PRELIMINARY DRAFT

RAYTHEON SERVICES NEVADA

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

TITLE I

DESIGN SUMMARY REPORT

FOR THE EXPLORATORY STUDIES FACILITY

REVISION 1

DRAFT H

VOLUME 4

OUTLINE SPECIFICATIONS

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OUTLINE SPECIFICATIONS

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SECTION 02210

SITE GRADING

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to perform site grading as indicated on the Drawings.

1.02 RELATED WORK

A. Section 02220 - Excavation, Trenching, and Backfill

B. Section 02224 - Dust Control (TBD)

PART 2 PRODUCTS

2.01 TOP SOIL

The upper organic layer of the existing native site soils as identified in the Site-specific Reclamation Stipulations determined in accordance with the Yucca Mountain Project Reclamation Guidlines shall be classified as Top Soil.

2.02 EXCAVATION

All soil, rock, and combinations thereof removed from the cuts indicated on the drawings shall be classified as excavation.

2.03 COMMON FILL

Embankment and fill constructed with the materials excavated from the cut areas shall be classified as Common Fill.

2.04 SELECT FILL

The upper surface of the pad areas, and where otherwise indicated on the drawings shall be Select Fill. Select Fill shall have the following physical properties:

GRAIN SIZE (When tested in accordance with ASTM D 422)

U.S. Standard Sieve Size	Percent Passing
3 inch	100
1-1/2 inch	90 - 100
No. 4	50 - 90
No. 200	5 - 35

The Plasticity Index, when tested in accordance with ASTM D 4318, shall not exceed 15.

2.05 BORROW

Borrow, as necessary to construct the fills to lines and grades indicated on the drawings, shall meet the requirements for Select Fill.

PART 3 EXECUTION

3.01 CLEARING AND GRUBBING

Clear and grub all areas upon which new construction is to be built.

3.02 EXCAVATION

Excavate areas to be cut to the lines and grades indicated on the drawings. To the extent practicable, the excavated material shall be used for Common Fill.

3.03 COMMON FILL

Common fill will be selectively placed in horizontal layers not exceeding 24 inches in thickness. Fill materials shall be watered to bring the moisture content to optimum moisture, plus or minus 2 percentage points, and compacted to not less than 90 percent of maximum density.

Optimum moisture and maximum density shall be determined in accordance with ASTM D 1557, Method D. In-place density shall be determined in accordance with ASTM D 1556 or ASTM D 2922 and ASTM D 3017.

3.04 SELECT FILL

Construct Select fill where indicated on the drawings using material as specified in Article 2.04. All fill constructed with borrow shall be placed as Select Fill. Select Fill shall be placed with a moisture content of optimum, plus or minus 2 percentage points, and shall be

compacted to not less than 95 percent of maximum density. Optimum moisture and maximum density shall be determined in accordance with ASTM D 1557, Method D. In-place density shall be determined in accordance with ASTM D 1556 or ASTM D 2922 and ASTM D 3017.

3.05 COMPLIANCE TESTING

Testing to verify compliance with these specifications will be performed by the Architect/Engineer (A/E) Materials Testing Laboratory.

END OF SECTION

SECTION 02220

EXCAVATION, TRENCHING, AND BACKFILL

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all material, tools, equipment, and labor to perform the Excavation, Trenching, and Backfill, related to the surface facilities, as indicated on the Drawings.

1.02 RELATED WORK

A. Section 02210 - Site Grading

B. Section 02224 - Dust Control (TBD)

C. Section 02311 - Controlled Drilling and Blasting

PART 2 PRODUCTS

2.01 STRUCTURAL EXCAVATION

The removal of soil, rock, and combinations thereof to accommodate construction of below-grade structures, shall be classified as structural excavation.

2.02 UTILITY EXCAVATION

Excavation to facilitate the construction of underground utilities shall be classified as Utility Excavation.

2.03 SELECT BACKFILL

The backfill of Structural Excavations and Utility Excavations above the pipe or conduit zone shall be constructed with material meeting the requirements of Select Fill material specified in Section 02210.

2.04 PIPE BEDDING MATERIAL

The initial backfill and bedding around utility pipe, conduits, cables, or other like carriers, shall have the following physical properties: TBD

PART 3 EXECUTION

3.01 CLEARING AND GRUBBING

Clear and grub all areas to be trenched or excavated, which have not been previously cleared in Site Grading.

