaller): Shall include toggle lever, neon pilot lights, stainless steel cover and nameplate, and thermal overload relays in all legs. Shall be open construction for flush-mounting in switchbox. Cover plate shall match device plates.

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 neon pilot light and shall be furnished and installed by this contractor. Starters shall be designed for 120 volts, single phase service. Starters shall be Allen Bradley 600 or 609; 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.

2.2 COMBINATION ACROSS-THE-LINE CONTROLLER/DISCONNECT

A. Magnetic motor starters (3/4 HP and larger motors, or where required for interlocking or automatic control): Multi-pole, NEMA-rated contactors with overload relays, nameplate, pilot light, and reset in cover. Provide phase failure relay with time delay. Provide 120 volt control power transformer, HAND/OFF/AUTO selector switch, or ON/OFF pushbutton switch where indicated.

1) Control circuit voltage shall be 120 volts provided by control circuit transformer. Fuse each side of primary and (1) side of secondary with current-limiting fuses.

2) Include at least (1) spare set of N.O. auxiliary contacts. Provide additional contacts as required to interlock and control fans and equipment.

3) Combination Magnetic Motor Starters non-reserving across-the-line full voltage type starters to be NEMA 1CS2 Class A full voltage rated.

4) Starters shall have heavy duty, fusible switch with rejection type fuses. NEMA KS 1.

5) Provide NEMA type enclosure as required for the environment within which it is located.

6) Single-phase magnetic motor contactor: Square D Class 8910. 120 volt coil, NEMA 1 enclosure.

B. Three-Phase starters shall be Allen Bradley Bulletin 509 or 512, Square D class 8538, General Electric type CR308, Siemens Class SCF.

1) Starters shall be equipped with under voltage and phase-failure relays.

2) Starters shall have 3-pole auxiliary contactor.

2.3 MOTOR CONTACTORS

A. For single-phase motors 1 HP and smaller, where required for interlocking or automatic control: Functional Devices, Inc., Model RIBT2401B. UL Listed 20 Amp. 120V coil, SPDT enclosed power relay contact, plenum-rated NEMA 1 housing, high/low voltage compartments, LED pilot light, and 16 in. long line voltage wiring pigtails.

3. PART 3 - EXECUTION

3.1 GENERAL

A. The electrical contractor shall connect power to all motors supplied by the Mechanical 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 ◆

SECTION 26 32 13

PACKAGED ENGINE GENERATORS

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Packaged Generator System

1) Furnish and install an emergency generator to provide the stand-by and emergency electrical systems as shown on the drawing and specified herein. Provide all required equipment including generator, exerciser, and battery charger.

2) See section 26 36 00 for Automatic Transfer Switch.

1.2 QUALITY ASSURANCE

A. Compliance with NFPA 110

B. Factory testing

C. Field testing

D. NFPA 70 - National Electrical Code

1) All work shall be in accordance with the National Electrical Code requirements.

E. Underwriter's Laboratory

1) Equipment shall be UL labeled or be UL listed.

a) UL 2200 – Stationary Generators.

F. Installation of Stationary Generator – NFPA 37

G. Fuel supply system: NFPA 30, 37

H. Approved Manufacturer's

1) Generac

2) Kohler

3) Onan

2. PART 2 - PRODUCTS

2.1 STAND BY EMERGENCY GENERATOR

A. Included shall be a a Diesel powered generator, transfer switch, emergency panel, all conduit, wiring, connections, etc.

B. Generator set shall be built, tested and shipped by the manufacturer so that there is one source of supply and responsibility. The performance of the electric plant shall be certified by an independent testing laboratory as to the plant's full power rating and voltage and frequency regulation.

C. The engine generator and starting control shall be coordinated and supplied as a complete package by the Contractor. Manufacturer shall have available trained service personnel and parts stock within a reasonable distance of the site.

D. Contractor shall require the generator manufacturer to provide the following services for the generator installation as outlined in these specifications:

E. New Central Fire Station

1) 200 KW – Natural Gas Powered.

2) Under Alternate 1, change to Diesel Powered with base mounted fuel tank with 24 hour fuel supply capacity.

F. Natural Gas emergency generator set rated 120/208 Volts, Three Phase, sound enclosure with internally mounted silencer- 74 dB(A), Battery Charger 10 Amp 9120 volt), Battery and Cables, 120 volt Block Heater, Flexible Fuel Lines, Pre-alarm Sender, Remote Annunciator, Rodent Guards, Run Relay, input/output board for contacts. A Decision-Maker 3000 controller with timers, sensors, indicators and meters as required by local codes shall be provided. The generator control logic shall be microprocessor based with inherent digital communications capability.

G. Natural Gas fired, liquid-cooled, 4 cycle, 1,800 RPM, with isolators between engine-generator set and skids, radiator, antifreeze, lube oil filter, air cleaner, 120 volt 1.5 KW block heater, flexible exhaust and fuel connections and critical silencer, starting batteries, 120 volt battery charger, radio suppression filters, main line circuit breakers, and control panel.

H. Circuit Breakers

1) One (1) – 40 AMP – 3 Pole

2) One (1) – 600 AMP – 3 Pole

I. Control panel shall have the following:

1) Voltmeter.

2) Ammeter.

3) Frequency meter.

4) Running Time meter.

5) Oil pressure gauge.

6) Water temperature gauge.

7) Trouble indicators for low oil pressure, high water temperature, overspeed,

and overcrank.

8) Miscellaneous lights, controls, and dry alarm contacts.

J. Controller: Provide the following control functions:

1) Field-programmable time delay for engine start. Adjustment range: 0 5 minutes in 1 second increments.

2) Field-programmable time delay engine cool-down. Adjustment range: 0 10 minutes in 1 second increments.

3) Real-time clock and calendar for time-stamping of events.

4) Output with adjustable timer for starting aid. Adjustment range: 0 10 seconds.

5) Output for shedding of loads if the generator reaches 100% of its KW rating or the generator output frequency falls below 59 Hz.

6) Programmable cyclic cranking that allows up to (6) crank cycles and up to 45 seconds of crank time.

7) Capability to reduce controller current battery draw, for applications where no continuous battery charging is present.

8) Generator exerciser.

K. Monitored Parameters:

1) Generator:

a) All output voltages: Single-phase, 3 phase, line-to-line, and line to neutral.

b) All single phase and 3 phase currents.

c) Output frequency.

d) System power factor.

e) Total instantaneous kilowatt loading.

f) Display of percent generator duty level — actual KW loading divided by the KW rating.

2) Engine:

a) Coolant temperature both in English and metric units.

b) Oil pressure in English and metric units.

c) Battery voltage.

d) RPM.

L. Alarm Parameters:

1) System shutdown:

a) Customer auxiliary input on any of the (4) inputs available.

b) Emergency stop.

c) High coolant temperature.

d) High oil temperature.

e) Controller internal fault.

f) Locked rotor.

g) Low coolant level.

h) Low oil pressure.

i) NFPA common alarm.

j) Overcrank.

k) Overspeed with user-adjustable level. Range: 65 Hz to 70 Hz on 60 Hz systems.

l) Output overvoltage with user-adjustable level. Range: 105% to 135%.

m) Underfrequency with user-adjustable level. Range: 80% to 90%.

n) Undervoltage with user-adjustable level. Range: 70% to 95%.

2) System warning:

a) Battery charger failure.

b) Coolant temperature gauge signal loss.

c) Customer auxiliary input on any of the (4) inputs available.

d) Power system supplying load.

e) Ground fault detected — detected by others.

f) High battery voltage with user-adjustable level. Range: 14.5 volts to 16.5 volts for 12 volt systems and 29 volts to 33 volts for 24 volt systems.

g) High coolant temperature.

h) Load shed.

i) Low output voltage.

j) Low battery voltage with user-adjustable level. Range: 10 volts to 12.5 volts for 12 volt systems and 20 volts to 25 volts for 24 volt systems.

k) Low coolant temperature.

l) Low fuel level or pressure.

m) Low oil pressure.

n) NFPA common alarms.

o) Overcurrent.

p) Oil pressure gauge signal loss.

q) Speed sensor fault.

r) Weak battery.

M. Keyboard Programmable Functions:

1) Time delay settings:

a) Generator run time (0 hours to 72 hours).

b) Enable times for auxiliary inputs.

c) Engine start.

d) Engine cooldown.

e) Overvoltage and undervoltage delays.

f) Starting aid.

g) Crank on and crank pause time.

2) Trip point settings:

a) High battery voltage.

b) Low battery voltage.

c) Overspeed.

d) Underfrequency.

e) Overvoltage.

f) Undervoltage.

N. Alternator shall be 4 pole revolving field, brushless, with radio interference suppression filters, ±5% voltage regulation, and heavy-duty, pre lubricated bearing at engine drive connection.

O. Electrical Contractor shall connect the built-in engine coolant heater as required.

P. All necessary gas piping, etc. shall be pre-piped to the engine-generator. Plumbing Contractor at Massillon Outpost shall provide gas service to generator from building.

Q. Weatherproof shelter

1) Generator shall be enclosed in a sound shield, weather protective, heavy-gauge, steel housing with removable side panels with lockable latches. Unit shall have fixed louvers sized for proper cooling of engine and generator at 110 deg. F. ambient. Housing shall have (2) rust-inhibiting primer coats, and (2) top finish coats of Manufacturer's standard finish. Critical silencer shall be mounted within the enclosure.

2) Enclosure shall be designed to protect against adverse weather, rodents, etc. and discourage tampering.

3) Shelter shall be welded and bolted, reinforced steel complete with floor plate, louvered openings for intake and exhaust and with protective inside screen mesh.

4) Access doors shall be hinged with key lock type handles. Shelters to include silencer mounting hardware, vibration isolators, battery mounting racks, battery charger, etc.

R. The complete emergency electric power system including parts, labor and travel, shall be warranted for a period of five years or 3000 operating hours, whichever occurs first, from the date of initial start-up. The warranty must be provided by the system manufacturer. Multiple warranties for individual components (engine, alternator, controls, etc.) will not be acceptable. Satisfactory warranty documents must be provided.

S. Contractor shall require the generator manufacturer to provide the following services for the generator installation:

1) Provide any supervisory assistance required.

2) Provide the services of a factory trained field service representative for testing and initial start-up. In addition, instruct the operating personnel in proper operation and maintenance procedures.

3) Provide the services of a factory trained field service representative to recheck the installation after 60 days of operation and review operating and maintenance procedures.

4) Provide all parts and labor to fulfill the terms of the standard warranty.

5) Three sets of complete operating manuals, which should include any non-standard options provided and include any as-built corrections and copies of the factory and on-site tests.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Install emergency generator, and accessories in accordance with manufacturer's recommendations.

B. Ground new generator in accordance with manufacture's recommendations and NEC requirements.

3.2 STARTUP/SITE TESTING

A. Startup to be performed by factory authorized technician and includes a 2 (two) hour load test with load bank.

♦ END OF SECTION ♦

SECTION 26 36 00

TRANSFER SWITCHES

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements for automatic transfer switch for packaged engine generators.

1.2 QUALITY ASSURANCE

A. NFPA 70 – National Electric Code

B. NFPA 110 – Emergency and Standby Power Systems Level 1

C. NEMA ICS 1

2. PART 2 – PRODUCTS

2.1 AUTOMATIC TRANSFER SWITCH

A. Provide all sensors, indicators and timers as required by local code and monitors for in phase transfer, phase rotation, single phase loss, low voltage, high voltage, low frequency and high frequency. The automatic transfer switch logic shall be microprocessor based with inherent digital communications and LCD display capability. Include five year comprehensive warranty.

B. 3 pole transfer switch with fully rated solid neutral plates. UL listed, mechanically held, electrically operated, silver alloy wiping action contacts, silver alloy-plated main contacts, operating handle, sensing relays. Microprocessor-based control module panel, including programming keypad, display, program selector switch, and LED status indication. Accessories for the following features:

1. Voltage sensing on both normal and emergency sources, pick 90%, drop out 85%, adjustable.

2. Momentary outage timer: 1 seconds to 6 seconds, set at 3 seconds.

3. Return-to-normal timer: 0 minutes to 30 minutes, set at 8 minutes.

4. Cool-down timer: 0 minutes to 30 minutes, set at 5 minutes.

5. Time delay on transfer to emergency: 0 seconds to 30 seconds, set at 0 seconds.

6. Auxiliary contact normal and emergency.

7. Test switch and pilot lights.

8. Engine generator exercise timer with reserve power feature.

C. Transfer switches shall return to NORMAL position only by manual reset button. Provide relays and modify controls as required.

D. Withstand and closing RMS symmetrical short circuit current rating shall be 200,000 amps with current-limiting fuses.

E. Transfer Switches

1. One (1) – 40 AMP

2. One (1) – 1000 AMP

2.2 WARRANTY

A. Provide comprehensive full 5 year warranty including parts, labor and travel.

3. PART 3 – EXECUTION

3.1 INSTALLATION

A. Install automatic transfer switch in accordance with manufacturer's recommendations.

◆ END OF SECTION ◆

SECTION 26 41 00

FACILITY LIGHTNING PROTECTION

1. PART 1 - GENERAL

1.1 Contractor shall furnish and install a complete lightning protection system for new tower as indicated on the plans. Installation and final connections shall be made by an accredited installer of a manufacturer of listed lightning protection systems and all material shall be subject to factory inspection and shall be labeled. Overall installation shall be made in the most inconspicuous manner possible. All materials used shall conform to any governing codes and standards

1.2 Installation shall be in accordance with NFPA 780.

2. PART 2 - MATERIALS

2.1 Lightning protection equipment shall be as manufactured by Burkett Industries, Inc.; AC Lighting Security, Inc.; Harger Lightning Protection; Maxwell Lightning Protection Company or the Protection Source.

2.2 Air terminals shall be solid aluminum, 3/8” diameter minimum drawn to a sharp point, not less than twelve (12) inches high, spaced not more than 20’-0” apart along the ridge or around the roof perimeter.

2.3 Down conductors to ground rods shall be installed as indicated on the plans and connected at ground level using 3/4” diameter by ten feet long copper clad ground rods.

2.4 All connections shall be made with heavy gauge hard copper or bronze anchors, fasteners or fittings of the bolt connection type best suited for the surface where used.

2.5 Aluminum components shall be used in locations where system components are mounted to aluminum surfaces to avoid galvanic corrosion of dissimilar metals. All bolts, nails and screws are to be stainless steel. Class I materials shall be used on structures not more than 75 feet in height.

3. PART 3 - EXECUTION

3.1 Telephone and electrical service entrance grounds hall be interconnected to the lightning protection system. The main water pipe shall be connected to the lightning protection system.

3.2 Furnish and install lightning protection system in accordance with NFPA 780 and other appropriate standards in order to obtain a UL labeled installation.

3.3 All down conductors shall be concealed and not exposed on building surface.

♦ END OF SECTION ♦

SECTION 26 43 13

TRANSIENT VOLTAGE SUPPRESSION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. DESCRIPTION

1) This section describes the materials and installation requirements for surge protective devices (SPD) for the protection of all AC electrical circuits from the effects of lightning induced currents, substation switching transients and internally generated transients resulting from inductive and/or capacitive load switching.

1.2 QUALITY ASSURANCE

A. NFPA 70 – National Electrical Code. Including article 285, NEC 2002.

1) All work shall be accordance with NEC requirements.

B. Underwriter's Laboratory

1) Equipment shall be UL listed or bear UL label.

C. Transient Voltage Surge Suppressors: UL 1449 2nd Edition and UL 1283, ANSI/IEEE C62.41 Category A,B,C, and C62.45 testing.

D. NEMA LS-1

1.3 REFERENCES

A. ANSI/IEEE C62.41 - IEEE Guide for Surge Voltages in Low Voltage AC Power Circuits

B. ANSI/IEEE C62.45 - IEEE Guide for Surge Suppressor Testing

C. FIPS Pub 94 (1983) - Guide on Electrical Power for ADP Installation

D. National Electric code - Article 280-1, 2, 4, 12, 21, 25

E. National Fire Protection Association - NFPA-20, NFPA-70, NFPA-75, NFPA-78

F. NEMA LS-1 - Low Voltage Surge Protective Devices

G. UL 1283 - Electromagnetic Interference Filters

H. UL 1449 - transient voltage Surge Suppressors

1.4 RELATED WORK SPECIFIED ELSEWHERE

A. General electrical provisions
B. Raceways, boxes, and fittings
C. Wire and cable

D. Grounding

1.5 SUBMITTALS

A. Shop drawings, product data and manufacturer's installation instructions for non-approved manufacturers shall be submitted for review ten days prior to the bid date. Approved manufacturers shall provide the same required documentation at the drawing approval stage.

B. The submittals shall include:

1) Dimensional drawing of each suppressor type indicating the following:

a) Service Entrance SPD

[1] Copper bus bars (electrical grade copper 1.5" wide, 0.25" thick).

[2] Redundant replaceable surge current diversion modules on each phase

[3] Replaceable 200,000 AIC fuses for each module

[4] Diagnostic monitoring package

[5] Line to neutral, and neutral to ground suppression paths

2) UL Standard 1449 Listing, Standard for Safety, Transient Voltage Surge Suppressors, documentation

3) UL Standard 1283 Listing, Electromagnetic Interference Filters, documentation

4) Spectrum analysis of SPD based on MIL-STD-220A test procedures between 50 kHz and 200 kHz.

5) Independent third part test results verifying maximum surge current capability (single pulse rated).

6) A document of specification compliance shall be included outlining the prospective manufacturers compliance or deviation from each point in the specification. Should deviations be noted, a comprehensive clarification shall be provided outlining the reason for deviation.

2. PART 2 - PRODUCTS

2.1 SERVICE ENTRANCE LOCATION

A. Transient Voltage Surge Protection Device

1) SPD shall be UL Listed to UL 1449, Standard for Safety, Transient Voltage Surge Suppressors, UL 1283, Electromagnetic Interference Filters.

2) SPD shall be modular in design. Each suppression element shall be a user replaceable surge current diversion module. (MOV based) Each surge current diversion module shall be fused with user replaceable 200 kAIC rated fuses. Each surge current diversion module shall include solid state status indicator lights. A 1% variation in metal oxide varistors is permitted.

3) SPD shall provide redundant surge current diversion modules between each phase conductor and the neutral conductor, and between the neutral conductor and ground. For delta configured systems, the SPD shall have components directly connected between each phase conductor and between each phase conductor and ground. Each mode of protection shall utilize two current sharing surge current diversion modules in parallel for either a wye or delta configuration.

4) SPD shall incorporate copper bus bars for the surge current path. Small gauge round wiring or plug-in connections shall not be used in the path for surge current diversion. Surge current diversion modules shall not be used in the path for surge current diversion. Surge current diversion modules shall use bolted confections to the bus bars for reliable low impedance confections.

5) SPD shall meet or exceed the following criteria:

   a) Maximum surge current capability (single pulse rated) shall be 120 kA per phase, in accordance with NEMA LS 1 Standard.

   b) Endurance Testing: capable of protecting against and surviving 4000 ANSI/IEEE C62.41 Category C3 transients without failure or degradation of UL 1449 Suppression voltage Rating by more than 10%.

   c) UL 1449 Suppression Voltage Ratings shall not exceed the following

[1]	Voltage	208Y/120
[2]	L-N	400V
[3]	L-G	400V
[4]	N-G	400V
[5]	L-L	800V

With Internal disconnect Switch.

6) SPD shall be designed to withstand a maximum continuous operating voltage (MCOV) of not less than 115% of nominal RMS voltage.

7) SPD shall have a minimum EMI/RFI filtering of -50dB at 100kHz with an insertion ratio of 50:1 using MIL STD. 220A methodology, in accordance with NEMA LS 1 Standard.

8) SPD shall be equipped with onboard visual and audible diagnostic monitoring. Red and green indicator lights shall provide full time visual diagnostic monitoring of the operational status of each phase as well as each surge current diversion module. Audible diagnostic monitoring shall be by way of audible alarm. This alarm shall activate upon a fault condition. An alarm on/off switch shall be provided to silence the alarm. An alarm push to

test switch shall be provided. The SPD diagnostic monitoring devices shall be mounted on the front of the SPD enclosure. The diagnostic monitoring circuits shall continually monitor the operational status of the surge current diversion modules. No other test equipment shall be required for SPD monitoring or testing before or after installation.

9) SPD shall have a response time no greater than one nanosecond for any of the individual protection modes.

10) SPD shall have a warranty for a period of five year, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period.

11) SPD shall be equipped with the following items

a) A transient event surge counter
b) An internal UL Listed disconnect
c) Form C dry contacts for remote annunciation

12) SPD shall be equal to current technologies model TG150 120/208 GY.

2.2 PANELBOARD LOCATIONS

A. Surge Protective Device

1) SPD shall be UL listed to UL 1449, Standard for Safety, Transient Voltage Surge Suppressors, UL 1283, Electromagnetic Interference Filters.

2) SPD shall be installed by and shipped from the electrical distribution equipment manufacturer's factory.

3) SPD shall provide suppression components between each phase conductor and neutral, between each phase conductor and ground and between the neutral conductor and ground. A 1% variation in metal oxide varistors is permitted.

4) SPD shall meet or exceed the following criteria:

a) Maximum surge current capability (single pulse rated) shall be a 80 kA per phase in accordance with NEMA LS 1 Standard

b) Endurance Testing. Capable of protecting against and surviving 4000 ANSI/IEEE C62.41 Category C3 transients without failure or degradation of UL 1449 Suppression voltage Rating by more than 10%.

c) The UL 1449 Suppression voltage Ratings shall nto exceed the following:

[1] VOLTAGE 208Y/120V

[2] L-G 400V

[3] L-N 400V

[4] N-G 400V

[5] L-L 800V

5) SPD shall be made of solid-state components and operate bidirectionally.

6) SPD shall have a response time no greater than one nanosecond for any of the individual protection modes.

7) SPD shall be designed to withstand a maximum continuous operating voltage (MCQV) of not less than 115% of nominal RMS voltage.

8) Visible indication of proper SPD connection and operation shall be provided. Visual indication shall be by means of solid state status indicator lights on the front of the SPD.

9) SPD shall have a warranty for a period of five years, incorporation unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period.

10) SPD shall be equal to Current Technologies TG 120/208 GY.

2.3 MANUFACTURERS

A. Approved Vendors

1) All levels of protection shall be provided by the same manufacturers.

2) Service Entrance SPD

a) Current Technologies
b) Square D
c) Siemens
d) General Electric

3) Panelboard SPD

a) Current Technologies

b) Square D

c) Siemens

d) General Electric

3. PART 3 - EXECUTION

3.1 SERVICE ENTRANCE

A. Install one SPD at the switchboard at each utility service entrance to the facility, according to manufacturer's recommendations.

B. The TVSS shall be installed on the load side of the service entrance.

C. The TVSS ground shall be bonded to the service entrance ground.

D. Provide built-in installation.

◆ END OF SECTION ◆

SECTION 26 51 00

INTERIOR LIGHTING

1. PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide LED lighting fixtures complete with drivers, frames, canopies, hangers, straps, and trim, as required for a complete installation.

B. Coordinate fixture mounting type with ceiling type listed on the Architectural Room Finish Schedule.

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. Solid State Lighting (LED) UL 1598.

D. Emergency Lighting UL 924.

E. Exit Signs UL 924.

2. PART 2 - PRODUCTS

2.1 SOLID STATE LIGHTING (LED) LUMINAIRES

A. Types

1) Recessed or surface mounted.

2) Comply with IES LM-79

3) CRI 70 minimum, color corrected temperature of 4100k.