3.02 STRUCTURAL EXCAVATION

Excavate areas to accommodate the construction of structures, including drainage structures, sufficiently to provide room for form work and accessory construction.

3.03 UTILITY EXCAVATION

Excavate trenches to accommodate the construction of underground utilities, including conduits and direct burial cables, sufficiently to provide room for construction.

3.04 SELECT BACKFILL

Construct Select backfill using material as specified. All backfill of structural excavations and utility trenches above the pipe zone shall be Select Backfill. Select Backfill shall be placed with a moisture content of optimum, plus or minus 2 percentage points, and shall be compacted to not less than 95 percent of maximum density. Optimum moisture and maximum density shall be determined in accordance with ASTM D 1557, Method D. In-place density shall be determined in accordance with ASTM D 1556 or ASTM D 2922 and ASTM D 3017.

3.05 PIPE BEDDING MATERIAL

The pipe zone, the zone of the trench prism from 6 inches below the bottom of the pipe to 12 inches above the top of the pipe, shall be backfilled with Pipe Bedding Material as specified. Pipe Bedding Material shall be consolidated by saturation then rolling with five complete coverages with a vibratory trench roller developing not less than 2400 pounds of combined dynamic and static force per foot of roller width.

3.05 COMPLIANCE TESTING

Testing to verify compliance with these specifications will be performed by the Architect/Engineer (A/E) Materials Testing Laboratory.

END OF SECTION

SECTION 02230

AGGREGATE BASE COURSE

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor for the production, stockpiling, processing, and placement of Aggregate Base Course for roads and parking areas as indicated on the Drawings.

1.02 RELATED WORK

A. Section 02210 - Site Grading.

B. Section 02220 - Excavation, Trenching, and Backfill.

PART 2 PRODUCTS

2.01 MATERIALS

A. General: Base Course shall be produced from aggregates that are clean, durable, sound, and free from organic matter. These aggregates may be crushed stone, crushed gravel, or crushed slag.

B. Physical Properties: The gradation and other physical properties of the Aggregate Base Course shall generally conform to the requirements of the Nevada Department of Transportation (NDOT) Standard Specifications.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

The subgrade upon which the Base Course is to be placed shall be fine graded and the upper six inches compacted to 95 percent of ASTM D 1557 maximum density immediately prior to the placement of the Base Course.

3.02 WATER

Water in sufficient quantity to bring the moisture content to optimum or above shall be mixed with the Base Course prior to placing on the grade.

3.03 PLACEMENT

Base Course shall be placed on the prepared subgrade with spreader boxes, paving machines, or other suitable equipment that will prevent segregation.

3.04 COMPACTION

The Base Course shall be compacted to 95 percent of ASTM D 1557 maximum density.

END OF SECTION

SECTION 02270

SLOPE PROTECTION AND EROSION CONTROL

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work under this Section includes furnishing all materials, tools, equipment, and labor to place Slope Protection and Erosion Control, as indicated on the Drawings.

1.02 RELATED WORK

A. Section 02210 - Site Grading

B. Section 02224 - Dust Control (TBD)

PART 2 PRODUCTS

2.01 GEOTEXTILE FILTER FABRIC

Geotextile fabric may be woven, non-woven, or non-woven needle punched. Fabric fiber shall be either polypropylene or polyester.

2.02 BEDDING MATERIAL

Bedding material shall comply with the requirements for Pipe Bedding Material specified in Section 02220.

2.03 RIPRAP

Riprap shall be sound, durable stone with a bulk density not less than 145 pounds per cubic foot. Stone shall be graded from 12 inches maximum size to 3 inches minimum.

PART 3 EXECUTION

3.01 SLOPE DRESSING

Slopes shall be graded to the shapes and contours indicated $\pm$ 0.5 foot.

3.02 PLACING FILTER FABRIC

Filter fabric shall be placed on slope subgrade in all areas indicated to have riprap slope protection. The fabric shall be lapped 2 feet minimum at longitudinal or transverse laps.

3.03 PLACING BEDDING MATERIAL

A minimum of 4 inches of bedding material shall be placed over the fabric. Exercise care not to rupture the fabric.

3.04 PLACEMENT OF RIPRAP

Riprap may be placed by hand or with a small crawler tractor to the thickness indicated.

END OF SECTION

SECTION 02311

CONTROLLED DRILLING AND BLASTING

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to perform drilling and blasting for tunnel, drift, or alcove excavation, as indicated on the Drawings or directed by the Engineer. Blasting to facilitate surface excavations shall also be performed under this Section.

1.02 RELATED WORK

A. Section 02220 - Excavation, Trenching, and Backfill

B. Section 02310 - Tunnel Excavation (TBD)

C. Section 02312 - Excavation for Stations, Drifts and Alcoves

1.03 SYSTEM DESCRIPTION

A. All rock excavations which require explosives to expedite removal, shall employ controlled blasting methods to minimize disturbance to the rock remaining outside of the spaces and fragment the rock to be removed.

B. The smooth blasting technique of controlled blasting shall be employed as the drilling and blasting method shown on the Drawings. The "Line Drilling" controlled blasting technique shall be used in initiating tunnel openings or other areas where precise opening dimensions are required.

C. Shots required to trim rock projections inside of the neat excavation line shall use the minimum amount of explosive required to remove the projection. Blasts of this type will be controlled in the same manner as all other blasting covered by these Specifications.

PART 2 PRODUCTS

2.01 EXPLOSIVE MATERIALS

A. Free running explosives are prohibited.

B. A chemical analysis of all explosive materials proposed for use shall be submitted to the Engineer 30 days prior

to the proposed use date. No blasting materials will be used prior to the Engineer's written approval. Approval of each lot or each individual shipment is required.

1. Explosives for Production Holes (Stoping Holes and Cut Holes): Production holes shall be charged with water gel explosive,or emulsion with equal blast strength characteristics.

2. Explosive for Perimeter Holes: Perimeter holes shall be charged by string loading small-diameter cartridges of a low density water gel explosive, or emulsion with equal strength characteristics.

2.02 DETONATORS

A. Blasting Caps: An approved non-electric detonating system must be used. Caps shall be furnished in delay groups to fire in the sequences and timing interval indicated on the Drawings.

B. Detonating Cord and Connectors: An approved detonating cord system shall be used.

2.03 STEMMING MATERIAL

The stemming material shall be granular or non-granular as indicated on the Drawings. Stemming material shall not contain particles larger than 1/4 inch.

PART 3 EXECUTION

3.01 DRILLING AND BLASTING METHODS

A. The Contractor shall employ the controlled blasting methods indicated on the Drawings for all blasting.

B. The Contractor shall take all steps necessary to ensure that no damage or unacceptable excavation occurs.

3.02 DRILLING AND BLASTING SAFETY

A. Drilling and Blasting will be permitted only after adequate provision has been made for the protection of persons, the work, and public or private property.

B. The Contractor shall make every effort to prevent surface blasting fly rock damage to structures or injury to personnel.

C. The Contractor shall provide proper warning signs, clearly visible to all traffic entering the area, that blasting

operations are taking place. An audible blast warning system and watchmen will be utilized to ensure that all personnel are kept a safe distance from each blast.

D. The Contractor shall submit a Blast Area Security Plan which includes pre-blast evacuation and shot guarding procedures.

3.03 MAPPING, MEASURING AND TESTING BY OTHERS

A. During the excavation of the tunnel, scientific testing personnel will map and measure rock fractures, in situ stresses, and other characteristics.

B. The Contractor shall be responsible for determining that blasted areas are adequately prepared for the safe entrance of measurement and testing personnel.

3.04 VIBRATION MONITORING

In addition to visual damage inspections to be performed by the Mining Inspectors, the Contractor shall supply, install and maintain a calibrated seismograph system.

3.05 DRILLING AND BLASTING PROCEDURES

The specific drill and blast procedures and patterns, as specified herein and indicated on the Drawings, are to be used to prepare the Contractor's initial Blasting Plan.

3.06 DRILLING BLAST HOLES

Drill water use is to be limited to the minimum amount required for efficient blast hole drilling A selected chemical tracer will be added to all water used in drilling so that it can be distinguished from water used for other construction or testing activities.

3.07 DRILL HOLE ALIGNMENT

Drill hole alignment shall conform to the Drawings.

3.08 DUST AND FUME CONTROL

Dust and fumes shall be controlled within the limits specified in the ACGIH "Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment".

3.09 DRILLING EQUIPMENT

All drilling equipment is subject to approval by the Engineer.