4) Color consistency NEMA SSL3

5) B50 rating at least 50,000 hours per IES LM-80

6) Fixtures shall have internal drivers unless specifically permitted/required by the fixture selection or installation.

2.2 EXIT SIGNS

A. Furnish and install the exit signs as shown on plans.

1) Standard LED Exit Signs

a) The new exit signs shall be equal to Lithonia Model LQMSWR120, or equal by Chloride or SureLite. Signs shall be 6" red letter with white housing and face. Arrows number of faces and mounting shall be as

shown on plans. Exit signs shall operate on 120 volts and include 90 minute battery back-up.

2.3 GENERATOR TRANSFER DEVICE

A. Generator-supplied egress lighting shall be provided by using a standard LED fixture equipped with a generator transfer device. The device shall be capable of bypassing the wall switch when the auxiliary generator powers lighting. The device shall consist of relay switching circuitry and fusing contained in a galvanized steel case; shall operate at 140 or 277 VAC, 60 Hz; shall have all inputs fused to three (3) A maximum; shall draw 280 mA and 1.6 watts during normal operation, and shall comply with the current NEC. The device shall be UL listed for installation inside, on top of or remote from the fixture and shall be warranted for a full five (5) years from the date of purchase.

B. Generator transfer devices shall be as manufactured by Bodine Company, Inc.; 924, Inc. or Low Voltage Systems.

C. Warranty

1) Generator Transfer devices shall carry a five (5) year manufacturer's warranty

2.4 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

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, hickeys, 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.

◆ END OF SECTION ◆

SECTION 26 56 00

EXTERIOR LIGHTING

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Exterior luminaries 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 reslient 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) LUMINUAIRES

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.

2.3 POLES

A. Poles shall have adequate strength to withstand wind gust factor of 1.3.

B. Poles shall be one piece construction and include metal base covers.

C. Poles shall include welded ½" threaded lug for grounding conductor connections.

D. Poles shall comply with AASHTO LTS-5

E. Poles shall comply with ASTM B429/B429M constructed with extruded seamless alloy.

F. Poles shall be heat treated full length of shaft to produce T6 temper

G. Poles shall have A 356 aluminum anchor base welded to shaft.

H. Each pole shall be complete with all required hardware for mounting one, two or three fixtures of top of pole as shown on plans. Finish shall be selected from manufacturer's standard colors. Provide vibration isolators as required. Foundations will be provided by the Electrical Contractor.

2.4 FLAG POLE LIGHTS

A. Provide LED lights for flag pole as shown on drawings ESP1.1. Finish shall be selected from manufacturer's architectural colors. Foundations shall be installed by Electrical Contractor.

3. PART 3 – EXECUTION

3.1 EXTERIOR BUIDLING 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.

3.2 EXTERIOR FIXTURE FOUNDATIONS

A. This contractor shall furnish and install all bases, foundations, anchor bolts, reinforcing, supports, etc. as required for the new outdoor lighting fixtures.

B. Foundations for parking lot lights will be provided by the Electrical Contractor.

◆ END OF SECTION ◆

SECTION 27 05 26

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Telecommunications Main Grounding Busbar (TMGB)
B. Telecommunications Grounding Busbar (TGB)
C. Telecommunications Bonding Backbone (TBB)

1.2 QUALITY ASSURANCE

A. All equipment shall be UL listed
B. All equipment and installation shall comply with the latest National Electric Code
C. All equipment installation shall comply with the latest Local Electric Code
D. All equipment installation shall comply with the latest ANSI/TIA/EIA 758 standard.
E. All equipment and installation shall comply with the latest ANSI J-STD-607, and BISCI standards.

2. PART 2 - PRODUCTS

2.1 TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TMGB)

A. Provide Telecommunications Main Ground Bus Bar (TMGB) in IT Room 126.

B. All TMGB Connections to be made with double-bolted, Compression style, Grounding Lugs.

2.2 TELECOMMUNICATIONS GROUND BUSBAR (TGB)

A. Provide Telecommunications Ground Bus Bar (TGB) in all Telecommunications Rooms (TRs) and AV Equipment Cabinet located in DATA Room 202.

B. All TGB Connections to be made with double-bolted, Compression style, Grounding Lugs.

2.3 TELECOMMUNICATIONS BONDING BACKBONE (TBB)

A. Provide Telecommunications Bonding Backbone (TBB) between all TGB's and the TMGB.

B. All TBB Connections to be made with double-bolted, Compression style, Grounding Lugs.

C. The TBB shall be a minimum of #2 AWG insulated copper bonding conductor.

2.4 GROUNDING AND BONDING CONDUCTORS

A. All rounding and bonding conductors shall be copper and may be insulated. When conductors are insulated, they shall be listed for the application. Minimum bonding conductor shall be N0. 6 AWG.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. As a minimum, Bond TMGB to following:

1) Building steel (minimum #2 AWG insulated copper bonding conductor). CAD Weld Bonding Conductors to Building Steel.

2) Main Electrical Service Ground (minimum #2 AWG insulated copper bonding conductor).

3) Local Service Panel Ground (minimum #6 AWG insulated copper bonding conductor).

4) Telecommunications Bonding Backbone (TBB) that connects TMGB to other TBG's (minimum #2 AWG insulated copper bonding conductor).

5) Associated Telecommunications Cable Tray(s) (minimum #6 AWG insulated copper bonding conductor).

6) Telecommunications Conduit(s) Entering TR (minimum #6 AWG insulated copper bonding conductor).

B. As a minimum, Bond TGB to following:

1) Building Steel (minimum #2 AWG insulated copper bonding conductors).

2) Local Service Panel Ground (minimum #6 AWG insulated copper bonding conductor).

3) Telecommunications Bonding Backbone (TBB) that connects TBG to other TGBs and TMGB (minimum #2 AWG insulated copper bonding conductor).

4) Associated Telecommunications Cable Tray(s) (minimum #6 AWG insulated copper bonding conductor).

5) Telecommunications Conduit(s) Entering TR (minimum #6 AWG insulated copper bonding conductor).

C. As a minimum, the Contractor shall bond the following devices to the associated TMGB and TGB's using a minimum #6 AWG insulated copper bonding conductor using compression style lugs.

1) Equipment Racks and Cabinets
2) TR Cable Ladder and Tray

3) Lightning and Surge Protectors
4) Coupled bonding Conductors (CBC=s)
5) Backbone Cable Shields
6) Telecommunication and Fiber Cable Shields
7) Antenna Cable Shields

♦ END OF SECTION ♦

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Equipment racks and cabinets

B. Cable management systems

C. Equipment room backboards

D. Cable ladder

1.2 QUALITY ASSURANCE

A. All equipment shall be UL listed.

B. Compliance with the National Electric Code.

C. Compliance with ANSI/TIA/EIA 568A, 569, 606, 607, and BICSI standards.

D. All equipment shall comply with latest ANSI/EIA-310 Standard.

1.3 SCOPE

A. Provide floor mounted rack in DATA room 202.

B. Provide communication system backboards in rooms 202.

C. Provide #2 ground wire at main communications board in room 202.

D. Provide #6 ground to equipment rack from ground bar.

1.4 SYSTEM WARRANTY

A. System shall carry an industry standard, performance based warranty, by the manufacturer and contractor, for a period of at least 20 years on the horizontal cabling; including patch panels, patch cables, terminations and labor. The remaining portions of the system shall be warranted for a period of one (1) year from the date of substantial completion.

1.5 WORK BY OTHERS

A. Electrical Contractor shall install new voice and data raceway system including cable tray and rough-in boxes as shown on plans.

2. PART 2 - PRODUCTS

2.1 EQUIPMENT RACKS

A. Equipment rack shall be 19" wide and manufactured by Hubbell, Ortronics or Great Lakes.

B. Rack shall hold all fiber optic patch panels and copper patch panels.

C. Racks shall have multi-outlet (minimum of 8 outlets) power strip at each side in the rear of the rack. Connect the power strip to the associated rack mounted UPS unit.

D. Each section of rack shall include one 19" shelf with mounting screws.

E. Racks shall be grounded to ground bar with #6 ground wire.

F. Free standing racks shall be black open frame type and include

1) Racks shall include 6" wide vertical cable channel on both the left and right side of each rack.

2) Racks shall include horizontal cable management per plans.

3) Racks shall be 84" tall.

4) Required Quantity

a) Closet 202 – one (1)

2.2 LADDER RACKS

A. Ladder Racks shall be 12 inches wide with 9 inch rung spacing.

B. Ladder Racks shall be constructed of 16 gauge tubular steel with durable powder coat finish.

C. Provide turns as shown on plans.

D. Provide all appropriate mounting hardware.

2.3 COMMUNICATIONS BACKBOARDS

A. Communications boards shall be constructed from 4' x 8' x ¾" fire treated plywood as detailed on plans. Each board shall be painted with fire retardant paint as directed by the Architect. Communications backboards shall be connected to the cable tray and communications racks by horizontal and vertical ladder rack to provide support for the communications cabling. Provide a #6 copper grounding conductor between each communications board and the building electrical grounding system. Terminate at ground bar on each new board.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. All work shall be completed in compliance with ANSI/TIA/EIA and BICSI Standards.

3.2 LABELING

A. All racks, patch panels, cables, jacks, system components, etc. shall be labeled according to ANSI/EIA/TIA-606 specifications and in coordination with the owner/architect.

3.3 GROUND AND BONDING

A. The wall mounting frame and data cabinets shall accommodate a grounding conductor that will provide a low DC resistance path to ground. The grounding conductor shall not be less than No. 6 AWG copper, and shall meet NBC Article 250 requirements. The frame and cabinet grounding conductor shall be bonded to an isolated grounding system originating from the service entrance grounding point.

B. Upon completion of the installation of the data/communication grounding system, the Contractor shall perform standard ground resistance tests with an approved ground resistance test equipment and procedures. Where test show resistance to ground is 5 ohms or greater, the contractor shall take appropriate action to reduce the ground resistance to less than 5 ohms. The Contractor shall then re-test to demonstrate compliance.

C. Record test results and provide description of test procedures for submission to Engineer for approval.

♦ END OF SECTION ♦

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Modular Voice/Data Jacks

B. Modular Cover plates

C. Horizontal Voice/Data Cable

D. Patch Panels

1.2 QUALITY ASSURANCE

A. All equipment shall be UL listed.

B. Compliance with the National Electric Code.

C. Compliance with EIA/TIA 568A, 569, 606, 607, 862 and BICSI standards.

D. All equipment shall meet Category 6 or Category 6A transmission performance as specified.

E. All connecting equipment shall be from same manufacturer.

1.3 SCOPE

A. Provide CAT 6A voice cable, and CAT 6, and CAT 6A data cables to jacks shown on plans. Note: CAT 6 cables are for CCTV cameras.

B. Provide modular jacks with cover plates at each jack location as shown on plans.

C. Provide patch panels for all voice and data cables as shown on plans.

D. Terminate all cables at jacks and patch panels.

E. Test all cabling in accordance with ANSI/EIA/TIA Standards.

F. Provide patch cables per schedules.

1.4 SYSTEM WARRANTY

A. System shall carry an industry standard, performance based warranty, by the manufacturer and contractor, for a period of at least 20 years on the horizontal cabling; including patch panels, patch cables, terminations and labor. The remaining portions of the system shall be warranted for a period of one (1) year from the date of substantial completion.

1.5 WORK BY OTHERS

A. Electrical Contractor shall install new voice and data raceway system including cable tray and rough-in boxes as shown on plans and specified below.

B. All raceways shall be a minimum of 3/4” conduit unless noted otherwise and shall extend from communications jack location to cable tray as shown on plans. All raceways longer than 10 feet shall include pull strings.

2. PART 2 - PRODUCTS

2.1 VOICE AND DATA JACKS

A. TELEPHONE JACKS

1) Telephone jacks shall be 8 position configurations.

2) Telephone jacks shall be modular in design.

3) Telephone jacks shall be flush mounted modular type.

4) Telephone jacks shall be RJ45 type - CAT 6A Rated - 568B

5) Color shall be White.

6) Required Quantity: 11

7) Category 6A modular jacks by Leviton part number 61110-RE6, Legrand (Ortronics) part number OR-HDJ6 or Hubbell part number HXJ6BL

B. DATA JACKS

1) Data jacks shall be 8 position configurations.

2) Data jacks shall be modular in design.

3) Data jacks shall be flush mounted modular type.

4) Data jacks shall be RJ45 type - CAT 6A Rated - 568B

5) Color shall be Blue.

6) Required Quantity: 62 – CAT 6A
11 – CAT 6 for CCTV cameras

7) Category 6A modular jacks by Leviton part number 61110-RE6, Legrand (Ortronics) part number OR-HDJ6 or Hubbell part number HXJ6BL

C. WIRELESS ACCESS POINT DATA JACKS

1) Data jacks shall be 8 position configurations.

2) Data jacks shall be modular in design.

3) Data jacks shall be flush mounted modular type.

4) Data jacks shall be RJ45 type - CAT 6A Rated - 568B

5) Color shall be Black.

6) Required quantity: 18

2.2 COVER PLATES

A. Plates shall be high-impact, modular, fire retardant plastic type.

B. Plates shall be modular to match to telephone and data jack.

1) Plates shall be equal to Leviton Part No. 42080-1W, Hubbell part number IFP11W or Legrand (Ortronics) part number OR-403HDJ11 for single gang plates.

2) Plates shall be equal to Leviton part number 42080-2W, Hubbell part number IFP12W, or Legrand (Ortronics) part number OR-403HDJ12 for double gang plates.

C. Base Bid Quantity

1)	Type C	11
2)	Type D	40
3)	Type TV	6
4)	Type TV2	2
5)	Type TV3	7
6)	Type TV4	1
7)	Type W	4
8)	Type HDMI	3
9)	Type HDMI2	1
10)	Type WAP	9
11)	Type T	1

D. Coordinate plate color with owner and architect.

2.3 HORIZONTAL CABLE

A. All horizontal voice and data copper cable shall be 4 PR twisted unshielded (UTP).

B. Cable shall be 24 AWG, solid bare copper.

C. Cable shall be insulated with FEP material.

D. Cable shall be air plenum 1459 CMP rated.

E. Cable shall be sequentially marked at 2 foot intervals.

F. Wire pair shall be color coded:

1) pair 1 - white/blue and blue

2) pair 2 - white/orange and orange

3) pair 3 - white/green and green

4) pair 4 - white/brown and brown

G. Cable shall be category 6 performance rated.

H. Category 6 Cable shall have a Blue jacket.

I. Cable shall be category 6A performance rated for wireless access point locations.

J. Category 6A Cable shall have a Red jacket.

K. Cable shall be manufactured by Hubbell, Berk-Tek, Superior Essex, or approved equal.

2.4 COPPER PATCH PANELS

A. Provide 48 port Rj45 patch panels with 2 racks for 24 port per unit.

B. Panel shall be:

1) Type = Category 6

a) Standards = EIA/TIA 568, UL Listed
b) Mounting = Mounts on EIA 19" Rack
c) Termination = PC-mounted D-4 110 Connector
d) No. of Port = 24-port RJ-45
e) Required Quantity: = One (1) – 24 Port

2) Patch Panel by Leviton part number 69586-L24, Legrand (Ortronics) part number OR-PHD66U24 or Hubbell HP624.

3) Type = Category 6A

a) Standards = EIA/TIA 568, UL Listed
b) Mounting = Mounts on EIA 19" Rack
c) Termination = PC-mounted D-4 110 Connector
d) No. of Port = 24 or 48-port RJ-45
e) Required Quantity: = Two (2) – 48 Port
One (1) - 24 Port

4) Patch Panel by Leviton part number 6910G-U24, Legrand (Ortronics) part number OR-PHD6AU24 or Hubbell HP6A24
5) Patch Panel by Leviton part number 69586-L48, Legrand (Ortronics) part number OR-PHD66U48 or Hubbell HP648.

C. Patch panel shall have rear cable-management mechanisms and front label strips.

2.5 COPPER PATCH CABLES

A. Patch Cable

1) Type = Category 6
   a) Standard = EIA/TIA 568, UL Listed
   b) Length = Up to 10 feet
   c) Required Quantity: = nnn Base bid
2) Type = Category 6A
   a) Standard = EIA/TIA 568, UL Listed
   b) Length = Up to 10 feet
   c) Required Quantity: = nnn Base bid

CAT 6 PATCH CABLES

TC	2' Blue	3'Blue	5' Blue	7' Blue	10' Blue
202	11	0	0	0	0
Totals	**11**	**0**	**0**	**0**	**0**

CAT 6A PATCH CABLES

TC	2' Red	2' White	2' Blue	3' Blue
202	**18**	**11**	**40**	**40**

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. All work shall be completed in compliance with EIA/TIA and BICSI Standards.

B. All cable shall be free of tension at both ends as well as over the length of the run. In cases where a cable must bear some stress, "Kellem" grips shall be used to spread the strain over a longer length of the cable.

C. Cable ties and supports shall not pinch, bind, crimp or in any way cause physical damage to, or cause electrical characteristic alterations to the data/ telecommunication cables.

D. Cabling Contractor shall take care to assure that during and upon completion of the installation, all cables are free of kinks, sharp bends, twists, gouges, cuts or any other physical damage which may cause physical or electrical characteristic alterations to the cables.

E. Cabling Contractor shall observe all minimum bend radius and tension limitations, etc, as specified by the cable manufacturer when reinstalling the cables.

F. Where cables pass through walls, the Contractor shall provide the minimum clearance hold required or sleeve to pass the cables through. Contractor shall patch an repair any holes, removals, adds or other damage and paint to match.

G. All cutting, patching and restoration to the original condition of walls, ceilings, floors, etc., shall be the responsibility of the Cabling Contractor.

H. All ceiling removal and restoration required for the execution of this work shall be the responsibility of the Cabling Contractor.

I. Cables that require service loops or additional length shall be coiled at 200% of their recommended minimum bend radius. The coil shall then be cable tied and attached to a nearby support. The coil shall be located, if possible, above the workstation, and tagged with the cable number.

J. All power devices or power sources emit a certain amount of electromagnetic interference (commonly called EMI). To reduce or eliminate the field effect of this EMI on data traffic on a given cable channel, cable runs shall be kept a minimum distance from these sources. In addition, running through the center of the building minimizes the external interference (EMI).

1) Minimum clearance distance requirements:

a) 5" (125mm) from power lines of 2 KVA or less
b) 12" (305 mm) from high voltage lighting (including fluorescent)
c) 39" (1 m) from power lines of 5 KVA or greater
d) 48" (1.2 m) from transformers and motors 5KVA and Larger.

3.2 LABELING

A. All racks, patch panels, cables, jacks, system components, etc. shall be labeled according to ANSI/EIA/TIA-606 specifications and in coordination with the owner/architect.

B. All cables shall be equipped with a self-laminating, wrap-around, machine printed label at both ends of the cable.

C. All patch panels shall be equipped with pre-printed cable identification designation strips installed behind clear plastic label holders on the front of the patch panel.

D. All modular faceplates shall be equipped with a pre-printed cable identification strip installed behind a clear plastic label holder.

3.3 SYSTEM TESTING

A. Upon completion of the cable installation, the Contractor shall perform complete cable certification tests including but not limited to:

1) Continuity checks on each cable, checking for opens and shorts between conductors

2) Cable length

3) Correct pair polarity.

B. Tests shall be performed at terminated patch panel.

C. The Contractor shall prepare complete cable test reports for all installed cable for review and acceptance by the Engineer prior to acceptance of the cabling system.

D. All Category 6 or 6A UTP cable shall be tested in accordance with TIA/EIA 568-B.2 or latest Standards using a Level III compliant tester. All cabling shall be tested and certified to comply with these standards.

E. Copies of cable certification report along with as built drawings shall be submitted to the Architect at time of final acceptance.

3.4 SCHEDULE OF DROPS - (TBD) Included at end of this Section

♦ END OF SECTION ♦

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

A. Horizontal Coax Cable

B. Coax connectors

C. Connector/jack inserts

1.2. QUALITY ASSURANCE

A. All Equipment shall be UL listed.

B. Compliance with the National Electrical Code and Local Electric Code.

C. Compliance with ANSI TIA/EIA 568, 569, 606, 607, 862 and BICSI standards.

D. Compliance with CATV Industry Standards.

E. Federal Communications Commission Part 15

1.3. SYSTEM DESCRIPTION

A. The Broadband Delivery System shall consist of a 1000 MHz, broadband, coaxial-based system for distributing centrally located RF video programming sources such as a CATV, satellite dish programming, etc.

B. The Broadband Wiring System shall be a bi-directional, star-wired, homerun, coaxial distribution system. Quad Shielded RG-6 and/or RG-11 as required.

C. The Video Wiring System shall have a minimum frequency bandwidth between 5MHz and 1000 MHz and support for HDTV.

1.4. SCOPE

A. Provide coaxial jacks and inserts at each jack location as shown on plans.

B. Provide coaxial horizontal cable to each jack location as shown on plans.

C. Provide coaxial splitter in tech closet.

D. Label and Test cabling in accordance with industry standards.

1.5. SYSTEM WARRANTY

A. System shall carry an industry standard, performance based warranty, by the manufacturer and contractor, for a period of at least 20 years on the horizontal

cabling; including patch panels, patch cables, terminations and labor. The remaining portions of the system shall be warranted for a period of one (1) year from the date of substantial completion.

1.6. WORK BY OTHERS

A. Electrical Contractor shall install new video raceway system including cable tray as shown on plans.

B. All raceways shall be a minimum of 1-1/4" conduit unless noted otherwise and shall extend from television jack through corridor wall as shown on plant.

C. Work area modular faceplates will be provided by others.

D. Tech closet communications backboards provided by others.

2. PART 2 - PRODUCTS

2.1. COAXIAL CABLE CONNECTORS/JACKS

A. Coaxial jacks shall be modular type.

1) Coordinate manufacturer and model of work area modular jacks and inserts with Division 27 15 13 contractor that supplies modular faceplates.

B. The coaxial/video outlet shall have the following:

1) One type "F" connector (camera/DVD/TV).

a) Female "F" type connectors are to be provided in each coax/video drop location. These will be snap-on, twist-on type to fit on the face plate.

[1]	Type	=	F
[2]	Termination Style	=	Twist-on
[3]	Mounting	=	Snap-on
[4]	Size	=	RG-6/U

b) Male "F" type connector for drop cable. These connectors must have annealed crimp ring for crimping drop cables at both ends.

2.2 HORIZONTAL COAXIAL CABLE

A. BRANCH COAX/VIDEO CABLE

1) The user drop coax/video cables shall be quad shielded, CMP Rated, RG-6U type cable.

a) Type = RG-6/U, FT6

b)	AWG	=	18 (solid, 0.40" Bare Copper Covered Steel
c)	Insulation	=	Foamed FEP TEFLON
d)	Shield	=	2 Tinned Copper Braid and 2 Duofoil Shields
e)	Capacitance	=	16.6 pF/ft
f)	Impedance	=	75 Ohms
g)	Attenuation	=	6 dB/100 ft @ 700 MHz

2.3 COAXIAL PATCH PANELS

A. WALL MOUNTED PATCH PANELS

1) Provide wall mounted 4-way splitter as required to terminate all branch coax cabling.

2) Mount splitter on communications backboard in tech closet 126.

3. PART 3 - EXECUTION

3.1. INSTALLATION

A. This Contractor shall supply all items necessary to complete intended work.

B. Installation of cabling and jacks shall be performed by qualified electricians in accordance with FCC and video industry standards.

C. System shall be installed in accordance with ANSI/EIA/TIA specifications and BISCI standards.

D. All branch coaxial cables will be terminated at the wall mounted patch panels. Each cable port will be clearly labeled to indicate cable location and cable length from patch panel to room faceplate.

E. Cable ties and supports shall not pinch, bind, crimp or in any way cause physical damage to, or cause electrical characteristic alterations to the cables.

F. Cabling Contractor shall take care to assure that during and upon completion of the installation, all cables are free of kinks, sharp bends, twists, gouges, cuts or any other physical damage which may cause physical or electrical characteristic alterations to the cables.

G. Cabling Contractor to observe all minimum bend radius and tension limitations, etc, as specified by the cable manufacturer when re installing the cables.

H. Where cables pass through walls, the Contractor shall provide the minimum clearance hold required or sleeve to pass the cables through. Contractor shall patch an repair any holes, removals, adds or other damage and paint to match.

I. All cutting, patching and restoration to the original condition of walls, ceilings, floors, etc., shall be the responsibility of the Cabling Contractor.

J. All ceiling removal and restoration required for the execution of this work shall be the responsibility of the Cabling Contractor.

3.2 LABELING

A. All racks, patch panels, cables, jacks, system components, etc. shall be labeled according to ANSI/EIA/TIA-606 specifications and in coordination with the owner/architect.

B. All cables shall be equipped with a self-laminating, wrap-around, machine printed label at both ends of the cable.

C. Patch panel labeled to indicate cable locations and length.

3.3 TESTING

A. Horizontal cabling shall be tested end-to-end complete.

B. Tests shall be performed at terminated cables.

C. This Contractor shall prepare complete cable test reports for all installed cable for review and acceptance by the Engineer prior to acceptance of the cabling system.

D. Copies of cable certification report along with as built drawings shall be submitted to the Architect at time of final acceptance.

E. All coaxial horizontal cables shall be sweep tested to 1000MHz with a hand held cable tester and shall meet the following minimum performance values listed in dB/100 feet.

MHz	**Series 6**
55	1.50
450	4.28
750	5.82
1000	6.54

◆ END OF SECTION ◆

SECTION 27 15 43

AUDIO-VIDEO COMMUNICATIONS HORIZONTAL CABLING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

A. Audio-Video Jacks and Inserts

B. Audio-Video Horizontal Cabling

1.2. QUALITY ASSURANCE

A. All Equipment shall be UL listed.

B. Compliance with the National Electrical Code and Local Electric Code.

C. Compliance with ANSI TIA/EIA 568A, 569, 606, 607, 862 and BICSI standards.

D. Federal Communications Commission Part 15

1.3. SYSTEM DESCRIPTION

A. The Audio/Video Cabling shall include local audio/video input/output cabling from the instructor's outlet to the interactive display and from the interactive display to the classroom sound reinforcement amplifier.

1.4. SCOPE

A. Provide HDMI jacks as noted on drawings.

B. Provide HDMI horizontal cable to each jack location as shown on plans.

C. Provide HDMI cable from the jack location for connection to the instructor's laptop.

D. Provide one (1) HDMI cables from the interactive display to the T jack location.

E. Provide one (1) HDMI cables from the interactive display to the HDMI jack location.

F. Provide one (1) HDMI cable from the interactive display to the TV ack in floor box.

G. Provide all faceplates and matching A/V jack connection. Coordinate manufacturer brand, model, and color with 27 15 13 contractor.

H. Test cabling in accordance with audio/video industry standards.

1.5. SYSTEM WARRANTY

A. System shall carry an industry standard, performance based warranty, by the manufacturer and contractor, for a period of at least 20 years on the horizontal cabling; including patch panels, patch cables, terminations and labor. The

remaining portions of the system shall be warranted for a period of one (1) year from the date of substantial completion.

2. PART 2 - PRODUCTS

2.1. AUDIO/VIDEO JACKS

A. Modular jacks and inserts

1) Coordinate manufacturer and model of work area modular jacks and inserts with Division 27 15 13 contractor.

B. HDMI Connector (All HDMI, TV and T Wall plates).

1) Female HDMI jack. These will be push on type.

a) Termination Style = Push-on
b) Size = HDMI
c) Quantity Required:

[1] Base Bid: = 20

C. Speaker Post (on A wall plates)

1) Female Speaker Posts

a) Termination Style = Push-on
b) Size = Banana Plug
c) Quantity Required:

[1] Base Bid: = 8

D. HDMI Cables

1) HDMI jumper cables eight foot (8’) length shall be provided for connection from the HDMI jack at the teacher’s desk, for connection to the instructor’s laptop.

a) Quantity Required:

[1] Base Bid: = 10

2) HDMI jumper cables three foot (3’) length shall be provided for connection from the HDMI jack at the interactive display to the interactive display HDMI input and HDMI output.

a) Quantity Required:

[1] Base Bid: = 12

3. D. PART 3 - EXECUTION

3.1. INSTALLATION

A. This Contractor shall supply all items necessary to complete intended work.

B. Installation of cabling and jacks shall be performed by qualified electricians in accordance with FCC and audio-video industry standards.

C. System shall be installed in accordance with ANSI/EIA/TIA specifications and BISCI standards.

D. Cable ties and supports shall not pinch, bind, crimp or in any way cause physical damage to, or cause electrical characteristic alterations to the cables.

E. Cabling Contractor shall take care to assure that during and upon completion of the installation, all cables are free of kinks, sharp bends, twists, gouges, cuts or any other physical damage which may cause physical or electrical characteristic alterations to the cables.

F. Cabling Contractor to observe all minimum bend radius and tension limitations, etc, as specified by the cable manufacturer when re installing the cables.

G. Where cables pass through walls, the Contractor shall provide the minimum clearance hold required or sleeve to pass the cables through. Contractor shall patch an repair any holes, removals, adds or other damage and paint to match.

H. All cutting, patching and restoration to the original condition of walls, ceilings, floors, etc., shall be the responsibility of the Cabling Contractor.

I. All ceiling removal and restoration required for the execution of this work shall be the responsibility of the Cabling Contractor.

3.2 LABELING

A. All cables, jacks, system components, etc. shall be labeled according to ANSI/EIA/TIA-606 specifications and in coordination with the owner/architect.

B. All audio-video cables shall be equipped with a self-laminating, wrap-around, machine printed label at both ends of the cable.

3.3 TESTING

A. Audio-Video Wiring System shall be tested end-to-end complete.

◆ END OF SECTION ◆

SECTION 27 21 33

DATA COMMUNICATIONS WIRELESS ACCESS POINTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Wireless Access Points

1.2 QUALITY ASSURANCE

A. All equipment included in bid is to be UL listed.

B. All equipment included in bid is to be in compliance with ANSI/NFPA-70 NEC.

C. All equipment included in bid is to be in compliance with the FCC guidelines.

D. Compliance with ANSI TIA/EIA 568, 569, 606, 607, 862 and BICSI standards.

E. All equipment shall comply with the latest ANSI-J-STD-607 Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications Standard.

F. All equipment shall provide protection and containment of the unwanted wireless signals and prevent student access to unwanted network and content, in accordance with CIPA requirements.

G. All equipment shall meet or exceed 802.11ac wave 2 requirements.

1.3 SCOPE

A. Provide and install all designated equipment.

B. Install WAP's to support wireless network devices throughout the building.

C. Installation and start up of all systems shall be under the direct supervision of a local agency regularly engaged in installation, repair, and maintenance of such systems. The supplier shall be accredited by the proposed equipment manufacturer.

D. Connect WAP to IP network via IEEE 802.3at PoE+ switch.

E. Coordinate VLAN and security requirements with the owner.

F. Perform complete building RF survey to verify optimum coverage. Optional antennas will be provided as determined by RF survey.

G. Program and configure access point with the cloud wireless controller to provide complete WAP management services as directed by owner.

1.4 WARRANTY AND CUSTOMER SERVICE RESPONSE

A. All equipment included in the bid is to have a minimum three (3) years full warranty. This includes labor, parts, and materials. In addition, within that three (3) year period, the bidder must agree to provide advanced replacement service to the district in the event of a major system failure in which any of the appliances fail within the three (3) year replacement period.

B. The contractor shall guarantee availability of local service by factory trained personnel of all specified equipment from an authorized distributor of all equipment specified under this section. On-the-premise maintenance shall be provided at no cost to the purchaser for a period of three (3) years (parts and labor) from date of acceptance unless damage or failure is caused by misuse, abuse, neglect or accident.

1.5 WORK BY OTHERS

A. Horizontal CAT6A wiring provided by Division 27 15 13 Contractor.

B. PoE network switches provided by others.

PART 2 – PRODUCTS AND EQUIPMENT

2.1 WIRELESS ACCESS POINTS

A. A total of five (5) 802.11b/g/n/ax client access radio by Cisco Meraki MR36 wireless access points with standard antennas are to be included in this bid with the following specifications for indoor use.

1) 2.4GHz and 5GHz dual band WIDS/WIPS radios.
2) AP's will be connected to CAT 6A cabling to 802.3at PoE switchports.
3) 2x2 multiple input, multiple outpu (MIMO) with 4 spatial streams.
4) SU-MIMO, UL MU-MIMO and DL MU-MIMO support.
5) Maximum ratio combining (MRC) and beamforming
6) 20 and 40 MHz channels (802.11n) 20, 40, and 80 MHz channels (802.11ac Wave2).
7) Three (3) year license.

B. A total of two (2) 802.11b/g/n/ax client access radio by Cisco Meraki MR70 wireless access points with standard antennas are to be included in this bid with the following specifications for use in the Apparatus Bay 143.

1) 2.4GHz and 5GHz dual band WIDS/WIPS radios.
2) AP's will be connected to CAT 6A cabling to 802.3at PoE switchports.
3) 2x2 multiple input, multiple outpu (MIMO) with 4 spatial streams.
4) SU-MIMO, UL MU-MIMO and DL MU-MIMO support.
5) Maximum ratio combining (MRC) and beamforming
6) 20 and 40 MHz channels (802.11n) 20, 40, and 80 MHz channels (802.11ac Wave2).
7) Three (3) year license.

C. Wireless Access Points must provide dynamic channel assignment, interference detection and avoidance, load balancing across multiple access points, coverage hole detection and avoidance, dynamic power control, user location services, real-time rogue access point detection and containment.

D. Above ceiling in-line power CAT6A drops are provided per drawings.

E. Contractor shall verify the coverage meets the following requirements by performing field measurements and submitting the results to the engineer for acceptance upon installation:

1) Minimum Signal Strength: -75dB
2) Signal-to-noise ratio: -20dB
3) Maximum channel overlap: 4
4) Coverage minimum: 35 users per AP

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine Conditions with the installer present, for compliance with requirements and other conditions affecting the performance of the system.

3.2 INSTALLATION

A. General

1) Provide and install all components necessary for a complete installation.

2) Utilize wire management and wire ties to provide immaculate installation.

3) The system bid is to include all peripheral equipment necessary to render the system fully operational.

B. All racks, patch panels, cables, jacks, system components, etc. shall be labeled according to ANSI/EIA/TIA-606 specifications and in coordination with the owner/architect.

C. All wireless access points shall be equipped with a self-laminating and machine printed label that is visible on the face of the access point.

D. Install and program all wireless equipment and establish all necessary VLAN's in coordination with owner.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Services - Provide services of a duly factory authorized service representative for this project location to supervise the field assembly and

connection of components and the pre-testing, testing and adjustment of the system.

B. All wireless equipment shall be compatible with IP network switch manufacture.

C. Testing – Rectify deficiencies indicated by tests and completely re-test work affected by such deficiencies at Bidder's expense. Verify by system testing that the total system meets the Specifications and complies with applicable standards.

3.4 TESTING

A. Setup and test the delivery system in its entirety. Perform complete site survey after system placement and verify coverage and throughput.

◆ END OF SECTION ◆

SECTION 27 41 19

VIDEO DISPLAY EQUIPMENT

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Flat Panel Mounts

1.2 QUALITY ASSURANCE

A. All equipment included in bid is to be UL listed.

B. All equipment included in bid is to be in compliance with the NEC.

C. All equipment included in bid is to be in compliance with the FCC guidelines.

D. Compliance with ANSI TIA/EIA 568, 569, 606, 607, 862 and BICSI standards.

1.3 SCOPE

A. Provide and install all designated equipment.

B. The agency providing the equipment shall be responsible for providing specified equipment and mentioned services for all equipment as specified herein.

1.4 WARRANTY AND CUSTOMER SERVICE RESPONSE

A. All equipment included in the bid is to have a minimum one (1) year full warranty. This includes labor, parts, and materials.

B. The contractor shall guarantee availability of local service by factory trained personnel of all specified equipment from an authorized distributor of all equipment specified under this section. On-the-premise maintenance shall be provided at no cost to the purchaser for a period of one (1) year (parts and labor) from date of acceptance unless damage or failure is caused by misuse, abuse, neglect or accident.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver new, off the shelf products in factory containers. Store the products in clean, dry space in original containers. Protect products from fumes and construction traffic. Handle carefully to avoid damage.

1.7 WORK BY OTHERS

A. Network wiring provided by others

B. A/V cabling and switching equipment provided by others.

C. TV’s and monitors will be provided by others.

PART 2 – PRODUCTS AND EQUIPMENT

2.1 FLAT PANEL MOUNTING BRACKETS

A. Mounting brackets for flat panel monitors will be purchased and installed as per the equipment matrix at the end of this section.

B. Pivoting mounting bracket for the 42” Flat Panel monitor will meet the following specifications:

1) Display size 32” to 80”
2) Load capacity 150lbs.
3) Tilt up to 10 degrees down
4) Pivot +/- 45 degrees
5) Mounting bracket shall be Peerless SP850-UNL or equal by Chief or Tripp Lite.

C. Pivoting mounting bracket for the 86” Flat Panel monitor will meet the following specifications:

1) Display size 46” to 90”
2) Load capacity 150lbs.
3) Tilt up to +15 degrees to -5 degrees
4) Mounting bracket shall be Peerless SA771PU or equal by Chief or Tripp Lite.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine Conditions with the installer present, for compliance with requirements and other conditions affecting the performance of the system.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General

1) Provide and install all components necessary for a complete installation prepared for the installation of the TV’s or monitors.

3.3 FIELD QUALITY CONTROL

A. Manufacturer’s Field Services - Provide services of a duly factory authorized service representative for this project location to supervise the field assembly and connection of components and the pre-testing, testing and adjustment of the system.

3.4 CLEANING AND PROTECTION

A. Prior to final acceptance, clean system components and protect them from damage and deterioration.

Equipment Schedule and additional diagrams follow.

Oregon Fire Station
System Equipment Schedule

Room Number	Room Description	42" TV Wall Mount	86" TV Wall Mount			
102	Lobby	1				
105	Training Room	1	2			
110	Chief Office	2				
111	Assistant Chief Office	2				
112	Plan Review	2				
113	Assistant Chief Office	2				
115	Conference Room		1			
116	Day Room	1	1			
124	Duty Office	2				
135	Watch Room	2				
152	Fitness Room	2				
	Totals	**18**	**3**			

◆ END OF SECTION ◆

SECTION 27 51 27

TRAINING ROOM SOUND REINFORCEMENT SYSTEM

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Sound Reinforcement System.

B. Speakers

1.2 QUALITY ASSURANCE

A. NFPA 70 - National Electrical Code

B. National Fire Protection Association

C. American with Disabilities Act

D. Underwriter's Laboratory

E. Federal Communications Commission Part 15

F. BICSI Telecommunications Distribution Methods Manual (TDMM) latest edition.

G. Latest ANSI TIA/EIA-568, 569, 606, 607 Standards and Eleventh Edition or latest.

1.3 SCOPE

A. BASE BID

1) This contractor shall provide and one (1) amplification system complete with amplifier mixerand four (4) in-ceiling speakers as noted on the drawings.

2) The contractor shall use the existing conduit and box as noted on the drawings for the wiring from the amplifier to the speakers and from the amplifier to the interactive display.

1.4 WARRANTY

A. The sound system Contractor shall warranty all parts and labor for a period of three (3) years from the date of substantial completion. During that time, the contractor shall repair or replace any defective material or labor without cost to the Owner, and with all reasonable speed. Where warranties on individual pieces of equipment exceed three years, the guarantee period shall be extended to the warranty period of the particular item in accordance with the manufacturer's terms.

2. PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Infrared Amplification System

1) Minimum 100 Watts RMS as noted in schedule total output with minimum 50-20KHz frequency response.

2) Minimum 3-band internal equalizer or tone controls.

3) Minimum one (1) line output for ADA wireless equipment.

4) Provide Teach Logic Model Spectrum III, 100 watt infrared amplification system, or equals by Lightspeed and Audio Enhancements for large room amplification as noted in the schedule.

B. Ceiling Speakers

1) Provide four (4), Teach Logic SP-628 plenum rated in-ceiling mounted speakers with minimum 65-20KHz frequency response or equal 4-speaker plenum rated system from Lightspeed or Audio Enhancements.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all equipment in accordance with manufacturer's written instructions and recommendations. All cabling and speaker wire must be plenum rated.

B. Wiring

1) Per speaker, provide No. 16 AWG plenum rated twisted pair wiring from wall jack to speaker. Terminate speaker wire at system wall plate. Wall junction box and face plate provided by others. This bidder to provide wire, speaker terminal posts and insert.

2) Provide plenum rated cable from wall jack to ceiling mounted IR sensor. Terminate sensor cable at system wall plate. Wall junction box and face plate provided by others. This bidder to provide wire, sensor cable jack and insert.

3) Provide all patch cables from amplifier receiver to wall jacks.

C. All equipment shall be held firmly in place. This shall include loudspeakers, cable, etc. Fastenings and supports shall be adequate to support their loads. All connectors, outlets, etc., shall be clearly, logically and permanently marked during installations.

D. Receiver/Amplifier units bid for this job are to be installed into existing wall mounted cabinets designed for this use and already installed in designated rooms or on existing counter tops.

E. Contractors shall furnish and install all miscellaneous structural supports, brackets, hangers, etc., for mounting any equipment as required.

F. The contractor must take such precautions as are necessary to guard against electromagnetic and electrostatic hum, to install adequate ventilation and to install equipment so as to provide maximum safety to the person who operates the system.

G. Care shall be exercised in wiring, so as to avoid damage to the cables and to the equipment. All joints or splices shall be made with electrical spring connectors or rosin-core solder where applicable. Crimp spade lugs are to be used on all cable connections to terminal strips.

H. The communication system supplied shall be listed by Underwriter's Laboratories under UL Standard 1459. A copy of the UL listing card for the proposed system shall be included with the Contractor's submittal.

I. The contractor shall conduct such tests and adjustments of equipment and shall be required by the owner’s representative, or as necessary to verify performance of the system.

J. The sound system Contractor shall cooperate and coordinate as required with the other Contractors who are responsible for work not included in this contract, which may affect the sound system installation in any way. He shall provide any and all information as required or requested in order for this work to be completed, in the best interests of the project. Such assistance or information shall be transmitted in writing to the requesting party in all cases.

◆ END OF SECTION ◆

SECTION 28 13 00

ACCESS CONTROL SYSTEM

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Access Control Components

1.2 QUALITY ASSURANCE

A. All equipment shall be UL listed.

B. All equipment included in bid is to be in compliance with the NEC.

C. All equipment included in bid is to be in compliance with the FCC Class B guidelines.

D. Compliance with ANSI TIA/EIA 568, 569, 606, 607 and BICSI TDMM standards.

E. Compliance with the ADA.

1.3 SCOPE

A. Provide all access controllers, credential readers and reader interfaces, IP addressable interfaces, power supplies, and access credentials.

B. The intent of this bid is to provide card readers, power supplies and hardware to connect the system to the existing Honeywell Pro Watch system that is located in the Oregon Municipal Complex. This bid should include all the equipment in part A of the scope and provide for installation and programming of this equipment so that is a fully functioning and operation access control system.

C. Access doors to receive access control proximity card reader interfaces are 100B and 114A per plans.

D. Access doors to receive access control proximity card reader with a keypad control interfaces are doors 121A and 148A per plans.

E. Provide all access controller to reader interface wiring and door component wiring per plans.

F. Provide IP network connectivity from access control system to building LAN.

G. Access Control hardware and software shall be compatible with door hardware, electric latch, exit and ADA devices.

1.4 RELATED WORK

A. Electrical rough-in boxes, pathway conduit and cable tray provided by Wiring Contractor.

B. Ethernet switches and IP infrastructure will be provided by others.

C. Equipment Cabinet and CAT6 patch panels in Data Room 202 will be provided and installed by others.

1.5 WARRANTY

A. This contractor shall warranty the complete access control system components, software and all wiring to be free from defects for a period of one year.

B. The manufacturer shall provide the Owner with a one-year service and maintenance contract covering all equipment installed.

C. These one year periods shall begin on the date of final acceptance.

1.6 SUBMITTALS

A. Submit all hardware and wiring diagram for approval.

2. PART 2 – PRODUCTS

2.1 CARD READERS

A. Provide reader Interfaces and HID proximity Card readers at all doors requiring credential access per plans.

1) Wall mounted
2) Connector for one multicolor LED for GO or NOGO indication
3) Capability to make local decisions if connection is lost to system controller.
4) Hidden mounting screws to be vandal resistant.
5) Single gang

B. Card reader shall be Honeywell OP40HON OmniProx HID Compatible.

C. Provide reader Interfaces and HID proximity Card readers with and integrated keypad at all doors requiring credential access per plans.

1) Wall mounted
2) Connector for one multicolor LED for GO or NOGO indication
3) Capability to make local decisions if connection is lost to system controller.
4) Hidden mounting screws to be vandal resistant.
5) 12 button keypad integrated into the device.

D. Card reader with keypad shall be HID 5355AGK.

E. Provide Intelligent door controllers at each door for card access control.

1) The door control interface shall be a Honeywell Pro Watch PW7K1IC intelligent controller.

2.2 MISCELLANEOUS EQUIPMENT

A. Provide power supply for Card access control equipment at each door control equipment cabinet.

1) Power supply shall be Altronix SMP10C12X.

B. Provide Honeywell Two-Reader Module Card for access control at each door control equipment cabinet.

1) Card shall be Honeywell Pro Watch PW7K1R2.

3. PART 3 - EXECUTION

3.1 GENERAL

A. Furnish and install in accordance with the manufacturer's recommendations all controllers, interfaces, mounting and enclosure hardware, wiring, fittings, etc. All wires shall be dressed, tagged and properly identified at all location points.

B. Complete the installation, configuration and programming of the Access Control system and all credentials. Coordinate the access schedules with owner.

C. Coordinate IP network connectivity with District and Local Area Network Electronics Contractor.

D. Coordinate the integration of the access control system with the CCTV system contractor. Provide all required interface components and complete integration.

E. Install credential readers and wire to reader interface per plans.

♦ END OF SECTION ♦

1. PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Video Management System (VMS)

B. Camera Licenses

C. Cameras

1.2 QUALITY ASSURANCE

A. NFPA 730 – Guide for Premises Security

B. NFPA 731 – Standard for Installation of Electronic Premises Security Systems

C. Underwriter's Laboratory (UL)

D. Compliance with the National Electric Code.

E. Compliance with ANSI/TIA/EIA 568A, 569, 606, 607, and BICSI standards.

F. All equipment shall comply with latest ANSI/EIA-310 Standard.

G. FCC Class B

H. NTSC/EIA

I. BICSI Telecommunications Distribution Manual (TDMM) Latest Version

1.3 SCOPE

A. Install a completely functional video surveillance system including all recording system software, cameras, camera and system programming and configuration, testing and commissioning.