3.10 DRILLING AND BLASTING PLANS

No drilling and blasting activity shall begin until the complete Drilling and Blasting Plan is approved by the Engineer.

END OF SECTION

SECTION 02312

EXCAVATION FOR STATIONS, DRIFTS, AND ALCOVES

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to perform underground excavation of Stations, Drifts, and Alcoves, and providing utilities as indicated on the Drawings.

1.02 RELATED WORK

A. Section 02310 - Tunnel Excavation (TBD)

B. Section 02311 - Controlled Drilling and Blasting

C. Section 02341 - Rock Reinforcement (TBD)

PART 2 PRODUCTS

None

PART 3 EXECUTION

3.01 GENERAL

A. Excavation for Stations, Drifts, and Alcoves shall be performed by either mechanical excavation or controlled drilling and blasting, as indicated on the Drawings.

B. Equipment Requirements:

All equipment shall be compatible with the requirements of MSHA and shall be subject to the review of the Engineer.

C. Dust Control:

Dust from general excavation operations shall be controlled to comply with Federal and State requirements.

3.03 EXCAVATION OF ROOMS, DRIFTS AND CROSSCUTS

A. Excavation Methods:

1. Drill and Blast: Excavation of the rooms, drifts ramps, alcoves and crosscuts by drill and blast methods shall be done as specified in Section 02311.

2. Mechanical Excavation: Mechanical excavation shall be performed in accordance with the Mechanical Excavation Plan prepared by the Contractor and approved by the Engineer.

B. The work shall conform to the dimensions indicated on the Drawings.

C. Testing Support

The Contractor shall provide support to underground testing as required.

3.04 ROCK REINFORCEMENT

Installation and testing of rock reinforcement shall be in accordance with Section 02341, "Rock Reinforcement."

3.05 FIELD QUALITY CONTROL

A. Contractor's Quality Control:

The Contractor shall be responsible for the true and proper setting out of the work as indicated on the Drawings and for the correctness of the positions, levels, dimensions and alignment of all parts of the work. The checking of any setting out of lines or levels by the Engineer does not relieve the Contractor of his responsibilities for the correctness thereof.

B. Inspection and Acceptance:

Inspection for the acceptance of the complete excavation shall be performed by the Engineer.

END OF SECTION

SECTION 02505

GRAVEL SURFACING

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools equipment,and labor to place Gravel Surfacing on the roads and other areas as indicated on the Drawings.

1.02 RELATED WORK

A. Section 02210 - Site Grading

B. Section 02224 - Dust Control (TBD)

PART 2 PRODUCTS

2.01 GRAVEL SURFACING MATERIAL

Gravel Surfacing shall be composed of crushed gravel or crushed stone, well graded from coarse to fine, with sufficient binder to form a homogeneous mass.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

Subgrade shall be built to the lines and grades indicated and compacted as specified in Section 02210.

3.02 PLACEMENT OF GRAVEL SURFACING

Surfacing shall be placed in such a manner as to avoid segregation, processed to optimum moisture, and spread to provide a compacted layer of the indicated thickness.

3.03 COMPACTION

Gravel Surfacing shall be compacted to not less than 95 percent of ASTM D 1557 maximum density.

3.04 SURFACE TOLERANCES

The surface of the finished gravel course shall be to the grade indicated $\pm$ 0.10 foot.

3.05 COMPLIANCE TESTING

Testing to verify specification compliance will be performed by the A/E's Materials Testing Laboratory personnel.

END OF SECTION

SECTION 02510

ASPHALT CONCRETE SURFACE COURSE

PART 1 GENERAL

1.01 WORK INCLUDED

The work covered in this Section includes furnishing all materials, tools, equipment, and labor to construct Asphalt Concrete Surface Course as indicated on the Drawings.

1.02 RELATED WORK

Section 02230 - Aggregate Base Course

PART 2 PRODUCTS

2.01 AGGREGATE

Aggregate shall consist of crushed stone, crushed gravel, or crushed slag with sand and other inert finely divided mineral aggregate.

2.02 BITUMINOUS MATERIAL

Bituminous material shall be asphalt cement grade 85-100.

2.04 JOB-MIX FORMULA

A. Work shall not begin nor shall any mixture be accepted until the Contractor has submitted samples of the materials intended for use and a satisfactory job-mix formula has been established.