B. System shall allow local and remote operational control and viewing of all cameras.

C. All IP systems to provide a minimum of 2MP camera video technology.

D. CAT 6 patch cables in the network cabinet in Data Room 202 will be supplied and included in this contract.

E. All servers and storage equipment will be located in the Data Room 202.

F. Contractor shall be responsible to obtain and pay for all licenses, permits, and inspections that are required.

G. Contractor shall adjust all cameras to cover the appropriate field of view as approved by the owner representative before final approval of the system.

1.4 SUBMITTALS

A. Product Data to be Submitted Before Work Begins

1) VMS Equipment Cut Sheets

2) Storage Media Cut Sheets

3) Camera Cut Sheets for each Model

4) Patch Cable Cut Sheets

5) Shop Drawing of System and Cameras

1.5 SYSTEM WARRANTY

A. Contractor shall provide a complete labor and installation warranty on all products associated with this purchase, for a period of three (3) years following acceptance of the entire system.

B. All software licenses and support agreements for the three (3) year warranty period shall be included in the contractor bid. The contractor shall also apply hot fixes, patches, and upgrades for the three (3) year warranty period.

C. During the warranty period the contractor shall supply an advanced replacement of each component of the system in need of replacement or repair at no additional cost to the owner.

D. Warranty response shall be by a factory trained technician properly equipped to handle service within the next business day.

E. Should any major system fail during the warranty period, response shall be within four (4) hour period of notification by a factory trained technician properly equipped to handle service.

2. PART 2 - PRODUCTS

2.1 VIDEO MANAGEMENT SYSTEM (VMS)

A. The Video Management System (VMS) shall be a Microsoft Windows-based video management and surveillance system consisting of two primary components, as follows:

1) An IP video management system. This application shall:

a) Maintain the database of cameras and recording devices and to provide a web-based administrative portal to manage the video

surveillance system

b) Route video traffic to users as requested and appropriate

c) Record and store video from resources on the network.

2) A client presentation application to allow users to view and manage live and recorded video.

B. The IP video management system shall record video and audio streams from IP cameras and video encoders on the network.

1) Video: MPEG4, MJPEG, H.264, or H.265 in High, Main, or Base Profile streams from both standard resolution and megapixel cameras

C. The system shall support recording schedules, including the ability to record based on motion, analytic, and alarm events.

D. The IP video management system shall be capable of continuous scheduled alarm/event and motion recording. Pre- and post- alarm recording shall also be available and shall be fully programmable on a per channel basis.

E. The IP video management system shall have the ability to record and playback audio streams along with associated video.

F. The IP Video Management System shall support recording of primary or secondary streams, individually or simultaneously. The server application can be configured to record a stream in unicast or multicast.

G. The IP Video Management System shall support video bookmarking, such that users can identify and recall important moments in recorded video based on the bookmark name or notes that are associated with it.

H. The IP video management system shall allow the administrator to set minimum and maximum retention periods for recorded video.

I. The IP video management system shall support network health and monitoring utilizing third-party SNMP monitoring tools.

J. The IP video management system shall indicate system performance and operation status utilizing a variety of reports.

K. The system shall be configurable remotely or over a network.

L. The system shall discover all available cameras on the network.

M. The system shall allow users to manually add cameras and devices by IP address or DNS hostname.

N. The system shall support aggregation by a higher-level system, tying multiple servers together in a single, unified environment.

O. The system shall support third-party cameras using ONVIF profile S or native drivers.

P. The IP VMS shall support Lightweight Directory Access Protocol (LDAP) to authenticate users.

Q. The IP video management system shall allow archival of video data to external network locations or NAS devices over a network connection. The archival schedule shall be either automatic at user-defined intervals or manually executed.

R. The video management system shall be available as a hardware server with capacity to record a minimum of 15 cameras at up to 450 Mbps recording throughput (per recorder).

S. The video management system shall be available as a software product that can be installed on COTS hardware.

T. The server shall support semantic grouping and organization of cameras/devices into groups using “tags”.

U. The system shall allow users to export video on request; exported video shall be stored locally on the server or on another network location selected by the administrator.

V. The system shall support aggregation by a higher-level environment, allowing the IP video management system to belong to a confederation of servers.

W. The VMS shall be accessible via a web browser with no software installed for live and playback functionality.

X. Basic Analytic capabilities

1) Motion – Receive motion detection events from cameras
2) Alarm – Receive detection of physical alarms from cameras within the system, triggering an event
3) Analytic – Detection of analytic events and edge analytic events from cameras, including those that are free of charge

Y. Advanced Analytics Suite powered by Deep Learning

1) Detection of Objects (People and Vehicles) from an enabled camera
2) Configure notifications when objects are detected in zones
3) Configure notifications when objects move the wrong way though zones
4) Configure confidence thresholds for object classification within a scene

Z. The VMS server shall meet the following hardware specifications:

1) Windows 10 IoT 2019 (mirrored RAID1)
2) Intel Xeon Silver
3) 16GB RAM
4) RAID 5
5) 1GbE NIC (x2)

6) 48TB storage for Server

7) Storage shall be for 30 days at 15 FPS, recording on motion only.

AA. Servers shall be Pelco VXP-P2-48-JT or engineer approved equal.

2.2 CAMERA LICENSE

A. Provide camera licenses for three (3) years for all cameras provided.

2.3 CAMERAS

A. Provide for six (6) exterior cameras on the drawings 270 degree viewing angle CCTV cameras that meet the following specifications;

1) Zoom in for detail live or retrospectively with client-side dewarping.
2) 12 MP (4x3 MPx) resolution.
3) Up to 30 fps.
4) H.264
5) Local storage on micro SD
6) IR illumination
7) PoE+
8) Camera shall be Pelco IMM12027-1EP for exterior use or engineer approved equal.

B. Provide for three (3), 360 degree viewing angle CCTV camera in EMS Supply Room 137 an in the Apparatus bay 143 on the drawings, that meet the following specifications;

1) Constant 360 degree surveillance with no blind spots
2) 12 MP resolution.
3) Up to 30 fps.
4) H.264
5) Local storage on micro SD
6) IR illumination
7) PoE+
8) Camera shall be Pelco EVO-12NMD or engineer approved equal.

C. Provide two (2) wedge cameras in Vestibules 100 and 136 as required on the drawings CCTV cameras that meet the following specifications;

1) 2 MP resolution.
2) Up to 30 fps.

3) H.264 and H.265
4) Local storage on micro SD
5) IR illumination
6) PoE+
7) 2.4mm Lense
8) Camera shall be Pelco IMP-232-1ERS or engineer approved equal.

3. PART 3 - EXECUTION

3.1 INSTALLATION

A. All cables, jacks, patch panels, switches, cameras, monitors, servers, storage equipment, and jumpers shall be installed in a neat and organized method.

B. Any damage, holes, chips, or cracks in the walls, ceilings, floors, or other structural or finished materials of the building caused by the installation of CCTV equipment shall be repaired by the contractor or a sub-contractor.

C. The equipment supplied shall be installed as a complete working system.

D. Installation shall include video labeling of all cameras for easy recognition by the owner when monitoring or reviewing camera displays.

E. All work shall be completed in compliance with ANSI/TIA/EIA and BICSI Standards.

3.2 LABELING

A. All racks, patch panels, cables, jacks, system components, etc. shall be labeled according to ANSI/EIA/TIA-606 specifications and in coordination with the owner/architect.

3.3 TESTING

A. Upon completion of work, the installation is to be entirely free of ground faults, short circuits, and open circuits.

B. Perform a thorough operational test of all systems and interfaces.

C. Contractor shall immediately rectify or correct minor performance and programming issues discovered during testing.

D. Configure all live view and recording parameters for the system.

E. A punch list will be established for all nonconforming tests and will be forwarded to the contractor. The contractor will rectify, correct, or reply to all nonconforming issues on the punch list and all items on the list must be remedied and accepted by the engineer for the work to be accepted as complete.

F. All cameras shall be viewed and accepted by the owner as capturing the area that is required to be viewed.

3.4 TRAINING

A. Provide a minimum of ten (10) hours of training to at least 3 representatives for the owner that cover the following topics:

1) System equipment connectivity

2) Device configurations

3) Operation, maintenance and upgrade procedures

B. Training should be broken down into administrator and user level sessions.

C. Trainer shall be factory certified and fully trained with valid certificate.

♦ END OF SECTION ♦

SECTION 28 31 00

FIRE DETECTION AND ALARM

1. PART 1 GENERAL

1.1 DESCRIPTION

A. Provide a fire alarm system with initiating and alarm signaling devices, and control panel, as shown on the Drawings.

B. Provide cellular dialer for digital communicator. Program digital communicator as required for Central Monitoring Service.

1.2 PERMITS

A. This contractor is responsible for obtaining any necessary permits required for modifications of the new fire alarm systems.

1.3 TESTING

A. This contractor shall have a trained representative of the equipment manufacturer demonstrate in the presence of the Architect, Local Fire Department, State Fire Marshal and Owner that the system functions properly.

B. This contractor shall provide a Certificate of Approval of Affidavit from the State Fire Marshal and a Certificate of Approval from the Local Fire Dept. before final payment will be made.

1.4 GUARANTEE

A. This contractor shall guarantee the complete fire alarm system and all wiring to be free from defects for a period of one year.

B. The manufacturer shall provide the Owner with a one-year service and maintenance contract covering all equipment installed.

C. These one year periods shall begin on the date of final acceptance.

1.5 CODES AND STANDARDS

A. All work shall be performed in accordance with the National Electrical Code, The Ohio Building Code, American with Disabilities Act and any other applicable or local codes.

1.6 IN-SERVICE TRAINING

A. The Contractor shall provide a minimum of eight hours of in-service training with this system. These sessions shall be broken into segments which will facilitate the training of individuals in the operation of this system. Operators Manuals and Users Guides shall be provided at the time of this training.

2. PART 2 PRODUCTS

2.1 FIRE ALARM CONTROL PANEL

A. The control panel shall contain the following general features:

1) Alarm shall override trouble.

2) Built-in lamp test.

3) Ground fault detection.

4) Alarm and silence switch combined. When a silence switch is activated, the trouble lamp shall be illuminated to indicate the abnormal situation.

5) Momentary switch for resetting the system.

6) All programming or editing of the software program shall be achieved without special equipment and without interrupting the alarm monitoring functions of the control panel.

B. System shall be based on Digital Monitoring Products and shall interface with Digital Monitoring Products intrusion detection system. If an event occurs, the areas below will respond in this manner:

	LOCATION	INDICATION
a)		
b)	Riser Location Pull Station	Alarm
c)	Sprinkler Waterflow	Alarm
d)	Wall P.I.V. Tamper Switch	Trouble
e)	Sprinkler Riser Tamper Switches	Trouble
f)	Smoke Detector	Alarm

C. Provide cellular dialer for off site monitoring of Fire Alarm System.

2.2 INITIATING AND ALARM DEVICES

A. Audio/visual alarm horn/strobes in large open areas shall be a minimum of 110 candelas. All other audio/visual alarm horn/strobes shall be a minimum of 30 candelas.

B. ALL strobes shall be synchronized. Provide module and wiring to alarm control panel as required.

2.3 WIRE AND CABLE

A. Furnish only wire recommended by Fire Alarm System Manufacturer.

B. Power-limited, solid or stranded (7-strand minimum) copper, #18 AWG and #14 AWG twisted, shielded or unshielded, color-coded vinyl insulation, black vinyl jacket.

C. Install wiring in conduit, unless concealed above ceiling or otherwise indicated.

D. Provide twisted pair telephone cables as required for digital communicator.

E. Wire and cable used in return air plenums shall be UL 910-listed or installed in conduit.

2.4 SMOKE DETECTORS

A. Addressable smoke detectors shall be photo electric type detectors using a stable LED light source and a silicon photodiode as the receiving element. The sensitivity range for each individual photoelectric sensor shall be control panel set and will range from 0.5% and 3.7% smoke obscuration.

2.5 MANUAL PULL STATIONS

A. Provide addressable single action pull stations as shown on plans. Locate pull stations at locations as noted on plans. Mounting height at new locations shall be 48" above floor level.

2.6 SIGNALS

A. Fire alarm signals shall be semi-flush combination, vibrating horns with red grille and multi candela strobe. Vibrating horn shall be 24-volt, DC parallel connected. All signals shall be mounted 80” above finish floor level to center of lamp unless noted otherwise.

B. Exterior signals shall be similar to interior signal, except without strobe unit, and shall be rated for exterior environment. All exterior signals shall be mounted 6'-4" above finish floor level.

2.7 VISUAL SIGNALS

A. New visual signals shall be multi candela strobes and be located as shown on plans. All signals shall be mounted 80" above finish floor level to center of lamp unless noted otherwise.

2.8 WATER FLOW SWITCHES AND TAMPER SWITCHES

A. Sprinkler water flow switches and valve tamper switches will be furnished and installed under the fire protection contract as shown on drawings and shall be complete with two (2) form “C” contacts. Flow switches and valve tamper switches shall be wired and connected to the fire alarm system by the Electrical Contractor.

2.9 CARBON MONOXIDE DETECTOR

A. Provide Carbon Monoxide Detectors as shown on plans.

2.10 REMOTE ANNUCIATOR PANEL

A. Provide and install new annunciator located in vestibule as shown on plans.

3. PART 3 - EXECUTION

3.1 GENERAL

A. This Contractor shall supply and install all materials necessary to complete fire alarm systems.

B. Get power for new fire alarm control panel from as shown on drawings.

C. Installation of this fire alarm system shall be performed by qualified electricians in accordance with the manufacturers printed instructions and recommendations or as required by Code.

D. Provide four (4) hours of field programming time for changes that may be required after issuance of Certificate of Substantial Completion. These modifications may take place any time during the first year after completion/

◆ END OF SECTION ◆

APPENDIX ITEMS

BOWSER MORNER SOIL EXPLORATION REPORT
(BMI Report No. 199079-0421-8693)

PROPOSED FIRE STATION 1040 SOUTH WYNN ROAD

SOIL EXPLORATION
PROPOSED FIRE STATION
1040 SOUTH WYNN ROAD
OREGON, LUCAS COUNTY, OHIO

SUBMITTED TO:

CITY OF OREGON
ATTENTION: Rodney Schultz, P.E.
Deputy City Engineer
5330 Seaman Street
Oregon, Ohio 43616

BMI Report No. 199079-0421-8693

April 20, 2021

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www.bowser-morner.com

Report To:	City of Oregon	**Date:**	April 20, 2021
Attention:	Mr. Rodney Schultz, P.E.	**Laboratory Job No.:**	199079
	5330 Seaman Street	**BMI Report No.:**	199079-0421-8693
	Oregon Ohio 43616	**Report Consists of**	**48 Pages**

Report On: SOIL EXPLORATION
Proposed Fire Station,
1040 South Wynn Road,
Oregon Lucas County, Ohio

Dear Ladies and Gentlemen:

Bowser-Morner, Inc. (BMI) has completed the authorized subsurface exploration and geotechnical engineering evaluation at the above-referenced project. The following report briefly reviews our exploration procedures, describes existing site and subsurface conditions, and presents our evaluations, conclusions, and recommendations.

1.0 AUTHORIZATION

The purpose of this subsurface exploration and geotechnical engineering evaluation was to determine the subsurface conditions at the project site and to analyze these conditions as they relate to foundation design and construction. All work was performed in accordance with BMI technical proposal No. T-27013 dated January 6, 2021 and its attached *Proposal Acceptance Sheet* between The City of Oregon and BMI. Authorization to proceed with the necessary work was given by Mr. Rodney Schultz on January 8, 2021. The scope of the exploration included subsurface drilling and sampling, limited laboratory testing, engineering evaluation of the field and laboratory data, and the preparation of this report.

2.0 WORK PERFORMED

2.1 Field Exploration

During this exploration, twelve soil test borings were drilled at the approximate locations shown on the attached *Boring Location Plan*. The borings were drilled to depths varying from 10 to 20 feet. Boring locations were established in the field by The City of Oregon by measuring distances and estimating right angles from existing site features. Boring elevations were estimated from a

GoogleEarth™ map. Since these measurements are not precise, the locations shown on the *Boring Location Plan* and the elevations on the *Boring Logs* should be considered approximate.

All soil sampling and standard penetration testing was conducted in general accordance with American Society for Testing and Materials (ASTM) Standard D1586. The borings were advanced by an all-terrain vehicle (ATV)-mounted drilling rig by mechanically twisting hollow-stem augers into the soil. At regular intervals, soil samples were obtained with a standard 2-inch outside diameter (O.D.) split spoon sampler driven 18 inches into the soil with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot was recorded and designated the "standard penetration resistance." The standard penetration resistance, or "N" value, when properly evaluated, is an index of the soil's strength, density, and ability to support foundations. The disturbed samples recovered by the split spoon sampler were visually classified in the field, logged, sealed in glass jars, and returned to the laboratory for testing and evaluation by a geotechnical engineer.

In boring 4, the split spoon samplers were fitted with liners to obtain samples of the subsurface soils for laboratory unconfined compressive strength testing. Although the liner samples are disturbed due to pounding from the standard penetration test and the thick sidewalls of the split spoon sampler and liner, they are protected from swelling and other post-sampling disturbances; therefore, they are less disturbed than conventional split spoon samples. The unconfined compressive strength test results obtained from liner samples, while approximate, do provide the geotechnical engineer with a means to evaluate relative soil strengths.

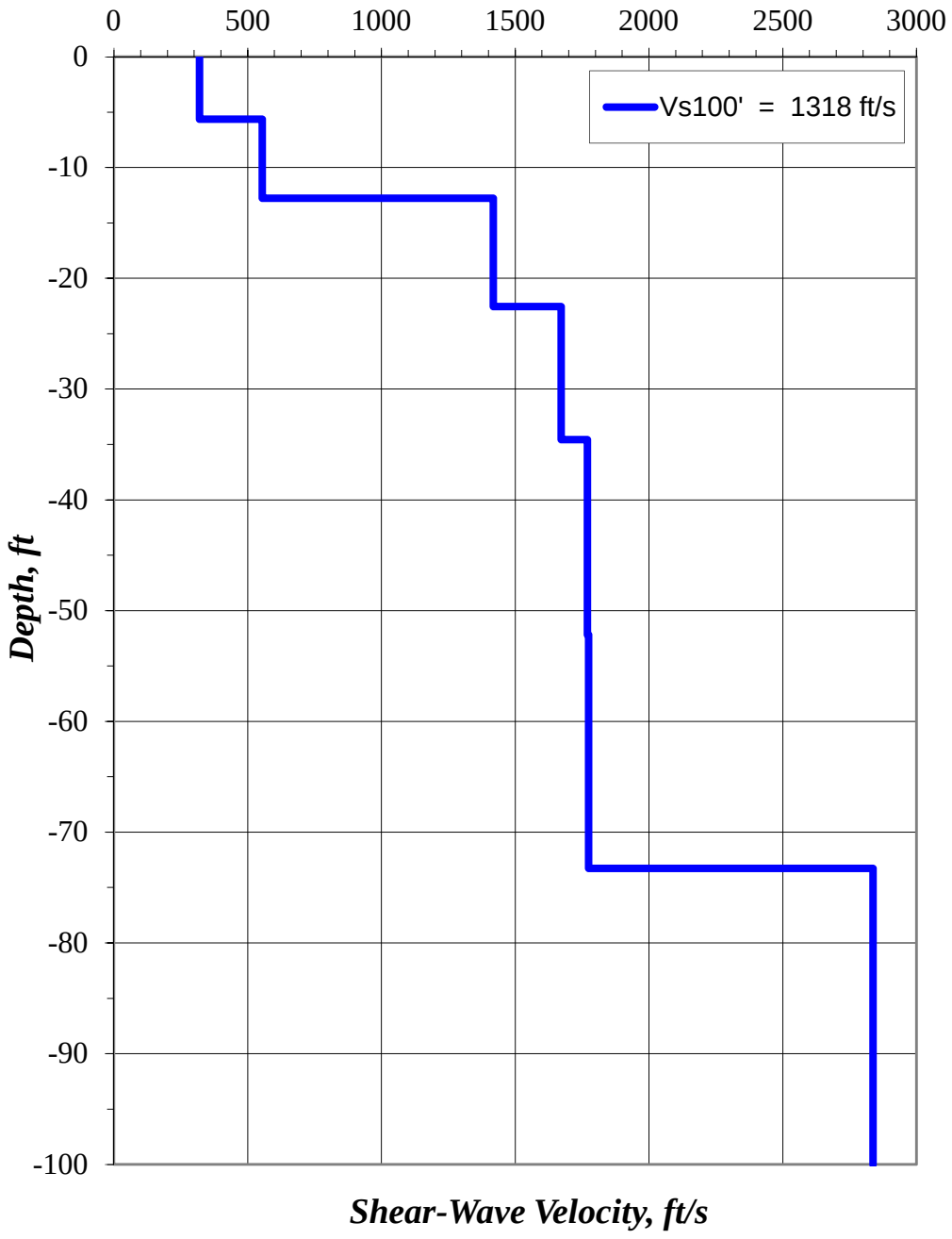
Boring Logs indicating soil descriptions, penetration resistances, and observed groundwater levels are attached.

2.2 Seismic Wave Testing

A BMI geotechnical engineer visited the project site on Thursday, April 8, 2021 to conduct shear wave testing using a a SeisOpt ReMi V_s30. Shear wave results are reviewed in Section 5.6.

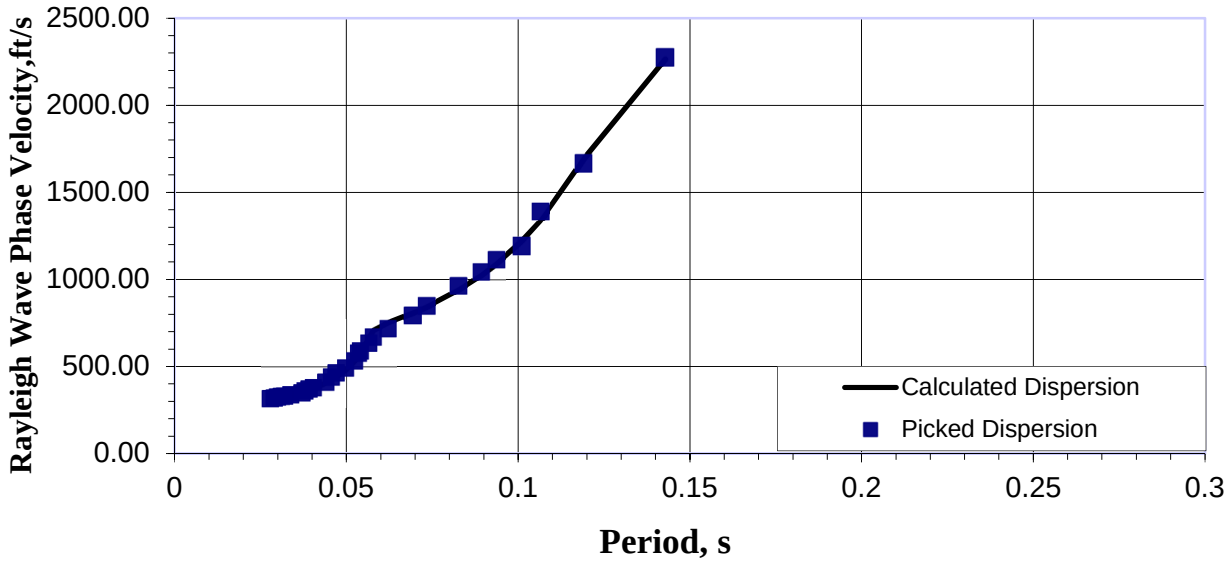
Test data is summarized below:

Vs Model

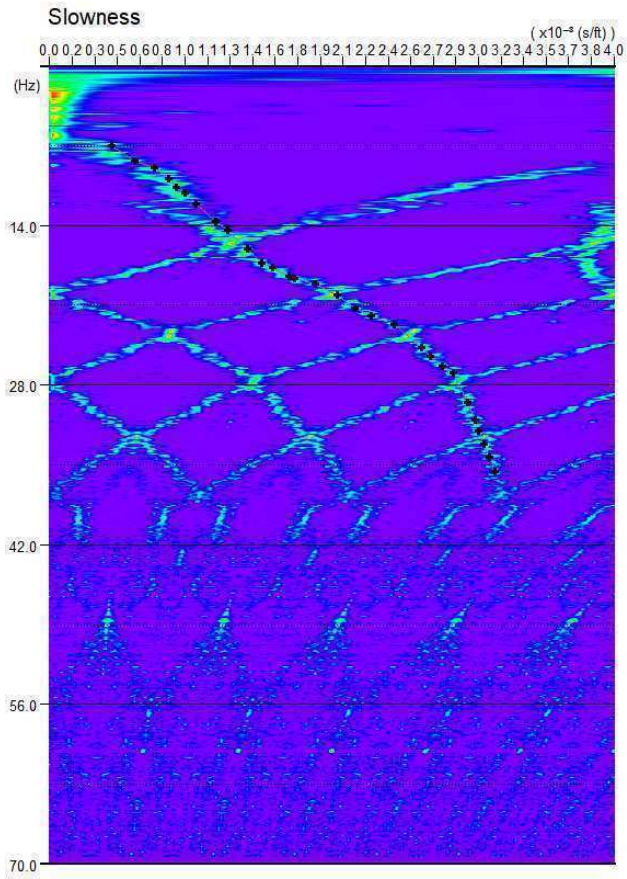


ft/s = feet per second

Dispersion Curve Showing Picks and Fit



p-f Image with Dispersion Modeling Picks



2.3 Laboratory Testing

In the laboratory, each of the samples recovered from the borings was examined and visually classified by a geotechnical engineer. In addition, samples of cohesive soils from the split spoon samplers were tested to determine the soil's approximate strength using a hand-held, calibrated spring penetrometer. These values were used by the geotechnical engineer to assist in the evaluation of the relative strengths of the subsurface soils and to aid in classification of the samples.