B. After the job-mix formula is established, all mixtures furnished for the project shall conform thereto within the following tolerances plus or minus:

Passing No. 4 and larger sieves - - - - - - - - -	7%
Passing No. 8 to No. 100 sieves (inclusive) - -	4%
Passing No. 200 sieve - - - - - - - - - - - - - -	2%
Bitumen -	0.4%
Temperature of mix - - - - - - - - - - - - - - -	20° F

2.05 MIXING PLANTS

Mixing plants shall conform to the requirements of the SNDH SPEC.

2.07 OTHER EQUIPMENT

A. Hauling Equipment: Trucks used for hauling bituminous mixtures shall have tight, clean, smooth metal beds. The beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other approved material to prevent the mixture from adhering to them.

B. Bituminous pavers: Bituminous pavers shall be self-contained power-propelled units with an activated screed or strike-off assembly.

C. Rollers: Rollers shall be capable of reversing without backlash and operating at slow speeds to avoid displacement of the bituminous mixture. The number, type, and weight of rollers shall be sufficient to compact the mixture to the required density while the mixture is still in a workable condition.

D. Blowers and brooms: Blowers and brooms shall be of the power type and shall be suitable for cleaning the surface to be paved.

E. Saws: Saws shall be of the power type and shall be capable of rapidly cutting pavement and trimming joints and edges of pavement.

F. Scales: Scales shall be standard, beam-type truck scales equipped with an accurate weight-recording device and shall be of sufficient size and capacity to accommodate all trucks to be used in handling bituminous mixtures.

PART 3 EXECUTION

3.01 PREPARATION FOR PLACING

Immediately before placing the bituminous mixture, the existing underlying course shall be cleaned of loose or deleterious material. A power sweeper equipped with a blower shall be used, supplemented with hand brooms if necessary.

3.02 TRANSPORTATION AND DELIVERY OF THE MIXTURE

A. The mixture shall be transported from the mixing plant to the point of use in vehicles described above.

B. The mixture shall be placed at a temperature between 250 and 300 degrees F.

3.03 SPREADING AND LAYING

Upon arrival, the mixture shall be dumped into an approved bituminous paver and immediately spread to the full depth required. The mixture shall be struck off in a uniform layer of such depth that, when the work is completed, it will have the required thickness and will conform to the grade and surface contour required.

3.04 COMPACTION OF MIXTURE

After spreading, the mixture shall be thoroughly and uniformly compacted with power rollers. Rolling shall begin as soon after spreading as the mixture will bear the roller without undue displacement or hair checking. Rolling shall continue until all roller marks are eliminated, the surface is of uniform texture and true to grade and cross section, and a density of at least 96% of the laboratory density.

3.05 SURFACE REQUIREMENTS

The surface course, upon completion of final rolling, shall be smooth and true to grade and cross section. The surface shall not vary more than 1/8 inch from a 10 foot straightedge.

END OF SECTION

SECTION 02665

WATER DISTRIBUTION SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to construct a water distribution system as indicated on the Drawings.

1.02 RELATED WORK

A. Section 02220 - Excavation, Trenching, and Backfill

B. Section 02224 - Dust Control (TBD)

C. Section 03300 - Cast-in-place Concrete

PART 2 PRODUCTS

2.01 WATER PRESSURE PIPE

A. Polyvinyl Chloride (PVC) Pipe shall conform to the requirements of AWWA C900.

B. Ductile Iron Pipe (DIP) shall conform to ANSI/AWWA C151/A21.51. All Ductile Iron Pipe shall be cement-mortar lined in accordance with ANSI/AWWA C104/A21.4.

2.02 GATE VALVES shall conform to the requirements of AWWA C509.

2.03 PIPE BEDDING MATERIAL shall conform to the requirements of Section 02220 of this Specification.

2.04 FIRE HYDRANTS shall conform to the requirements of AWWA C502.

2.05 DUCTILE IRON FITTINGS shall conform to the requirements of AWWA C110.

PART 3 EXECUTION

3.01 TRENCHING, EXCAVATION, AND BACKFILL shall be performed in accordance with Section 02220.

3.02 PIPE INSTALLATION

A. Install Ductile Iron Pipe water line in accordance with AWWA C 600.

B. Install PVC pipe water line in accordance with AWWA M 23.

3.03 PIPE BEDDING

Bed all pipe in Pipe Bedding Material as specified in Section 02220.

3.04 TESTING

A. BACKFILL shall be tested as specified in Section 02220.

C. PRESSURE TESTING

1. Ductile iron pipe shall be tested in accordance with AWWA C 600.

2. PVC water lines shall be tested in accordance with AWWA M 23.

END OF SECTION

SECTION 02730

SANITARY SEWER COLLECTION SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to construct a Sanitary Sewer Collection System, complete, as indicated on the Drawings.

1.02 RELATED WORK

A. Section 02220 - Excavation, Trenching, and Backfill

B. Section 02224 - Dust Control (TBD)

C. Section 03300 - Cast-in-place Concrete

PART 2 PRODUCTS

2.01 SEWER PIPE shall be Polyvinyl Chloride (PVC) conforming to the requirements of ASTM D 3034.

2.02 MANHOLES shall conform to the requirements of ASTM C 478, Precast Concrete Manhole Sections.

2.03 PIPE BEDDING MATERIAL shall conform to the requirements of Section 02220 of this Specification.

PART 3 EXECUTION

3.01 TRENCHING, EXCAVATION, AND BACKFILL shall be performed in accordance with Section 02220.

3.02 MANHOLE BASES may be precast or cast-in-place. Inverts shall be hand formed to provide smooth flow of the sewage through the manhole.

3.03 TESTING

A. BACKFILL shall be tested as specified in Section 02220.

B. LAMP TESTING

Each new sewer line shall be lamped between manholes to determine proper grade and alignment and to ascertain that

it is free of obstructions. Ninety percent of full circle shall be considered acceptable.

C. LEAK TESTING

Air Testing: The minimum time interval allowable for a pressure drop from 3.5 psi to 3.0 psi for air exfiltration tests performed between 2 consecutive manholes shall be 4 minutes for 6 inch pipe and 5 minutes for 8 inch pipe.

D. MANDREL TESTING

Not less than 30 days after installation and backfill of PVC sewer lines, the pipe shall be tested for deflection with a mandrel (Go/NoGo device). The minimum radius of each mandrel shall be 94 percent of the nominal inside radius of the line being tested and shall have a length not less than the pipe diameter. The mandrel shall pass freely through the pipe when pulled by hand.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment and labor necessary to mix, transport, and place concrete, reinforcing steel, and accessories as indicated on the Drawings.

1.02 RELATED WORK

A. Section 03301 - Concrete Batch Plant (TBD)

PART 2 PRODUCTS

2.01 MATERIALS

A. Portland Cement

Cement used shall conform to the requirements of ASTM C 150, Type II.

B. Aggregates

All aggregates shall conform to ASTM C 33.

C. Water

Mixing water shall comply with the requirements of ASTM C 94

D. Admixtures

1. Air-Entraining Admixtures (AEA)

Air-entraining admixture shall conform to ASTM C 260.

2. Water Reducing Admixtures (WRA)

Water reducing admixtures shall conform to ASTM C 494.

E. Reinforcing Steel:

Reinforcing steel shall conform to ASTM A 615, grade 40.

2.02 MIX DESIGN

Proportions for the design mix shall be selected in accordance with ACI 211.1.

2.03 FORMS

A. General Requirements:

Form materials and construction shall conform to ACI 301, Chapter 4.

B. Form Materials:

Forms shall be of wood, plywood, or steel.

2.04 CURING MATERIALS

A. Polyethylene Plastic Sheeting, 0.006 inches minimum thickness.

B. Liquid Membrane-Forming Compounds for Curing Concrete conforming to ASTM C 309, Class A, Type 1-D or Type 2 as specified hereafter.

PART 3 EXECUTION

3.01 SURFACE PREPARATION:

Foundation surfaces against or upon which concrete is to be placed shall be free from standing water, mud, debris, ice, snow and laitance immediately before placing concrete.

3.02 FORMS

Forms for building construction shall comply with ACI 301, Chapter 4, unless indicated otherwise on the drawings. Finish of formed concrete surfaces shall be as indicated on the drawings.

3.03 REINFORCEMENT

Concrete reinforcement shall be as indicated on the drawings and the fabrication, installation, and placement of the reinforcing steel shall comply with Chapter 5 of ACI 301.