Five unconfined compressive strength tests were performed on the disturbed samples recovered by the liner samplers. These tests were performed on a constant rate of strain apparatus with a deformation rate adjusted to cause failure of the sample in less than 10 minutes. Note that care should be utilized in applying these test values due to the method of sampling. The results of these tests have been summarized and tabulated below.

Boring No.	Sample No.	Sample Depth (ft)	Moisture Content (%)	Dry Unit Weight (pcf)	Unconfined Compressive Strength (psf)	Strain at Failure (%)
4	SL-1	1.0-2.5	23.4	98.1	3,931	13.8
	SL-2	3.5-5.0	26.0	99.7	4,186	13.9
	SL-3	6.0-7.5	24.9	109.5	3,069	5.7
	SL-4	8.5-10.0	17.3	122.7	10,187	13.8
	Sl-6	18.5-20.0	15.5	112.3	2,604	13.8

pcf = pounds per cubic foot psf = pounds per square foot

One Unified Soil Classification (including washed sieve, hydrometer, and Atterberg limits analyses) was performed on a representative sample from the borings in general accordance with ASTM specifications D422, D2487, and D4318. Test results are detailed on the attached *Grain Size Distribution Test Report* sheets.

Two Atterberg limits analyses were performed on typical samples of the soil from the borings in general accordance with ASTM D4318 specifications. Test results are presented in the following table.

Boring No.	Sample No.	Liquid Limit	Plastic Limit	Plasticity Index
8	SS-1	59	20	39
10	SS-1	58	21	37

Natural moisture content determinations were made on 42 split spoon samples recovered from the soil test borings. The results of the moisture content determination tests are shown on the attached *Moisture Content Summary Sheet*.

Soil samples are normally retained in our laboratory for a period of 60 days before they are discarded. To view the samples or arrange for longer storage of samples, please contact us.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Description

The project site is located at 1040 South Wynn Road. The site is covered in grass and the surface topography varies by less than 3 feet.

3.2 Soil Profile

Data from the soil test borings are shown on the attached *Boring Logs*. The subsurface conditions discussed in the following paragraphs and those shown on the *Boring Logs* represent an estimate of the subsurface conditions based on interpretation of the boring data using normally accepted geotechnical engineering judgments. Although individual test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times.

Geologically, the project site is situated in a glacial ground moraine that consists of till containing an unsorted, unstratified mixture of clay, silt, sand and coarser fragments deposited discontinuously by advancing ice. Overlying the glacial till is a layer of laminated silts and clays of lacustrine origin.

Topsoil covered the ground surface and was recorded by the drillers as approximately 4 to 8 inches in thickness. Below the topsoil was fill material in borings 1, 2, 3, 5, 6, 7, 9, 11 and 12. The fill material in borings 1, 3, 5, 6, 9 and 12 consisted of brown silt and clay with some sand. The fill material in borings 2 and 11 consisted of brown silt and clay with some sand and a trace of gravel. The fill material in boring 7 consisted of brown silt and clay with some sand, some red brick, and a trace of crushed stone. The fill extended to depths of 1.5 to 3 feet. Below the fill material, and below the topsoil in borings 4, 8 and 10, was a lacustrine deposit that consisted of brown and gray to gray silt and clay with some sand. The lacustrine soil extended to depths of 6 to 8.5 feet. Below the lacustrine deposit was a glacial till that consisted of brown and gray silt and clay with some sand and a trace of gravel. The glacial till extended to the bottom of the borings.

The estimated undrained shear strength of the lacustrine soil varies between 1000 and 3,000 psf. The estimated undrained shear strength of the underlying glacial till varies from 1,500 to greater than 4,500 psf.

3.3 Groundwater Observations

During the field exploration, the drilling rods and sampling equipment were continuously checked by the drillers for indications of groundwater or seepage. The *Boring Logs* list our driller's

observations of groundwater or seepage. Three readings are recorded on the logs. The initial groundwater level indicates the depth(s) at which groundwater or seepage was initially noted by the drillers as the boring was being advanced and the intensity of the seepage. The completion groundwater level represents the depth groundwater was observed in the borehole immediately after the completion of the hole. The last reading on the *Boring Logs* represents the depth groundwater was observed in the borehole after an increment of time has passed. In this case, both the depth and time are listed.

Groundwater was encountered during drilling at a depth of 9 feet in boring 5. The remaining borings were dry.

Groundwater levels fluctuate with seasonal and climatic variations and may be different at other times. More specific information regarding groundwater levels, standard penetration resistances, and soil descriptions is detailed on the attached *Boring Logs*.

4.0 PROPOSED CONSTRUCTION

It is our understanding that the proposed construction is to consist of a new City of Oregon Fire Station. The new structure will be a pre-engineered, single-story with slab-on-grade building. In addition to the building, parking lots and driveways will be constructed.

Structural loading information was not provided for this project. We have assumed maximum column loads will be on the order of 75 kips, with maximum wall loads of approximately 2 to 4 kips per lineal foot. If these assumptions are not appropriate for the intended construction, please contact us so we can re-evaluate our recommendations.

5.0 EVALUATIONS AND CONCLUSIONS

The following evaluations and conclusions are based on our interpretation of the field and laboratory data obtained during the exploration and our experience with similar subsurface conditions. Soil penetration data and laboratory data have been used to estimate allowable bearing pressures using commonly accepted geotechnical engineering practices. Subsurface conditions in uninvestigated locations between borings may vary considerably from those encountered in the borings. If structure location, loadings, or levels are changed, we request we be advised so we may re-evaluate our recommendations.

5.1 Site and Subgrade Preparation

Before proceeding with construction, all vegetation, root systems, topsoil, refuse, and other deleterious non-soil materials should be stripped from proposed construction areas, as indicated by the attached *Model Clearing and Grading Specifications*.

After the completion of clearing and stripping, the exposed soils should be thoroughly compacted and areas intended to support floor slabs, pavements, new fill, and foundations should be carefully evaluated by the geotechnical engineer. At that time, the engineer will require proof-rolling of the subgrade with a 20- to 30-ton loaded truck or other pneumatic-tired vehicle of similar size and weight. The purpose of the proof-rolling is to locate soft, weak, or excessively wet

soils present at the time of construction. Any unsuitable materials observed during the evaluation and proof-rolling operations should be undercut and replaced with a compacted fill or stabilized in place.

Based on the boring and laboratory data, it appears the silty clay soil in the upper 3.5 to 5 feet of this site consist of highly plastic clay and silt soils. These soils have natural moisture contents ranging from 22 to 29 percent. The standard Proctor optimum moisture content of these soils is likely to be in the range of 22.5 to 23 percent (estimated). It is very important these soils be compacted and maintained at the proper moisture content. Soils that are compacted too wet may shrink after construction. Soils that are compacted too dry may swell after construction and crack floor slabs and pavements. It is recommended these soils be compacted to between 95 and 100% of standard Proctor maximum dry unit weight (ASTM D698) at optimum to plus 4% over optimum.

5.2 Structural Fill

Fill used to replace undercut areas or to achieve finished grades may be select cohesive soils or granular material such as sand, sand and gravel, or crushed stone. If cohesive soils are used as structural fill, they should be low plasticity soils (PI less than 25), and free of organics and rock fragments larger than 3 inches in diameter. Based on our review of the soil samples, the on-site silty clay soils in the upper 5 feet of the soil profile are highly plastic and are not recommended for use as structural fill in the building pad. They may be used below the pavements and in landscape areas.

Structural fill should be placed in lifts of 6 to 8 inches loose measure. All fill material should be placed in horizontal lifts and adequately keyed into stripped and scarified subgrade soils. In no instance should puddling or jetting of the backfill materials be allowed as a compaction method. Proper drainage should be maintained during and after construction.

Structural fill placed below foundations or other settlement-sensitive structures should be compacted to a minimum of 95 percent of the modified Proctor maximum dry density of the soil, as determined by a laboratory moisture-density relationship test (ASTM D1557). Cohesive structural fill used above foundation bottoms or beneath pavements and floor slabs should be compacted to a minimum of 90 percent of the modified Proctor maximum dry density. Granular structural fill used in a similar fashion should be compacted to 90 percent of the same standard, except for fine silty sand (a common borrow material in the northwest Ohio-southeast Michigan area), which should be compacted to 95 percent of the modified Proctor dry density whenever it is used. In cut areas, the upper 8 inches of soils intended to support floor slabs or pavements should be scarified and recompacted according to the above recommendations. Note that pavement base material such as crushed stone must be compacted to 95 percent of the maximum modified Proctor dry unit weight (ASTM D1557).

Structural fill should be moisture-conditioned prior to placement to ±3 percent of the optimum moisture content for the material. No fill material should be placed that is more than 3 percent over optimum.

Compaction equipment and methods used should be appropriate for the types of fill materials being placed. Discing and pulverizing of cohesive soils may be required prior to fill placement. Cohesive soils should generally be compacted using non-vibratory sheepsfoot rollers. Discing and pulverization may be needed to achieve uniform compaction. Granular fill materials should be compacted using vibratory or non-vibratory smooth-drum rollers. In confined areas such as utility trenches, granular fill materials should be used and portable compaction equipment and thin lifts may be required to achieve specified degrees of compaction. In general, it is BMI's experience that hand-operated compaction equipment is typically only effective in compacting the uppermost 3 to 4 inches of a fill lift. Therefore, if hand-operated equipment is used, the lift thickness should be reduced. In no instance should puddling or jetting of the backfill materials be allowed as a compaction method. Proper drainage should be maintained during and after fill placement.

During fill placement, density tests should be performed by a qualified soils technician to determine the degree of compaction and compliance with the project specifications. At least one field density test should be made per 2,500 square yards of fill area for each lift of compacted soil. Testing frequency should be increased in confined areas. Any areas that do not meet the compaction specifications should be recompacted to achieve compliance.

5.3 Foundations

All of the borings, except borings 4, 8, and 10, encountered existing fill materials that are considered to be unreliable for shallow foundation support. Consequently, we recommend these existing fill materials be undercut and replaced with new compacted structural fill or the foundations should extend through the fill and be supported on the natural soil found below the existing fill. Structural fill placement should be performed in accordance with the structural fill section of this report. We recommend a net allowable soil boring capacity of 3,000 psf for shallow foundations bearing in the new structural fill or on the original silty clay.

Exterior footing bottoms should be at least 3.5 feet below exterior grades for protection against frost damage. Interior footings should be maintained at the same elevation, so as to minimize the potential for differential movements that may be created by soil swelling or shrinkage.

5.4 Foundation Construction and Evaluation

Bottoms of foundation excavations should be evaluated by a geotechnical engineer prior to the placement of reinforcing steel and concrete to verify adequate bearing materials are present and all debris, mud, and loose, frozen, or water-softened soils are removed.

Foundation excavations should be concreted as soon as practical after they are excavated. Water should not be allowed to pond in any excavation. If an excavation is left open for an extended period, a thin mat of lean concrete should be placed over the bottom to minimize damage to the bearing surface from weather or construction activities. Foundation concrete should not be placed on frozen or flooded subgrades.

5.5 Special Inspections

The International Building Code (IBC) requires "Special Inspections." These inspections are required in 14 major categories of work and are over and above the inspections that building officials commonly provide per Section 109. The purpose of the special inspector is to review aspects of construction that require special knowledge and training that the code official does not possess.

For each project, the Ohio Department of Commerce's Division of Industrial Compliance requires the principal designer to identify which materials and contracted work require special inspections and specify the frequency of inspection. The designer is to submit this completed list with the building permit application.

At the completion of the project, a *Final Report of Special Inspections* must be submitted by the registered design professional in responsible charge of the project in order to receive the final occupancy permit.

BMI is capable of providing the special inspection services. Based on our current understanding of your project, we have developed the following summary of the Special Inspections that may be required by the principal designer:

SOILS AND FOUNDATIONS – 1705.6	
Item	**Scope**
1. Shallow Foundations	*Inspect soils below footings for adequate bearing capacity and consistency with geotechnical report.* *Inspect removal of unsuitable material and preparation of subgrade prior to placement of controlled fill.*
2. Controlled Structural Fill	*Perform sieve tests (ASTM D422 and D1140) and modified Proctor tests (ASTM D1557) of each source of fill material.* *Inspect placement, lift thickness, and compaction of controlled fill.* *Test density of each lift of fill by nuclear methods (ASTM D2922).* *Verify extent of fill placement.*
Cast-in-Place Concrete – 1705.3	
1. Mix Design	*Review concrete batch tickets and verify compliance with approved mix design. Verify that water added at the site does not exceed that allowed by the mix design.* *Mix designs, mix verifications.*
2. Material Certification	

3. Reinforcement Installation	*Inspect size, spacing, cover, positioning, and grade of reinforcing steel. Verify that reinforcing bars are free of form oil or other deleterious materials. Inspect bar laps and mechanical splices. Verify that bars are adequately tied and supported on chairs or bolsters.*
4. Post-Tensioning Operations	*Inspect placement, stressing, grouting, and protection of post-tensioning tendons. Verify that tendons are correctly positioned, supported, tied, and wrapped. Record tendon elongations.*
5. Welding of Reinforcing	*Visually inspect all reinforcing steel welds. Verify weldability of reinforcing steel. Inspect preheating of steel when required.*
6. Anchor Rods	*Inspect size, positioning, and embedment of anchor rods. Inspect concrete placement and consolidation around anchors.*
7. Concrete Placement	*Inspect placement of concrete. Verify that concrete conveyance and depositing avoids segregation or contamination. Verify that concrete is properly consolidated.*
8. Sampling and Testing of Concrete	*Test concrete compressive strength (ASTM C31 and C39), slump (ASTM C143), air-content (ASTM C231 or C173), and temperature (ASTM C1064).*
9. Curing and Protection	*Inspect curing, cold weather protection, and hot weather protection procedures.*
Masonry – 1705.4	
1. Material Certification	
2. Mixing of Mortar and Grout	*Inspect proportioning, mixing, and retempering of mortar and grout.*
3. Installation of Masonry	*Inspect size, layout, bonding, and placement of masonry units.*
4. Mortar Joints	*Inspect construction of mortar joints, including tooling and filling of head joints.*
5. Reinforcement Installation	*Inspect placement, positioning, and lapping of reinforcing steel.* *Inspect welding of reinforcing steel.*
6. Prestressed Masonry	*Inspect placement, anchorage, and stressing of prestressing bars.*
7. Grouting Operations	*Inspect placement and consolidation of grout. Inspect masonry clean-outs for high-lift grouting.*

8. Weather Protection	*Inspect cold weather protection and hot weather protection procedures. Verify that wall cavities are protected against precipitation.*
9. Evaluation of Masonry Strength	*Test compressive strength of mortar and grout cube samples (ASTM C780).* *Test compressive strength of masonry prisms.*
10. Anchors and Ties	*Inspect size, location, spacing, and embedment of dowels, anchors, and ties.*
Structural Steel – 1705.2 and 1705.10	
Item	**Scope**
1. Fabricator Certification/Quality Control Procedures ☐ Fabricator Exempt	*Review shop fabrication and quality control procedures.*
2. Material Certification	*Review certified mill test reports and identification markings on wide-flange shapes, high-strength bolts, nuts, and welding electrodes.*
3. Open Web Steel Joists	*Inspect installation, field welding, and bridging of joists.*
4. Bolting	*Inspect installation and tightening of high-strength bolts. Verify that splines have separated from tension control bolts. Verify proper tightening sequence. Continuous inspection of bolts in slip-critical connections.*
5. Welding	*Visually inspect all welds. Inspect pre-heat, post-heat, and surface preparation between passes. Verify size and length of fillet welds.* *Ultrasonic testing of all full-penetration welds.*
6. Shear Connectors	*Inspect size, number, positioning, and welding of shear connectors. Inspect suds for full 360-degree flash. Ring test all shear connectors with a 3-pound hammer. Bend test all questionable studs to 15 degrees.*
7. Structural Details	*Inspect steel frame for compliance with structural drawings, including bracing, member configuration, and connection details.*
8. Metal Deck	*Inspect welding and side-lap fastening of metal roof and floor deck.*
Spray-Applied Fire Resistant Material – 1705.14	

1. Material Specifications	
2. Laboratory Tested Fire Resistance Design	*Review UL fire resistive design for each rated beam, column, or assembly.*
3. Schedule of Thickness	*Review approved thickness schedule.*
4. Surface Preparation	*Inspect surface preparation of steel prior to application of fireproofing.*
5. Application	*Inspect application of fireproofing.*
6. Curing and Ambient Control	*Verify ambient air temperature and ventilation is suitable for application and curing of fireproofing.*
7. Thickness	*Test thickness of fireproofing (ASTM E605). Perform a set of thickness measurements for every 1,000 square feet of floor and roof assemblies and on not less than 25 percent of rated beams and columns.*
8. Density	*Test the density of fireproofing material (ASTM E605).*
9. Bond Strength	*Test the cohesive/adhesive bond strength of fireproofing (ASTM E736). Perform not less than one test for each 10,000 square feet.*

5.6 Soil Seismic Site Classification

BMI analyzed the site soil field and laboratory data to characterize the site for seismic design.

The shear wave velocity of the site was measured for this site (see section 2.2). The average shear wave velocity was 1318 ft/s., therefore, BMI recommends a Seismic Site Classification of "C" for the new fire station.

5.7 Soil-Supported Slabs

Subject to the site and subgrade preparation recommendations of this report, floor slabs may be soil-supported on the existing soils or engineered fill required to raise the site to grade. However, due to the high shrink/swell potential of the near-surface soil at this site, we recommend the floor slab be underlain by at least 8 inches of granular material to help minimize the potential for differential floor movement.

Floor slabs should be jointed around columns and along footing-supported walls to minimize cracking as a result of differential movement. Subdrainage systems are not required beneath slabs, provided floor slabs are located at least 8 inches above exterior grades and site grades are oriented to drain away from the building. Note that footing tiles are recommended, if below slab heating ducts are used.

5.8 Groundwater Control

During the field exploration, groundwater was encountered below a depth of 9 feet. We do not anticipate significant difficulties with groundwater during construction. However, groundwater will tend to accumulate in open excavations. We anticipate the amount of water, if any, that does accumulate will be light and can be controlled by pumping from prepared sumps as needed.

The amount and type of dewatering required during construction will depend on the weather and groundwater levels at the time of construction and the effectiveness of the contractor's techniques in preventing surface runoff from entering open excavations. Typically, groundwater levels are highest during winter and spring months and lower in summer and early fall.

5.9 Slopes and Temporary Excavation

The owner and the contractor should make themselves aware of and become familiar with applicable local, state, and federal safety regulations, including current Occupational Safety and Health Administration (OSHA) excavation and trench safety standards. Construction site safety generally is the sole responsibility of the contractor. The contractor shall also be solely responsible for the means, methods, techniques, sequences, and operations of construction operations. BMI is providing the following information solely as a service to the client. Under no circumstances should BMI's provision of the following information be construed to mean BMI is assuming responsibility for construction site safety or the contractor's activities; such responsibility is not implied and should not be inferred.

The contractor should be aware that slope height, slope inclination, and excavation depths (including utility trench excavations) should in no case exceed those specified in local, state, or federal safety regulations, such as OSHA Health and Safety Standards for Excavations, Chapter 29 of the Code of Federal Regulations (CFR) Part 1926, or successor regulations. Such regulations are strictly enforced and, if not followed, the owner, the contractor, or earthwork or utility subcontractors could be liable for substantial penalties.

For this site, the overburden soil encountered in our exploration is mostly silty clay of lacustrine origin. Some fill, estimated at depths of 1.5 to 3 feet or more, will be encountered. We anticipate OSHA will classify the fill materials as Type C. The underlying naturally occurring undisturbed clay soils would be likely classified as Type B.

Note: Soils encountered in the construction excavations may vary significantly across the site. Our preliminary soil classifications are based solely on the materials encountered in widely spaced borings. The contractor should verify similar conditions exist throughout the proposed area of excavation. If different subsurface conditions are encountered at the time of construction, BMI recommends we be contacted immediately to evaluate the conditions encountered.

If any excavation, including a utility trench, is extended to a depth of more than 20 feet, OSHA requires the side slopes of such excavation be designed by a Professional Engineer.

5.10 Pavement Design

The natural clay and silt soils encountered at this site are highly plastic and are considered to be poor for the support of pavement structures. We recommend pavements be designed for the average condition of a California Bearing Ration (CBR) of 3, with the understanding there may be areas of the site where subgrade stabilization will be required.

In areas where fire trucks will operate, we recommend a minimum pavement section consisting of 5 inches of asphalt concrete on 12 inches of compacted crushed stone base. If concrete pavements are used, we recommend a minimum pavement section consisting of 6 inches of concrete over 6 inches of compacted crushed stone base.

In areas where only automobile traffic will operate, we recommend a minimum pavement section consisting of 3.5 inches of asphalt concrete on 8 inches of compacted crushed stone base. A concrete pad 8 inches in thickness should be provided for any trash disposal containers. The pad should be large enough to support the loaded axle from the trash hauling vehicle.

Because the subgrade soils at this site contain a high percentage of fines (silt and clay) and are plastic, they will shrink and swell with the loss and addition of water. They will also be susceptible to frost action. We recommend all new pavements be equipped with a system of edge drains and subdrains. At a minimum, we recommend finger drains be provided around all catch basins and manholes to remove water trapped at low elevations of the pavement section. The pavement design thickness calculations assume proper subsurface drainage. If underdrains are not installed, thicker pavements are recommended.

Improvement of surface drainage by ditching or other means is also strongly recommended. The pavement surface should be adequately sloped (minimum 2 percent) to promote good surface drainage and to reduce water infiltration into the base course.

Bituminous concrete utilized for this project should conform to The Ohio Department of Transportation (ODOT) Item 441. Base and binder course material should meet job formula limits outlined in 441.02-1, Type 2. Surface or wearing courses should fall within Type 1 limits. Both should be designed for medium traffic. The asphalt binder material shall be PG 64-22.

A job mix formula developed in accordance with the Asphalt Institute Manual Series 2 (Mix Design Methods for Asphalt Concrete, Marshall method) should be submitted to the engineer for review or approval. Compacted mixture properties should conform to Item 441.02-1. During production, a testing agency accredited by the American Association of State Highway Transportation Officials (AASHTO) should be retained by the owner to conduct quality assurance testing.

In areas where exterior concrete flatwork is planned, it is recommended the concrete be in accordance with ODOT Item 499 Class QC-1. The water/cementitious ratio should be 0.45 or less, and the entrained air content must be 6 (-1 to +2) percent. All concrete pavements should be supported on a prepared subgrade. The proper use of expansion, control, and isolation joints should be carefully investigated and shown on the drawings. Control joints should be placed in the unreinforced concrete at intervals no greater than 15 feet and preferably less than 12 feet. (No further apart than 3 feet per inch of concrete thickness, i.e., 10.5 feet for 3.5-inch thick

pavement.) Proper construction procedures and curing of the concrete is vitally important. Curing compound should be applied immediately and should be a pigmented material applied in two directions at right angles.

It should be noted that soils with CBR ratings less than 5 or 6 are usually not stable enough to support the construction traffic required to install pavements unless the work is done during the hottest, driest period of the year. When construction is attempted during other times of the year, some form of subgrade stabilization is usually required to support the 35- to 40-ton concrete, stone, and asphalt trucks commonly employed by paving contractors. This can significantly increase the cost of pavement construction.

5.11 Pavement Construction

Long-term pavement performance will be a function of the quality of the subgrade at the time the paving is performed and the quality, thickness, and strength of the pavement section. Pavement subgrades should be prepared in accordance with the site and subgrade preparation recommendations given earlier in this report.

If the pavement subgrade work is not done during a period of hot, dry weather, it may be necessary to stabilize the subgrade. Alternative forms of subgrade stabilization include subbase, geotextiles, geogrids, and lime or cement stabilization. The amount of subgrade stabilization required is best determined at the time of construction, after clearing, stripping, and initial subgrade stabilization.

During pavement subgrade preparation, cohesive fill materials should be used to raise grades or backfill undercut areas below pavements. Since the on-site soils are predominately clayey, perched water could collect in granular fill pockets and lead to a reduction in the pavement support. Granular fill materials should only be used beneath pavement areas if drainage is provided to prevent water from collecting in the granular soils. If utility trenches cross beneath pavements, granular fill may be used to backfill the excavations, but the final 1.5 feet of material should be clayey.

Proper compaction of the crushed stone base is essential if the asphalt pavement section is to perform properly. It is recommended the crushed stone be placed in thin lifts and be compacted to at least 95 percent of the maximum modified Proctor dry unit weight. Compaction tests should be performed on the crushed stone at an interval of one test per lift per 2,500 feet of square area.

6.0 QUALIFICATIONS

The evaluations, conclusions, and recommendations in this report are based on our interpretation of the field and laboratory data obtained during the exploration, our understanding of the project, and our experience with similar sites and subsurface conditions. Data used during this exploration included, but was not necessarily limited to:

- twelve exploratory borings performed during this study;
- observations of the project site by our staff;

- results of limited laboratory soil testing;
- preliminary site plans and drawings furnished by The City of Oregon;
- limited interaction with Mr. Rodney Schultz of The City of Oregon; and
- published soil or geologic data of this area.

In the event changes in the project characteristics are planned, or if additional information or differences from the conditions anticipated in this report become apparent, BMI should be notified so the conclusions and recommendations contained in this report can be reviewed and, if necessary, modified or verified in writing.

The subsurface conditions discussed in this report and those shown on the *Boring Logs* represent an estimate of the subsurface conditions based on interpretation of the boring data using normally accepted geotechnical engineering judgments. Although individual test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times.

Regardless of the thoroughness of a subsurface exploration, there is the possibility conditions between borings will differ from those at the boring locations, conditions are not as anticipated by designers, or the construction process has altered the soil conditions. As variations in the soil profile are encountered, additional subsurface sampling and testing may be necessary to provide data required to re-evaluate the recommendations of this report. Consequently, after submission of this report, it is recommended BMI be authorized to perform additional services to work with the designer(s) to minimize errors and/or omissions regarding the interpretation and implementation of this report.

Prior to construction, we recommend that BMI:

- work with the designers to implement the recommended geotechnical design parameters into plans and specifications;
- consult with the design team regarding interpretation of this report;
- establish criteria for the construction observation and testing for the soil conditions encountered at this site; and
- review final plans and specifications pertaining to geotechnical aspects of design.

During construction, we recommend that BMI:

- observe the construction, particularly site preparation, fill placement, and foundation excavation or installation;
- perform in-place density testing of all compacted fill;
- perform materials testing of soil and other materials as required; and
- consult with the design team to make design changes in the event differing subsurface conditions are encountered.

If BMI is not retained for these services, we shall assume no responsibility for construction compliance with the design concepts, specifications, or recommendations.

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. No other warranty, expressed or implied, is made.

The scope of our services did not include an environmental site assessment for the presence or absence of hazardous substances in the soil, surface water, groundwater, or air, on, within, or beyond the site studied. Our scope of services also did not include an evaluation for the presence or absence of mold, wetlands, or protected species. Any statements in the report or on the *Boring Logs* regarding odors, staining of soils, or other unusual items or conditions observed are strictly for the information of our client.

To evaluate the site for possible environmental liabilities, we recommend conducting an environmental site assessment. Additional subsurface drilling and sampling, including groundwater sampling, may be required to evaluate environmental conditions. The presence or absence of wetlands or protected species should be determined by a water resources delineation and may represent additional state and Federal waterway permitting obligations. BMI can provide these services and would be pleased to provide a cost proposal to perform these studies, if requested.

This report has been prepared for the exclusive use of The City of Oregon for specific application to the proposed fire station located at 1040 South Wynn Road in Oregon, Lucas County, Ohio. Specific design and construction recommendations have been provided in the various sections of the report. The report should, therefore, be used in its entirety. This report is not a bidding document and shall not be used for that purpose. Anyone reviewing this report must interpret and draw their own conclusions regarding specific construction techniques and methods chosen. BMI is not responsible for the independent conclusions, opinions, or recommendations made by others based on the field exploration and laboratory test data presented in this report.

Respectfully submitted,

BOWSER-MORNER, INC.

Nicole Redinger

Nicole S. Redinger, E.I.
Geotechnical Engineer

Ahmad Rashid

Ahmad K. Rashid, P.E.
Chief Geotechnical Engineer
Manager, Toledo Engineering
and Environmental Services

NSR/AKR:all
Attachments: *Boring Location Plan*
Boring Log Terminology
Boring Logs
Grain Size Distribution Test Reports
Moisture Content Summary Sheets
Model Clearing and Grading Specifications
1-Client (via email rshultz@ci.oregon.oh.us)

This document has been provided in an electronic format to expedite delivery of results and/or recommendations to Bowser-Morner's Client. Because electronic files can be altered, if there is any question about the validity of the document you are reviewing, please contact our office to view the reference copy of the document stored at 1419 Miami Street, Toledo, Ohio 43605

BORING LOCATION PLAN

Soil Exploration for Proposed Fire Station
1040 South Wynn Road
Oregon, Lucas County, Ohio

3-2021/ks

PROJECT NO.	SCALE
199079	N.T.S.

BOWSER MORNER

BORING LOG TERMINOLOGY

Stratum Depth:

Distance in feet and/or inches below ground surface.

Description of Materials:

When the color of the soil is uniform throughout, the color recorded will be such as brown, gray, or black and may be modified by adjectives such as light and dark. If the soil's predominant color is shaded by a secondary color, the secondary color precedes the primary color, such as gray and brown, yellow and brown. If two major and distinct colors are swirled throughout the soil, the colors will be modified by the term mottled, such as mottled brown and gray.

There are two types of visual classification methods currently used by Bowser-Morner, Inc. The first is ASTM D2488. This method results in classifications such as "lean clay". The second method is the ASEE system or Burmister system. This system results in classifications such as "silt and clay, with traces of sand" and is described below.

Particle Size		Visual
Boulders		Larger than 8"
Cobbles		8" to 3"
Gravel:	Coarse	3" to 3/4"
	Fine	3/4" to 2 mm
Sand:	Coarse	2 mm to 0.6 mm (pencil size)
	Medium	0.6 mm to 0.2 mm (table sugar & salt size)
	Fine	0.2 mm to 0.06 mm (powdered sugar size)
Silt		0.06 mm to 0.002 mm
Clay		0.002 mm and smaller (particles of silt and clay size are not visible to the naked eye)

Soil Components	
Major Components	**Minor Component Term**
Gravel Sand Silt Clay	Trace.....1 - 10% Some.....11 - 35% And.....36 - 50%

Moisture Content	
Term	**Relative Moisture**
Dry	Powdery
Damp	Moisture content below plastic limit
Moist	Moisture content above plastic limit, but below liquid limit
Wet	Moisture content above liquid limit

Condition of Soil Relative to Compactness (Granular Material)	
Condition	**N**
Very Loose	5 blows/ft or less
Loose	6 to 10 blows/ft
Medium Dense	11 to 30 blows/ft
Dense	31 to 50 blows/ft
Very Dense	51 blows/ft of more

Condition of Soil Relative to Consistency (Cohesive Material)	
Condition	**Approximate Undrained Shear Strength**
Very Soft	Less than 250 psf
Soft	250 to 500 psf
Medium Stiff	500 to 1,000 psf
Stiff	1,000 to 2,000 psf
Very Stiff	2,000 to 4,000 psf
Hard	Greater than 4,000 psf

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Sample Number:

Sample numbers are designated consecutively, increasing with depth for each boring.

Sample Type:

"A" Split spoon, 2-inch O.D., 1-3/8-inch I.D., 18 inches in length.
"B" One of the following:
- Power Auger Sample
- Piston Sample
- Liner Sample
- Denison Sample
- Sonic Sample

"C" Shelby Tube 3-inch O.D., except where noted.

Sample Depth:

The depth below top of ground at which the sample was taken.

Blows per 6 inches on Sampler:

The number of blows required to drive a 2-inch O.D., 1-3/8-inch I.D., split spoon sampler, using a 140-pound hammer with a 30-inch free fall, is recorded for 6 inch drive increments. (Example: 3/8/9)

"N" Blows/Feet:

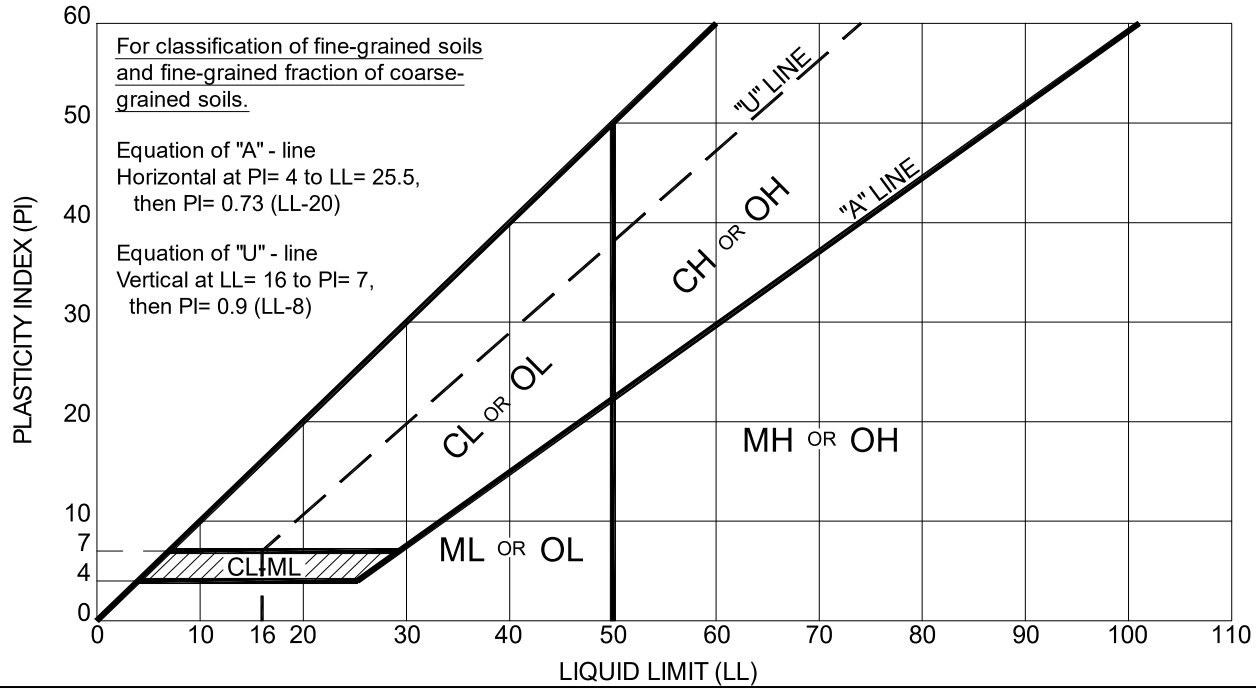
Standard penetration resistance. This value is based on the total number of blows required for the last 12 inches of penetration. (Example: 3/8/9 : N = 8 + 9 = 17)

Water Observations:

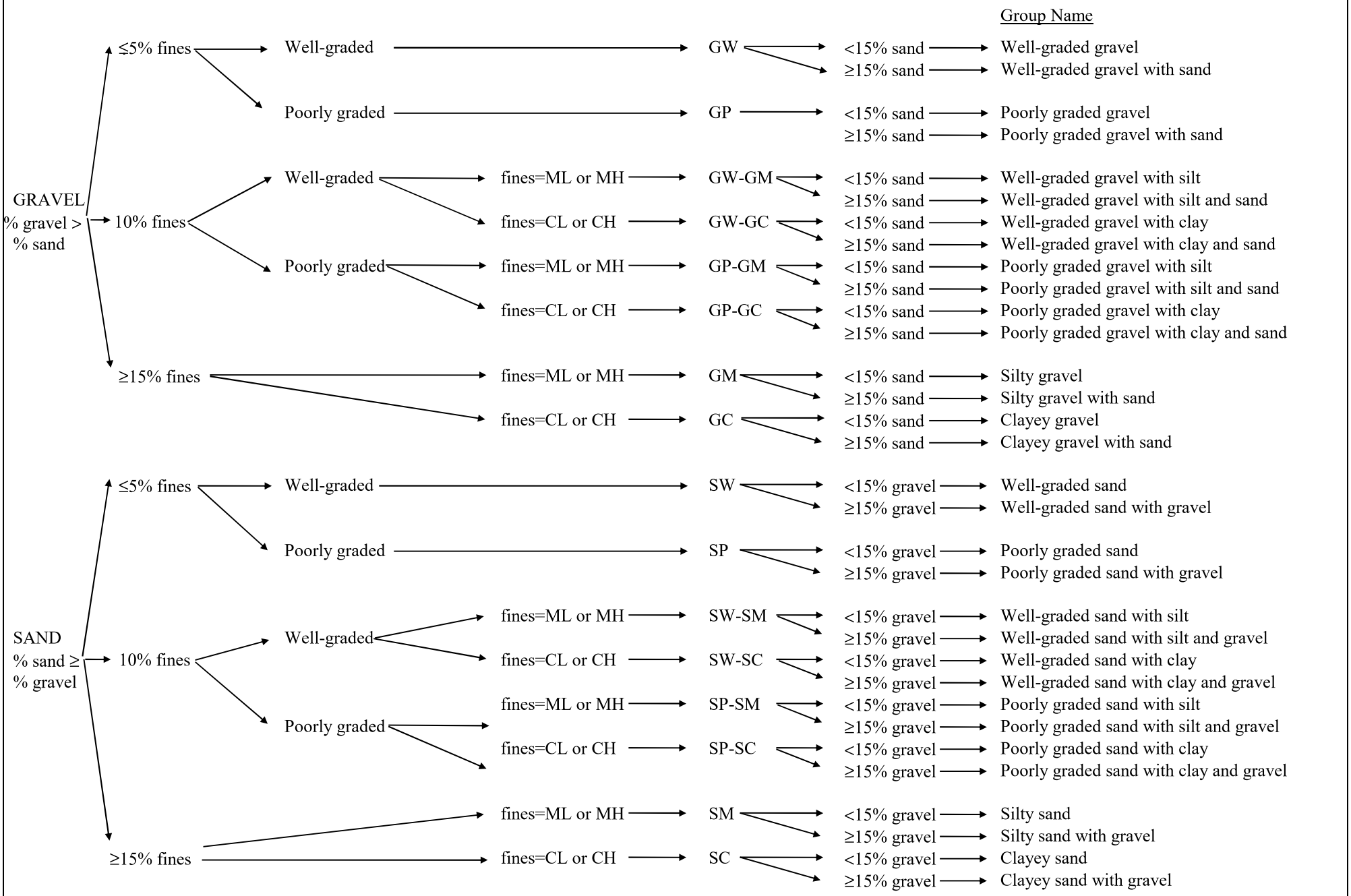
The depth of water recorded in the test boring is measured from the top of ground to the top of the water level. Initial depth indicates the water level during boring, completion depth indicates the water level immediately after boring, and depth after "X" number of hours indicates the water level after letting the water rise or fall over a time period. Water observations in pervious (sand and gravel) soils are considered reliable ground water levels for that date, Water observations in impervious (silt and clay) soils cannot be considered accurate unless records are made over a time period of several days to a month. Factors such as weather, soil porosity, etc. will cause the ground water level to fluctuate for both pervious and impervious soils.

UNIFIED CLASSIFICATION SYSTEM

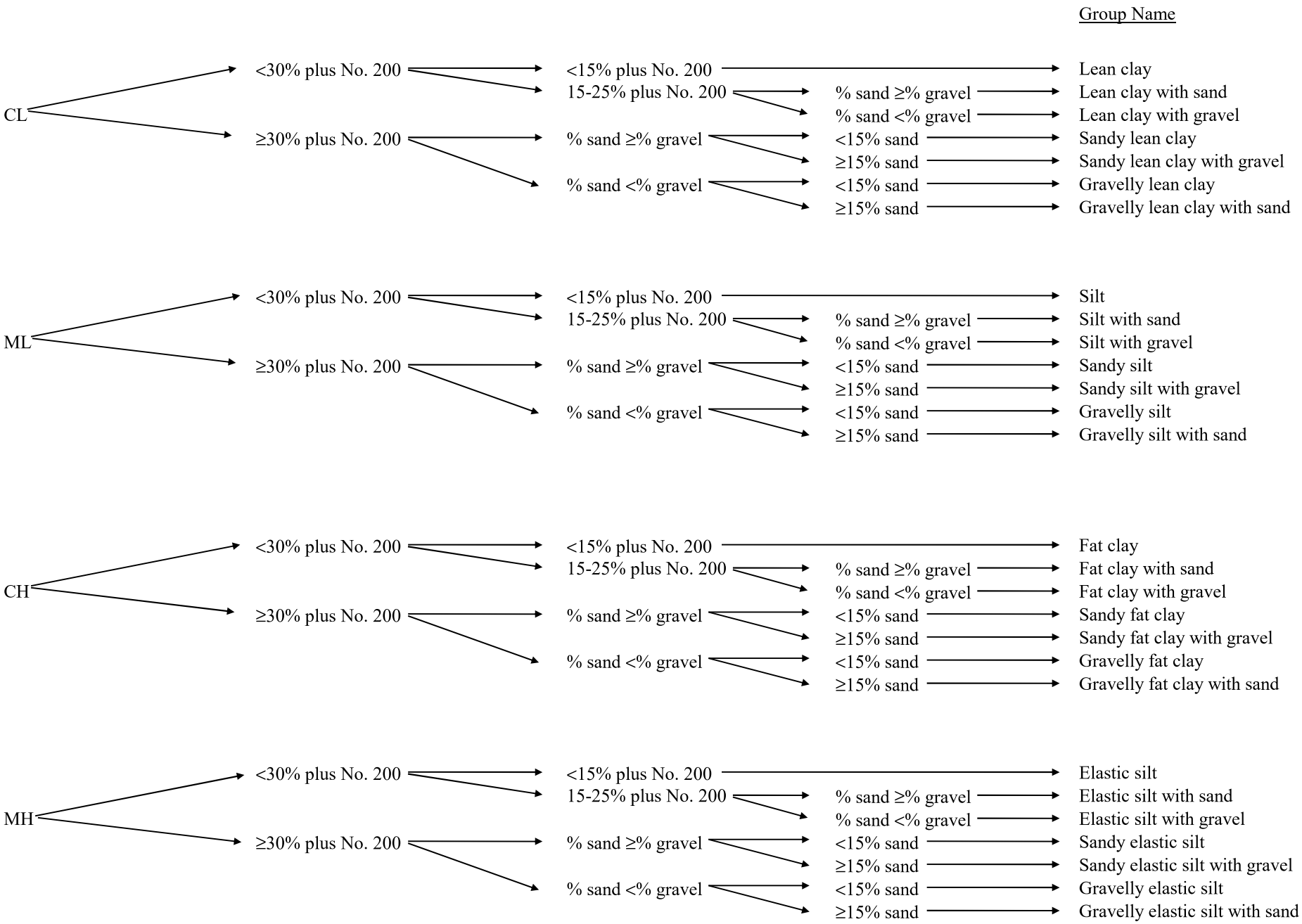
MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVEL WELL-GRADED GRAVEL WITH SAND
				GP	POORLY GRADED GRAVEL POORLY GRADED GRAVEL WITH SAND
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES APPRECIABLE AMT. OF FINES)		GM	SILTY GRAVEL SILTY GRAVEL WITH SAND
				GC	CLAYEY GRAVEL CLAYEY GRAVEL WITH SAND
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SAND WELL-GRADED SAND WITH GRAVEL
				SP	POORLY GRADED SAND POORLY GRADED SAND WITH GRAVEL
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMT. OF FINES)		SM	SILTY SAND SILTY SAND WITH GRAVEL
				SC	CLAYEY SAND CLAYEY SAND WITH GRAVEL
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILT AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	SILT, SILT WITH SAND, SANDY SILT GRAVELLY SILT, GRAVELLY SILT WITH SAND
				CL	LEAN CLAY WITH SAND, SANDY LEAN CLAY GRAVELLY LEAN CLAY WITH SAND
				OL	ORGANIC CLAY, SANDY ORGANIC CLAY ORGANIC SILT, SANDY ORGANIC SILT WITH GRAVEL
	SILT AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	ELASTIC SILT WITH SAND, SANDY ELASTIC SILT GRAVELLY ELASTIC SILT WITH SAND
				CH	FAT CLAY WITH SAND, SANDY FAT CLAY GRAVELLY FAT CLAY WITH SAND
				OH	ORGANIC CLAY WITH SAND, SANDY ORGANIC CLAY, ORGANIC SILT, SANDY ORGANIC SILT
	HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS



Flow Chart for Visually Identifying Soils Based on ASTM D-2488



Flow Chart for Visually Identifying Soils Based on ASTM D-2488



STANDARD PENETRATION RESISTANCE (ASTM D1586)

The purpose of this test is to determine the relative consistency of the soils in a boring, or from boring over the site. This method consists of making a hole in the ground and driving a 2-inch O.D. split spoon sampler into the soil with a 140-pound hammer dropped from a height of 30 inches. The sampler is driven 18 inches and the number of blows recorded for each 6 inches of penetration. Values of standard penetration (N) are determined in blows per foot, summarizing the flows required for the last two 6-inche increments of penetration.

Example : 2-6-8; N = 14

THIN-WALLED SAMPLER (ASTM D1587)

The purpose of the thin-walled sampler is to recover a relatively undisturbed soil sample for laboratory tests. The sampler is a thin-walled seamless tube with a 3-inch outside diameter, which is hydraulically pressed into the ground, at a constant rate. The ends are then sealed to prevent soil moisture loss, and the tube is returned to the laboratory for tests.

UNCONFINED COMPRESSION OR TRIAXIAL TESTS (ASTM D 2166)

The unconfined compression test and the triaxial tests are performed to determine the shearing strength of the soil, to use in establishing its safe bearing capacity. In order to perform the unconfined compression test, it is necessary that the soil exhibit sufficient cohesion to stand in an unsupported cylinder. These tests are normally performed on samples which are 6.0 inches in height and 2.85 inches in diameter. In the triaxial test, various lateral stresses can be applied to more closely simulate the actual field conditions. There are several different types of triaxial tests. These are, however, normally performed on constant strain apparatus with a deformation rate of 0.05 inches per minute.

CONSOLIDATION TEST (ASTM D 2435)

The purpose of this test is to determine the compressibility of the soil. This test is performed on a sample of soil which is 2.5 inches in diameter and 1.0 inch in height, and has been trimmed from relatively "undisturbed" samples. The test is performed with a lever system or an air activated piston for applying load. The loads are applied in increments and allowed to remain on the sample for a period of 24 hours. The consolidation of the sample under each individual load is measured and a curve of void ratio vs. Pressure is obtained. From the information obtained in this manner and the column loads of the structure, it is possible to calculate the settlement of each individual building column. This information, together with the shearing strength of the soil, is used to determine the safe bearing capacity for a particular structure.

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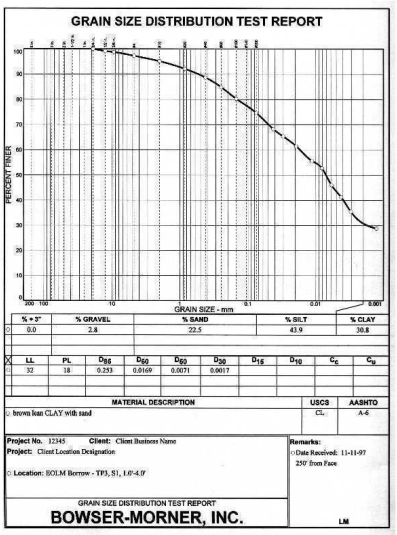
REVISED TO ASTM D4318

ATTERBERG LIMITS (ASTM D423 AND D424)

These tests determine the liquid and plastic limits of soils having a predominant percentage of fine particle (silt and clay) sizes. The liquid limit of a soil is the moisture content expressed as a percent at which the soil changes from a liquid to a plastic state, and the plastic limit is the moisture content at which the soil changes from a plastic to a semi-solid state. Their difference is defined as the plasticity index (P.I. = L.L. - P.L.), which is the change in moisture content required to change the soil from a "semi-solid" to a liquid. These tests furnish information about the soil properties which is important in determining their relative swelling potential and their classifications.

MECHANICAL ANALYSIS (ASTM D422)

This test determines the percent of each particle size of a soil. A sieve analysis is conducted on particle sizes greater than a No. 200 sieve (0.074 mm), and a hydrometer test on particles smaller than the No.200 sieve. The gradation curve is drawn through the points of cumulative percent of particle size, and plotted on semi-logarithmic paper for the combined sieve and hydrometer analysis. This test, together with the Atterberg Limits tests, is used to classify a soil.



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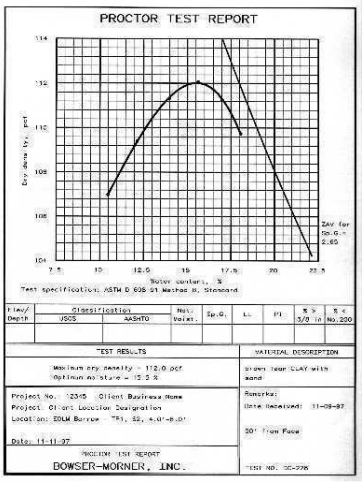
NATURAL MOISTURE CONTENT (ASTM D2216)

The purpose of this test is to indicate the range of moisture contents present in the soil. A wet sample is weighed, placed in the constant temperature oven at 105° for 24 hours, and re-weighed. The moisture content is the change in weight divided by the dry weight.

PROCTOR TESTS

The purpose of these tests is to determine the maximum density and optimum moisture content of a soil. The Modified Proctor test is performed in accordance with ASTM D1557. The test is performed by dropping a 10-pound hammer 25 times from an 18-inch height on each of 5 equal layers of soil in a 1/30 cubic foot mold, which represents a compaction effort of 56,250 foot pounds per cubic foot. The moisture content is then raised, and this procedure is repeated. A moisture density curve is then plotted, with the density on the ordinate axis and the moisture on the abscissa axis. The moisture content at which the maximum density requirement can be achieved with a minimum compactive effort is designated as the optimum moisture content (O.M.C.). The Standard Proctor test is performed in accordance with ASTM D698. This test is similar to the Modified Proctor test and is performed by dropping a 5.5 pound hammer 25 times from a height of 12 inches on 3 equal layers of soil in a 1/30 cubic foot mold, which represents a compaction effort of 12,375 foot pounds per cubic foot. This test gives proportionately lower results than the Modified Proctor test.



CLIENT	JOB NO.		
City of Oregon	**199079**		
PROJECT	BORING STARTED **3/22/21**	BORING COMPLETED **3/22/21**	**1** Boring No.
Proposed Fire Station, 1040 South Wynn Road, Oregon, Lucas County, Ohio	DRILLER **CJ CR**	METHOD **2 1/4" HSA**	
	TYPED BY **NSR**		**Sheet 1 of 1**

PROJECT LOCATION
LAT. LONG.
SURFACE ELEVATION
BORING LOCATION
As shown on Boring Location Plan.
It has been necessary to interpolate between samples. Therefore, the contacts between the various soil strata should not be taken as absolute.

COMMENTS

N VALUE, blows/ft. (10, 20, 30, 40, 50, 60, 70, 80, 90)

DEPTH	SAMPLE NO.	SAMPLER TYPE / RECOVERY	GRAPHIC LOG	VISUAL CLASSIFICATION OF THE MATERIAL	BLOW COUNTS	N VALUE	REMARKS
				Topsoil (8")			
1.0				(FILL) Stiff brown silt and clay, some sand, moist	2		
2.0	SS-1			Stiff brown and gray silt and clay, some sand, moist	5 5	10	
3.0							
4.0	SS-2			(Becomes very stiff at 3.5')	4 5 6	11	
5.0							
6.0				Very stiff brown and gray silt and clay, some sand, trace of gravel, moist	4		
7.0	SS-3				4 7	11	
8.0							
9.0	SS-4				4 6 7	13	
10.0							
11.0							
12.0							
13.0							
14.0	SS-5			(Becomes stiff at 13.5')	3 4 5	9	
15.0							
16.0							
17.0							
18.0							
19.0	SS-6			(Becomes very stiff and gray at 18.5')	4 6 8	14	
20.0				Bottom of boring at 20.0 feet			
21.0							
22.0							

WATER LEVEL MEASUREMENTS

	DEPTH	DATE
INITIAL	NONE	3/22/2021
AT COMPLETION	NONE	3/22/2021
OTHER		

SS — SPLIT SPOON
SL — SPLIT SPOON W/SOIL LINER
NQ— ROCK CORE
ST — SHELBY TUBE
AS — AUGER CUTTINGS
SC — SONIC

BOWSER MORNER

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CLIENT	JOB NO.		
City of Oregon	**199079**		
PROJECT	BORING STARTED **3/22/21**	BORING COMPLETED **3/22/21**	**2** Boring No.
Proposed Fire Station, 1040 South Wynn Road, Oregon, Lucas County, Ohio	DRILLER **CJ CR**	METHOD **2 1/4" HSA**	
	TYPED BY **NSR**		**Sheet 1 of 1**

PROJECT LOCATION
LAT. LONG.
SURFACE ELEVATION
BORING LOCATION
As shown on Boring Location Plan.
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DEPTH	SAMPLE NO.	SAMPLER TYPE / RECOVERY	GRAPHIC LOG	VISUAL CLASSIFICATION OF THE MATERIAL	BLOW COUNTS	N VALUE	REMARKS
				Topsoil (8")			
1.0 – 2.0	SS-1			(FILL) Stiff brown silt and clay, some sand, trace of gravel, moist	3 3 3	6	
3.0 – 4.0 – 5.0 – 6.0 – 7.0 – 8.0	SS-2, SS-3			Stiff brown and gray silt and clay, some sand, moist	2 2 3; 3 4 6	5; 10	
9.0 – 10.0 – 11.0 – 12.0 – 13.0	SS-4			Very stiff brown and gray silt and clay, some sand, trace of gravel, moist	5 6 7	13	
14.0 – 15.0 – 16.0 – 17.0 – 18.0	SS-5			(Becomes gray at 13.5')	3 5 7	12	
19.0 – 20.0	SS-6				7 10 13	23	
				Bottom of boring at 20.0 feet			
21.0 – 22.0							

WATER LEVEL MEASUREMENTS

	DEPTH	DATE
INITIAL	NONE	3/22/2021
AT COMPLETION	NONE	3/22/2021
OTHER		

SS — SPLIT SPOON
SL — SPLIT SPOON W/SOIL LINER
NQ— ROCK CORE
ST — SHELBY TUBE
AS — AUGER CUTTINGS
SC — SONIC

BOWSER MORNER

GINT Report Used: NEWLOGIN Report No.: 199079-XXXX-XXXX.GPJ GINT Template Used: NATALIE_EDITS.GDT Date Printed: 4/20/21

CLIENT	JOB NO.		
City of Oregon	**199079**		
PROJECT	BORING STARTED **3/22/21**	BORING COMPLETED **3/22/21**	**3** Boring No.
Proposed Fire Station, 1040 South Wynn Road, Oregon, Lucas County, Ohio	DRILLER **CJ CR**	METHOD **2 1/4" HSA**	
	TYPED BY **NSR**		**Sheet 1 of 1**

PROJECT LOCATION
LAT. LONG.
SURFACE ELEVATION
BORING LOCATION
As shown on Boring Location Plan.
It has been necessary to interpolate between samples. Therefore, the contacts between the various soil strata should not be taken as absolute.

COMMENTS

N VALUE, blows/ft. (10 20 30 40 50 60 70 80 90)

DEPTH	SAMPLE NO.	SAMPLER TYPE / RECOVERY	GRAPHIC LOG	VISUAL CLASSIFICATION OF THE MATERIAL	BLOW COUNTS	N VALUE	REMARKS
				Topsoil (8")			
1.0				(FILL) Very stiff brown silt and clay, some sand, moist	3		
2.0	SS-1			Very stiff brown and gray silt and clay, some sand, moist	5 5	10	
3.0							
4.0	SS-2				4 5 7	12	
5.0							
6.0				(Becomes stiff at 6')	4		
7.0	SS-3				4 6	10	
8.0							
9.0	SS-4			Stiff brown and gray silt and clay, some sand, trace of gravel, moist	3 5 6	11	
10.0							
11.0							
12.0							
13.0							
14.0	SS-5			(Becomes medium stiff at 13.5') (Becomes gray at 14')	3 4 4	8	
15.0							
16.0							
17.0							
18.0							
19.0	SS-6				3 4 6	10	
20.0				Bottom of boring at 20.0 feet			
21.0							
22.0							

WATER LEVEL MEASUREMENTS

	DEPTH	DATE
INITIAL	NONE	3/22/2021
AT COMPLETION	NONE	3/22/2021
OTHER		

SS — SPLIT SPOON
SL — SPLIT SPOON W/SOIL LINER
NQ— ROCK CORE
ST — SHELBY TUBE
AS — AUGER CUTTINGS
SC — SONIC

BOWSER MORNER

GINT Report Used: NEWLOGIN Report No.: 199079-XXXX-XXXX.GPJ GINT Template Used: NATALIE_EDITS.GDT Date Printed: 4/20/21

CLIENT	JOB NO.		
City of Oregon	**199079**		
PROJECT	BORING STARTED **3/22/21**	BORING COMPLETED **3/22/21**	**4** Boring No.
Proposed Fire Station, 1040 South Wynn Road, Oregon, Lucas County, Ohio	DRILLER **CJ CR**	METHOD **2 1/4" HSA**	
	TYPED BY **NSR**		**Sheet 1 of 1**

PROJECT LOCATION
LAT. LONG.
SURFACE ELEVATION
BORING LOCATION
As shown on Boring Location Plan.
It has been necessary to interpolate between samples. Therefore, the contacts between the various soil strata should not be taken as absolute.

DEPTH	SAMPLE NO.	SAMPLER TYPE / RECOVERY	GRAPHIC LOG	VISUAL CLASSIFICATION OF THE MATERIAL	BLOW COUNTS	N VALUE, blows/ft. (10 20 30 40 50 60 70 80 90)	REMARKS
				Topsoil (8")			
1.0	SL-1			Very stiff brown and gray silt and clay, some sand, moist	4 4 6	10	
2.0							
3.0							
4.0	SL-2				3 5 6	11	
5.0							
6.0	SL-3			Very stiff brown and gray silt and clay, some sand, trace of gravel, moist	5 8 9	17	
7.0							
8.0							
9.0	SL-4				6 9 10	19	
10.0							
11.0							
12.0							
13.0							
14.0	SL-5				2 4 6	10	
15.0							
16.0							
17.0							
18.0							
19.0	SL-6			(Becomes stiff and gray at 18.5')	4 8 13	21	
20.0				Bottom of boring at 20.0 feet			
21.0							
22.0							

WATER LEVEL MEASUREMENTS

	DEPTH	DATE
INITIAL	NONE	3/22/2021
AT COMPLETION	NONE	3/22/2021
OTHER		

SS — SPLIT SPOON
SL — SPLIT SPOON W/SOIL LINER
NQ— ROCK CORE
ST — SHELBY TUBE
AS — AUGER CUTTINGS
SC — SONIC

BOWSER MORNER

GINT Report Used: NEWLOGIN Report No.: 199079-XXXX-XXXX.GPJ GINT Template Used: NATALIE_EDITS.GDT Date Printed: 4/20/21

CLIENT	JOB NO.		
City of Oregon	**199079**		
PROJECT	BORING STARTED **3/22/21**	BORING COMPLETED **3/22/21**	**5** Boring No.
Proposed Fire Station, 1040 South Wynn Road, Oregon, Lucas County, Ohio	DRILLER **CJ CR**	METHOD **2 1/4" HSA**	
	TYPED BY **NSR**		**Sheet 1 of 1**

PROJECT LOCATION
LAT. LONG.
SURFACE ELEVATION
BORING LOCATION
As shown on Boring Location Plan.
It has been necessary to interpolate between samples. Therefore, the contacts between the various soil strata should not be taken as absolute.

COMMENTS

N VALUE, blows/ft. (10 20 30 40 50 60 70 80 90)

DEPTH	SAMPLE NO.	SAMPLER TYPE / RECOVERY	GRAPHIC LOG	VISUAL CLASSIFICATION OF THE MATERIAL	BLOW COUNTS	N VALUE	REMARKS
				Topsoil (8")			
1.0	SS-1			(FILL) Very stiff brown silt and clay, some sand, mosit	4 4	9	
2.0				Stiff brown and gray silt and clay, some sand, trace of gravel, moist	5		
3.0							
4.0	SS-2				4 5 5	10	
5.0							
6.0					4		
7.0	SS-3			Very stiff brown and gray silt and clay, some sand, trace of gravel, moist	5 6	11	
8.0							
9.0	SS-4				4 5 6	11	∇
10.0							
11.0							
12.0							
13.0							
14.0	SS-5			(Becomes stiff and gray at 13.5')	3 6 7	13	
15.0							
16.0							
17.0							
18.0							
19.0	SS-6				3 5 6	11	
20.0				Bottom of boring at 20.0 feet			
21.0							
22.0							

WATER LEVEL MEASUREMENTS

	DEPTH	DATE
INITIAL	9.0 ∇	3/22/2021
AT COMPLETION	NONE ▼	3/22/2021
OTHER	▼	

SS — SPLIT SPOON
SL — SPLIT SPOON W/SOIL LINER
NQ— ROCK CORE
ST — SHELBY TUBE
AS — AUGER CUTTINGS
SC — SONIC

BOWSER MORNER

GINT Report Used: NEWLOGIN Report No.: 199079-XXXX-XXXX.GPJ GINT Template Used: NATALIE_EDITS.GDT Date Printed: 4/20/21

CLIENT	JOB NO.		
City of Oregon	**199079**		
PROJECT	BORING STARTED **3/23/21**	BORING COMPLETED **3/23/21**	**6** Boring No.
Proposed Fire Station, 1040 South Wynn Road, Oregon, Lucas County, Ohio	DRILLER **CJ CR**	METHOD **2 1/4" HSA**	
	TYPED BY **NSR**		**Sheet 1 of 1**

PROJECT LOCATION
LAT. LONG.
SURFACE ELEVATION
BORING LOCATION
As shown on Boring Location Plan.
It has been necessary to interpolate between samples. Therefore, the contacts between the various soil strata should not be taken as absolute.

COMMENTS

N VALUE, blows/ft. (10, 20, 30, 40, 50, 60, 70, 80, 90)

DEPTH	SAMPLE NO.	SAMPLER TYPE / RECOVERY	GRAPHIC LOG	VISUAL CLASSIFICATION OF THE MATERIAL	BLOW COUNTS	N VALUE	REMARKS
				Topsoil (6")			
1.0 – 2.0	SS-1			(FILL) Brown and gray silt and clay, some sand, moist	3 5 5	10	
3.0 – 5.0	SS-2			Very stiff brown and gray silt and clay, some sand, moist	4 6 7	13	
6.0 – 7.0	SS-3			(Becomes medium stiff at 6')	3 5 6	11	
9.0 – 10.0	SS-4			Stiff gray silt and clay, some sand, trace of gravel, moist	3 4 4	8	
14.0 – 15.0	SS-5				3 5 6	11	
19.0 – 20.0	SS-6			(Becomes very stiff at 18.5')	4 8 8	16	
20.0 – 22.0				Bottom of boring at 20.0 feet			

WATER LEVEL MEASUREMENTS

	DEPTH	DATE
INITIAL	NONE	3/23/2021
AT COMPLETION	NONE	3/23/2021
OTHER		

SS — SPLIT SPOON
SL — SPLIT SPOON W/SOIL LINER
NQ— ROCK CORE
ST — SHELBY TUBE
AS — AUGER CUTTINGS
SC — SONIC

BOWSER MORNER

GINT Report Used: NEWLOGIN Report No.: 199079-XXXX-XXXX.GPJ GINT Template Used: NATALIE_EDITS.GDT Date Printed: 4/20/21

CLIENT	JOB NO.		
City of Oregon	**199079**		
PROJECT	BORING STARTED **3/23/21**	BORING COMPLETED **3/23/21**	**7**
Proposed Fire Station, 1040 South Wynn Road, Oregon, Lucas County, Ohio	DRILLER **CJ CR**	METHOD **2 1/4" HSA**	Boring No.
	TYPED BY **NSR**		**Sheet 1 of 1**

PROJECT LOCATION
LAT. LONG.
SURFACE ELEVATION
BORING LOCATION
As shown on Boring Location Plan.
It has been necessary to interpolate between samples. Therefore, the contacts between the various soil strata should not be taken as absolute.

COMMENTS

N VALUE, blows/ft. (10, 20, 30, 40, 50, 60, 70, 80, 90)

DEPTH	SAMPLE NO.	SAMPLER TYPE / RECOVERY	GRAPHIC LOG	VISUAL CLASSIFICATION OF THE MATERIAL	BLOW COUNTS	N VALUE	REMARKS
				Topsoil (6")			
1.0	SS-1			(FILL) Brown silt and clay, some sand, some red brick, trace of crushed stone, moist	3 4 4	8	
3.0	SS-2			Very stiff brown and gray silt and clay, some sand, moist	3 5 7	12	
6.0	SS-3			Very stiff brown and gray silt and clay, some sand, trace of gravel, moist	4 5 5	10	
9.0	SS-4				4 6 7	13	
14.0	SS-5			(Becomes gray and medium stiff at 13.5')	3 4 6	10	
19.0	SS-6			(Becomes stiff at 18.5')	4 6 8	14	
20.0				Bottom of boring at 20.0 feet			

WATER LEVEL MEASUREMENTS

	DEPTH	DATE
INITIAL	NONE	3/23/2021
AT COMPLETION	NONE	3/23/2021
OTHER		

SS — SPLIT SPOON
SL — SPLIT SPOON W/SOIL LINER
NQ— ROCK CORE
ST — SHELBY TUBE
AS — AUGER CUTTINGS
SC — SONIC

BOWSER MORNER

GINT Report Used: NEWLOGIN Report No.: 199079-XXXX-XXXX.GPJ GINT Template Used: NATALIE_EDITS.GDT Date Printed: 4/20/21

CLIENT	JOB NO.		
City of Oregon	**199079**		
PROJECT	BORING STARTED **3/22/21**	BORING COMPLETED **3/22/21**	**8** Boring No.
Proposed Fire Station, 1040 South Wynn Road, Oregon, Lucas County, Ohio	DRILLER **CJ CR**	METHOD **2 1/4" HSA**	
	TYPED BY **NSR**		**Sheet 1 of 1**

PROJECT LOCATION
LAT. LONG.
SURFACE ELEVATION
BORING LOCATION
As shown on Boring Location Plan.
It has been necessary to interpolate between samples. Therefore, the contacts between the various soil strata should not be taken as absolute.

COMMENTS

N VALUE, blows/ft. (10 20 30 40 50 60 70 80 90)

DEPTH	SAMPLE NO.	SAMPLER TYPE / RECOVERY	GRAPHIC LOG	VISUAL CLASSIFICATION OF THE MATERIAL	BLOW COUNTS	N VALUE	REMARKS
				Topsoil (6")			
1.0	SS-1			Very stiff brown and gray silt and clay, some sand, moist	3 6 6	12	
2.0							
3.0							
4.0	SS-2				5 4 7	11	
5.0							
6.0	SS-3				3 5 7	12	
7.0							
8.0							
9.0	SS-4			Very stiff brown silt and clay, some sand, trace of gravel, moist (Becomes gray at 9.5')	7 8 9	17	
10.0				Bottom of boring at 10.0 feet			
11.0							
12.0							
13.0							
14.0							
15.0							
16.0							
17.0							
18.0							
19.0							
20.0							
21.0							
22.0							

WATER LEVEL MEASUREMENTS

	DEPTH	DATE
INITIAL	NONE	3/22/2021
AT COMPLETION	NONE	3/22/2021
OTHER		

SS — SPLIT SPOON
SL — SPLIT SPOON W/SOIL LINER
NQ— ROCK CORE
ST — SHELBY TUBE
AS — AUGER CUTTINGS
SC — SONIC

BOWSER MORNER

GINT Report Used: NEWLOGIN Report No.: 199079-XXXX-XXXX.GPJ GINT Template Used: NATALIE_EDITS.GDT Date Printed: 4/20/21

CLIENT	JOB NO.		
City of Oregon	**199079**		
PROJECT	BORING STARTED **3/22/21**	BORING COMPLETED **3/22/21**	**9**
Proposed Fire Station, 1040 South Wynn Road, Oregon, Lucas County, Ohio	DRILLER **CJ CR**	METHOD **2 1/4" HSA**	Boring No.
	TYPED BY **NSR**		**Sheet 1 of 1**

PROJECT LOCATION
LAT. LONG.
SURFACE ELEVATION
BORING LOCATION
As shown on Boring Location Plan.
It has been necessary to interpolate between samples. Therefore, the contacts between the various soil strata should not be taken as absolute.

COMMENTS

N VALUE, blows/ft.

DEPTH	SAMPLE NO.	SAMPLER TYPE / RECOVERY	GRAPHIC LOG	VISUAL CLASSIFICATION OF THE MATERIAL	BLOW COUNTS	N VALUE	REMARKS
				Topsoil (6")			
1.0				(FILL) Very Stiff brown and gray silt and clay, some sand, moist	2		
2.0	SS-1			Very stiff brown and gray silt and clay, some sand, moist	5 5	10	
3.0							
4.0	SS-2				5 5 7	12	
5.0							
6.0							
7.0	SS-3				3 5 6	11	
8.0				Hard brown and gray silt and clay, some sand, trace of gravel, moist			
9.0	SS-4				5 7 9	16	
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							
16.0							
17.0							
18.0							
19.0							
20.0				Bottom of boring at 10.0 feet			
21.0							
22.0							

WATER LEVEL MEASUREMENTS

	DEPTH	DATE
INITIAL	NONE	3/22/2021
AT COMPLETION	NONE	3/22/2021
OTHER		

SS — SPLIT SPOON
SL — SPLIT SPOON W/SOIL LINER
NQ— ROCK CORE
ST — SHELBY TUBE
AS — AUGER CUTTINGS
SC — SONIC

BOWSER MORNER

GINT Report Used: NEWLOGIN Report No.: 199079-XXXX-XXXX.GPJ GINT Template Used: NATALIE_EDITS.GDT Date Printed: 4/20/21

CLIENT	JOB NO.		
City of Oregon	**199079**		
PROJECT	BORING STARTED **3/22/21**	BORING COMPLETED **3/22/21**	**10** Boring No.
Proposed Fire Station, 1040 South Wynn Road, Oregon, Lucas County, Ohio	DRILLER **CJ CR**	METHOD **2 1/4" HSA**	
	TYPED BY **NSR**		**Sheet 1 of 1**

PROJECT LOCATION
LAT. LONG.
SURFACE ELEVATION
BORING LOCATION
As shown on Boring Location Plan.
It has been necessary to interpolate between samples. Therefore, the contacts between the various soil strata should not be taken as absolute.

COMMENTS

N VALUE, blows/ft. (10 20 30 40 50 60 70 80 90)

DEPTH	SAMPLE NO.	SAMPLER TYPE / RECOVERY	GRAPHIC LOG	VISUAL CLASSIFICATION OF THE MATERIAL	BLOW COUNTS	N VALUE	REMARKS
				Topsoil (6")			
1.0	SS-1			Stiff brown and gray silt and clay, some sand, moist	3 4 6	10	
2.0							
3.0							
4.0	SS-2				3 5 5	10	
5.0							
6.0				Hard brown silt and clay, some sand, trace of gravel, moist	4 9 10	19	
7.0	SS-3						
8.0							
9.0	SS-4			(Becomes stiff at 8.5')	5 6 9	15	
				(Becomes gray at 9.5')			
10.0				Bottom of boring at 10.0 feet			
11.0							
12.0							
13.0							
14.0							
15.0							
16.0							
17.0							
18.0							
19.0							
20.0							
21.0							
22.0							

WATER LEVEL MEASUREMENTS

	DEPTH	DATE
INITIAL	NONE	3/22/2021
AT COMPLETION	NONE	3/22/2021
OTHER		

SS — SPLIT SPOON
SL — SPLIT SPOON W/SOIL LINER
NQ— ROCK CORE
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BOWSER MORNER

GINT Report Used: NEWLOGIN Report No.: 199079-XXXX-XXXX.GPJ GINT Template Used: NATALIE_EDITS.GDT Date Printed: 4/20/21

CLIENT	JOB NO.		
City of Oregon	**199079**		
PROJECT	BORING STARTED **3/22/21**	BORING COMPLETED **3/22/21**	**11** Boring No.
Proposed Fire Station, 1040 South Wynn Road, Oregon, Lucas County, Ohio	DRILLER **CJ CR**	METHOD **2 1/4" HSA**	
	TYPED BY **NSR**		**Sheet 1 of 1**

PROJECT LOCATION
LAT. LONG.
SURFACE ELEVATION
BORING LOCATION
As shown on Boring Location Plan.
It has been necessary to interpolate between samples. Therefore, the contacts between the various soil strata should not be taken as absolute.

COMMENTS

N VALUE, blows/ft. (10 20 30 40 50 60 70 80 90)

DEPTH	SAMPLE NO.	SAMPLER TYPE / RECOVERY	GRAPHIC LOG	VISUAL CLASSIFICATION OF THE MATERIAL	BLOW COUNTS	N VALUE	REMARKS
				Topsoil (4")			
1.0				(FILL) Very stiff brown silt and clay, some sand, trace of gravel, moist	3		
2.0	SS-1			Very stiff brown and gray silt and clay, some sand, moist	6 6	12	
3.0							
4.0	SS-2				5 6 7	13	
5.0							
6.0				Very stiff brown and gray silt and clay, some sand, trace of gravel, moist	7		
7.0	SS-3				5 8	13	
8.0							
9.0	SS-4			(Becomes hard at 8.5') (Becomes gray at 9')	8 9 13	22	
10.0				Bottom of boring at 10.0 feet			
11.0							
12.0							
13.0							
14.0							
15.0							
16.0							
17.0							
18.0							
19.0							
20.0							
21.0							
22.0							

WATER LEVEL MEASUREMENTS

	DEPTH	DATE
INITIAL	NONE	3/22/2021
AT COMPLETION	NONE	3/22/2021
OTHER		

SS — SPLIT SPOON
SL — SPLIT SPOON W/SOIL LINER
NQ— ROCK CORE
ST — SHELBY TUBE
AS — AUGER CUTTINGS
SC — SONIC

BOWSER MORNER

GINT Report Used: NEWLOGIN Report No.: 199079-XXXX-XXXX.GPJ GINT Template Used: NATALIE_EDITS.GDT Date Printed: 4/20/21

CLIENT	JOB NO.		
City of Oregon	**199079**		
PROJECT	BORING STARTED **3/22/21**	BORING COMPLETED **3/22/21**	**12** Boring No.
Proposed Fire Station, 1040 South Wynn Road, Oregon, Lucas County, Ohio	DRILLER **CJ CR**	METHOD **2 1/4" HSA**	
	TYPED BY **NSR**		**Sheet 1 of 1**

PROJECT LOCATION
LAT. LONG.
SURFACE ELEVATION
BORING LOCATION
As shown on Boring Location Plan.
It has been necessary to interpolate between samples. Therefore, the contacts between the various soil strata should not be taken as absolute.

COMMENTS

N VALUE, blows/ft. (10 20 30 40 50 60 70 80 90)

DEPTH	SAMPLE NO.	SAMPLER TYPE / RECOVERY	GRAPHIC LOG	VISUAL CLASSIFICATION OF THE MATERIAL	BLOW COUNTS	N VALUE	REMARKS
				Topsoil (8")			
1.0				(FILL) Very stiff brown silt and clay, some sand, moist	3		
2.0	SS-1			Very stiff brown and gray silt and clay, some sand, moist	5 5	10	
3.0							
4.0	SS-2			(Becomes stiff at 3.5')	3 5 5	10	
5.0							
6.0					3		
7.0	SS-3				6 6	12	
8.0							
9.0	SS-4			Stiff brown silt and clay, some sand, trace of gravel, moist	4 4 7	11	
10.0				Bottom of boring at 10.0 feet			
11.0							
12.0							
13.0							
14.0							
15.0							
16.0							
17.0							
18.0							
19.0							
20.0							
21.0							
22.0							

WATER LEVEL MEASUREMENTS

	DEPTH	DATE
INITIAL	NONE	3/22/2021
AT COMPLETION	NONE	3/22/2021
OTHER		

SS — SPLIT SPOON
SL — SPLIT SPOON W/SOIL LINER
NQ— ROCK CORE
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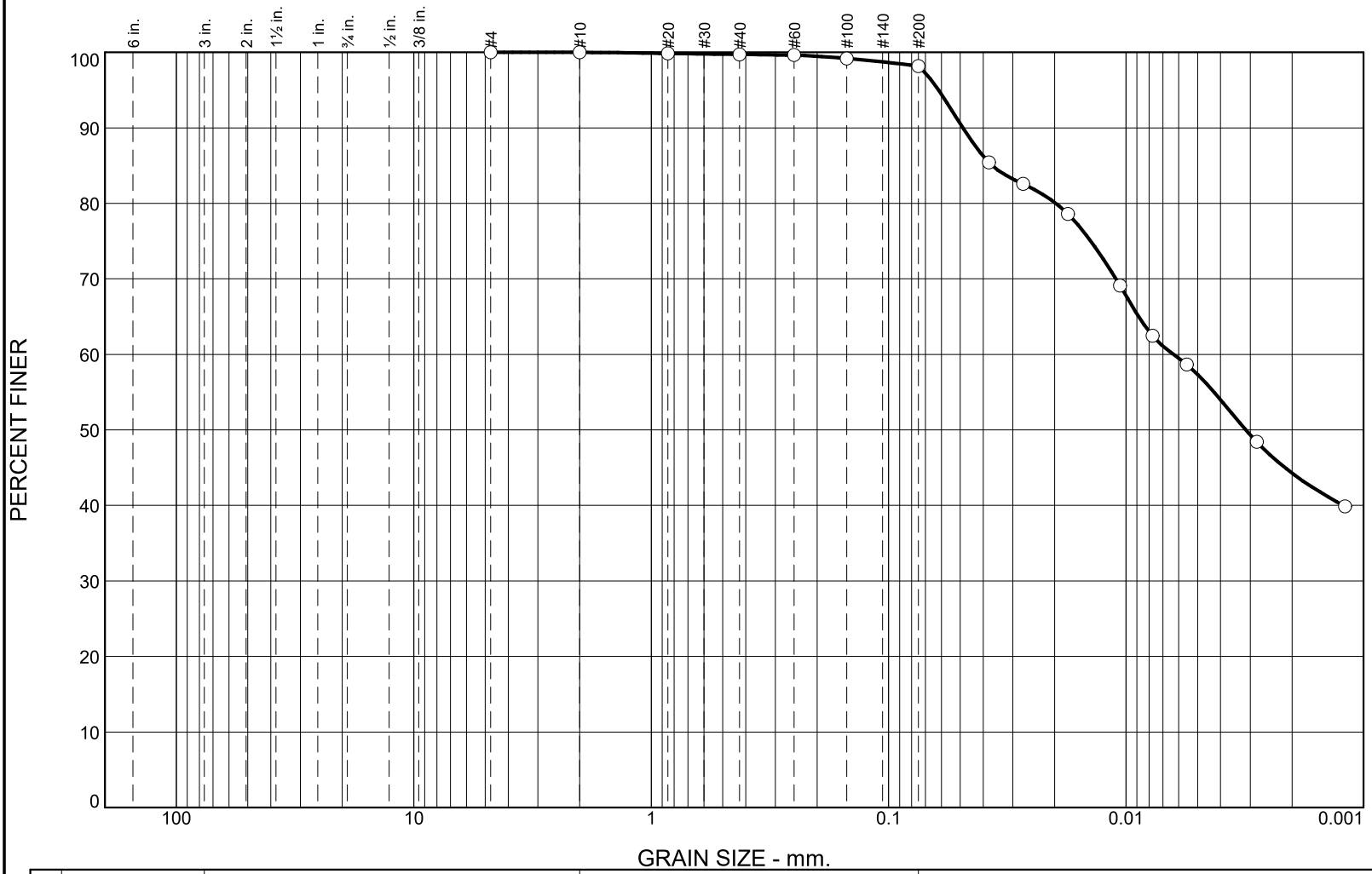
SC — SONIC

BOWSER MORNER

GINT Report Used: NEWLOGIN Report No.: 199079-XXXX-XXXX.GPJ GINT Template Used: NATALIE_EDITS.GDT Date Printed: 4/20/21

GRAIN SIZE DISTRIBUTION REPORT



		% +3"	% Gravel		% Sand		% Fines	
			Coarse	Fine	Coarse	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	0.3	1.5	40.8	57.4

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	59	20	0.0366	0.0063	0.0031					

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○ Brown silty clay, trace sand			

Project No. 199079 **Client:** Oregon, City of

Project: Proposed Fire Station

1040 South Wynn Road

○ **Source of Sample:** Boring #8 - SS - 1 **Depth:** 1.0 - 2.5'

Remarks:

○ 0.0% Coarse Sand

1.5% Fine Sand

ODOT Classification

A-7-6 (20) D50 = 0.0031

BOWSER-MORNER, INC.

Toledo, Ohio

Figure

MOISTURE CONTENT SUMMARY SHEET

Job No. 199079

Boring No.	Sample No.	Depth (Feet)	Moisture (%)
1	SS-1	1.0-2.5	22.0
	SS-2	2.5-5.0	23.8
	SS-3	6.0-7.5	22.0
	SS-4	8.5-10.0	15.5
	SS-5	13.5-15.0	16.6
	SS-6	18.5-20.0	*
2	SS-1	1.0-2.5	24.9
	SS-2	2.5-5.0	28.9
	SS-3	6.0-7.5	21.5
	SS-4	8.5-10.0	20.7
	SS-5	13.5-15.0	17.1
	SS-6	18.5-20.0	*
3	SS-1	1.0-2.5	27.1
	SS-2	2.5-5.0	22.7
	SS-3	6.0-7.5	24.5
	SS-4	8.5-10.0	21.6
	SS-5	13.5-15.0	17.1
	SS-6	18.5-20.0	*

* Not Tested

BOWSER MORNER

MOISTURE CONTENT SUMMARY SHEET

Job No. 199079

Boring No.	Sample No.	Depth (Feet)	Moisture (%)
4	SL-1	1.0-2.5	23.4
	SL-2	2.5-5.0	26.0
	SL-3	6.0-7.5	24.9
	SL-4	8.5-10.0	17.3
	SL-5	13.5-15.0	**
	SL-6	18.5-20.0	15.5
5	SS-1	1.0-2.5	25.8
	SS-2	2.5-5.0	25.0
	SS-3	6.0-7.5	19.2
	SS-4	8.5-10.0	26.5
	SS-5	13.5-15.0	17.2
	SS-6	18.5-20.0	*
6	SS-1	1.0-2.5	25.7
	SS-2	2.5-5.0	24.8
	SS-3	6.0-7.5	25.6
	SS-4	8.5-10.0	28.9
	SS-5	13.5-15.0	16.6
	SS-6	18.5-20.0	*

* Not Tested

** No Recovery

BOWSER MORNER

MOISTURE CONTENT SUMMARY SHEET

Job No. 199079

Boring No.	Sample No.	Depth (Feet)	Moisture (%)
7	SS-1	1.0-2.5	24.3
	SS-2	2.5-5.0	25.7
	SS-3	6.0-7.5	23.0
	SS-4	8.5-10.0	20.6
	SS-5	13.5-15.0	17.0
	SS-6	18.5-20.0	*
8	SS-1	1.0-2.5	23.2
	SS-2	2.5-5.0	22.8
	SS-3	6.0-7.5	18.0
	SS-4	8.5-10.0	15.5
9	SS-1	1.0-2.5	27.5
	SS-2	2.5-5.0	24.4
	SS-3	6.0-7.5	24.7
	SS-4	8.5-10.0	19.4
10	SS-1	1.0-2.5	25.4
	SS-2	2.5-5.0	24.1
	SS-3	6.0-7.5	17.4
	SS-4	8.5-10.0	17.0

BOWSER MORNER

MODEL CLEARING AND GRADING SPECIFICATIONS

I. GENERAL CONDITIONS

The contractor shall furnish supervision, labor, materials, and equipment, and shall perform all work and services necessary to complete in a satisfactory manner the site preparation, excavation, filling, compaction, and grading, as shown on the approved and issued for construction plans; as described therein.

This work shall consist of all clearing and grading, removal of existing structures unless otherwise stated, proper and approved disposal of materials not reused for the project, preparation of the land to be filled, filling of the land, spreading and compaction of the fill, and all subsidiary work necessary to complete the grading of the cut and fill areas to conform with the lines, grades, slopes, and specifications.

This work is to be accomplished under the constant and continuous observation of Bowser-Morner, Inc. Bowser-Morner's presence on-site, and the fact that they may conduct observations and tests for the benefit of the Owner, in no way releases or reduces the Contractor's obligation to perform the work in strict accordance with the plans and specifications.

In these specifications the terms "approved" and "as directed" shall refer to directions to the Contractor from the Owner or the designated representative.

II. SUBSURFACE CONDITIONS

Prior to bidding the work, the Contractor shall 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 subsurface conditions and obstacles to be encountered on and around the construction site; and shall make such additional investigation necessary for the planning and proper execution of the work. Borings and/or soil investigations have been made for the purpose of the design of this project. Results of these borings and studies will be made available by the Owner to the Contractor upon request, but the Owner and Bowser-Morner, Inc. are not responsible for any interpretations or conclusions with respect thereto made by the Contractor on the basis of such information, and the Owner further has no responsibility for the accuracy of the borings and the soil investigations.

If conditions different than those indicated in the bid documents are discovered by the Contractor, the Owner should be notified immediately. The material which the Contractor believes to be a changed condition should not be disturbed, so that the Owner can investigate the condition.

III. SITE PREPARATION

Within the specified areas, all trees, brush, stumps, logs, tree root balls, roots larger than one-inch in diameter, and structures scheduled for demolition shall be removed and disposed of according to requirements of applicable governing agencies. Demolition shall consist of the removal and proper disposal of all building materials, slabs, foundations, refuse, and unsuitable backfill materials.

All cut and fill areas shall be properly stripped. Topsoil will be removed to its full depth and stockpiled for use in finish grading. Any rubbish, organic and other objectionable soils, and other deleterious material shall be disposed of off the site, or as directed by the Owner or his designated representative if on site disposal is provided. In no case shall such objectionable material be allowed in or under the fill unless specifically authorized in writing.

Objectionable material is defined as those materials which cannot be altered or utilized according to project specifications. In no circumstances can an organic material be utilized.

Prior to the addition of fill, the original ground shall be proof-rolled to job specifications as outlined below. Special notice shall be given to the proposed fill area at this time. If wet spots, spongy conditions, or ground water seepage is found, corrective measures must be taken before the placement of fill.

IV. FORMATION OF FILL AREAS

Fills shall be formed of satisfactory materials placed in successive horizontal layers of not more than eight (8) inches in loose depth for the full width of the cross section. The depth of lift may be increased if the Contractor can consistently demonstrate the ability to satisfactorily compact a thicker lift throughout the entire lift. If compaction is accomplished using hand-tamping equipment, lifts should be limited to 4-inch loose lifts.

All material entering the fill shall be free of organic matter such as leaves, grass, roots, and other objectionable material.

Frozen material shall not be placed in the fill nor shall the fill be placed upon frozen material. The operations on earthwork shall be suspended at any time when satisfactory results cannot be obtained because of rain, freezing weather, or other unsatisfactory conditions. The Contractor shall keep the work areas graded to provide drainage at all times.

The fill material shall be of the specified moisture content range before compaction efforts are started. Wetting or drying of the material and manipulation to secure uniform moisture content throughout the layer shall be required. Should the material

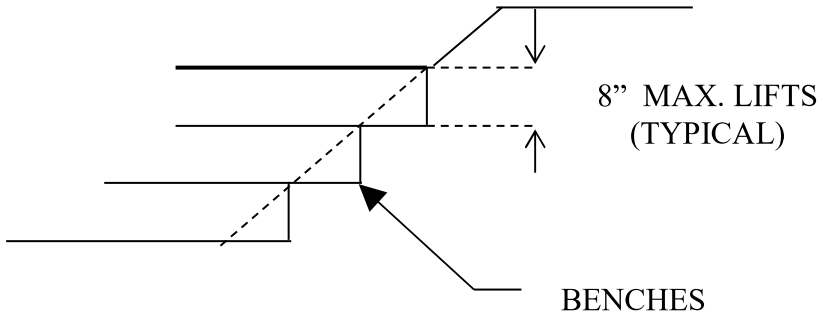
be too wet to permit proper compaction or rolling, all work on all portions of the embankment thus affected shall be delayed until the material has dried to the required moisture content. The moisture content of the fill material should be no more than two (2) percentage points higher or lower than optimum when using clay or silt material, nor three (3) when using granular material unless otherwise authorized. Sprinkling shall be done with equipment that will satisfactorily distribute the water over the disced area.

Compaction operations shall be continued until the fill is compacted to not less than (*refer to recommendations found in report text*) percent above foundation elevation and (*refer to recommendations found in report text*) percent below foundation elevation of the maximum density, as determined in accordance with the most current version of ASTM (*refer to report text*) Proctor. Any areas inaccessible to a roller shall be consolidated and compacted by mechanical tampers. The equipment shall be operated in such a 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.

In the construction of filled areas, starting layers shall be placed in the deepest portion of the fill and, as placement progresses, additional layers shall be constructed in horizontal planes as illustrated in Figure IV-1. 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.

FIGURE IV-1

TYPICAL LIFT PLACEMENT



When rock and other embankment materials are excavated at approximately the same time, the rock shall be incorporated into the outer portion of the areas. Stones or fragmentary rock larger than four (4) inches in their greatest dimensions will not be allowed in the fill unless specifically authorized in writing. Rock fill shall be brought up in layers as specified or as directed, and every effort shall be exerted to fill the voids with the finer material to form a dense, compact mass. Rock or boulders shall be disposed of as deleterious material per Item III.

The Contractor shall be responsible for the stability of all fills made under the contract, and shall replace any portion which, in the opinion of the Owner or his designated representative, has become displaced due to carelessness or negligence on the part of the Contractor. The Contractor shall meet all OSHA requirements for working in trenches and excavated areas. Fill damaged by inclement weather shall be repaired at the Contractor's expense.

V. SLOPE RATIO AND SURFACE WATER RUN-OFF

Temporary construction slopes less than 20 feet deep should not be steeper than 2 (horizontal) to 1 (vertical) in either cut or fill, and surface water shall not be drained over the slopes.

VI. GRADING

The Contractor shall furnish, operate, and maintain such equipment as is necessary to construct uniform layers and control smoothness of grade for maximum compaction and drainage. It is recommended that finish grades and intermediate grades subject to inclement weather condition be rolled with a smooth-drum roller to seal the compacted surface. Smooth surfaces should be "roughed up" by equipment cleats or sheeps-foot rollers prior to placement of the successive loose lift.

VII. COMPACTING

The compaction equipment shall be approved equipment of such design, weight, operational performance, and quantity to obtain the specified density in accordance with these specifications.

VIII. TESTING AND OBSERVATION SERVICES

Testing and observation services will be provided by the Owner.

IX. SPECIAL CONDITIONS

CONSTRUCTION PLANS

See attached plans titled

New Central Fire Station
for
Oregon Fire Department
1040 S. Wynn Road

Plans prepared by:

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