3.04 PRODUCTION OF CONCRETE

A. Truck Mixing

Mix and deliver concrete in a truck mixer. Ready mixed concrete shall comply with the requirements of ASTM C 94 and other requirements of Chapter 7 of ACI 301.

B. Temperature Control

1. General:The temperature of the concrete "as deposited" shall be in accordance with in accordance with ACI Recommended Practices for Cold Weather Concreting or Hot Weather Concreting, as applicable.

3.05 CONVEYING AND PLACING CONCRETE

Concrete shall be conveyed and deposited as specified in ACI 301, Chapter 8.

3.06 SURFACE FINISHES (EXCEPT FLOOR AND SLAB ON GRADE)

A. Repair of Surface Defects

Repair all surface defects including tie holes, minor honeycombing, and otherwise defective concrete as specified in Chapter 9 of ACI 301.

B. Finishing of Formed Surfaces:

Formed surfaces shall be finished as specified in Chapter 10 of ACI 301. The type of finish required shall be as indicated on the drawings.

3.07 FLOOR AND SLAB CONSTRUCTION

The construction of floors and slabs shall be in accordance with the requirements of Chapter 11 of ACI 301. Slab finish shall be as indicated on the drawings.

3.08 CURING AND PROTECTION

A. General Requirements

Protect concrete adequately from injurious action by sun, rain, flowing water, frost, and mechanical injury, and do not allow to dry out from the time it is placed until the minimum curing periods specified.

B. Removal of Forms and Protection:

Remove forms in a manner which will prevent damage to the concrete.

C. Curing

1. After form removal, curing shall be continued on formed concrete members by the application of curing compound meeting the requirements of ASTM C 309, Type 1-D.

2. Curing of slabs shall begin immediately after final finish.

3.09 SAMPLING AND TESTING

A. General

All sampling and testing shall be performed by the Architect/Engineer's (A/E) Materials Testing Laboratory.

B. Sampling:

1. Aggregates at Batch Plant: Before delivery of concrete to the job site, fine and coarse aggregates will be sampled in accordance with ASTM D 75 and tested for compliance with ASTM C 33.

2. Concrete: Samples of fresh concrete will be taken each day at the site of placement in accordance with ASTM C 172.

3. Cement Testing: Cement shall be tested, and cement mill test reports provided for each load of cement delivered.

END OF SECTION

SECTION 03361

SHOTCRETE

PART I GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all material, tools, equipment, and labor required to pneumatically apply a low slump concrete at high velocity onto a prepared rock surface as indicated on the Drawings, or directed by the Engineer.

1.02 SYSTEM DESCRIPTION

A. Furnish, place and cure shotcrete for the following:

1. Initial protection and support for the excavated shaft walls.

2. Protection and support of underground excavation surface where deemed necessary.

3. Creation of fireproof ventilation barriers at selected locations in the underground openings.

PART 2 PRODUCTS

2.01 SHOTCRETE

A. Shotcrete shall have a minimum 28 day compressive strength of 4000 psi with an air content, when using the wet mix process, of 6 to 8 percent in the pre-placed mix.

2.02 MATERIALS

A. Portland Cement: Cement used in shotcrete shall conform to ASTM C 150, Type I, or Type II.

B. Blended Hydraulic Cement: ASTM C 595, Type IS-MS, IP-MS. Either ASTM C 618 fly ash or pozzolan, or ASTM C 989 ground iron blast furnace slag may be mixed with the specified type of ASTM C 150 cement to produce the equivalent ASTM C 595 blended cement.

C. Aggregate: Aggregates shall conform to ASTM C 33.

D. Admixtures: Use only when approved by the Engineer.

1. Retarders: ASTM C 494, Type B.

2. Water Reducers: ASTM C 494, Type A.

3. Air Entraining Additives: ASTM C 260.

4. Accelerators: ASTM C 494, Type C.

PART 3 EXECUTION

3.01 BATCHING AND MIXING

A. Weight Batching: ASTM C 94 for the wet mix process, and for the cement and aggregate for the dry mix.

B. Volumetric Batching: ASTM C 685. Provide one weight batching check every 4 hours of volumetric batching using ASTM C 94 weighing equipment.

3.02 SHOTCRETE PLACEMENT

Place shotcrete in layer thickness to prevent sagging of the shotcrete. When shooting more than one layer of reinforcement, the first layer of shotcrete shall completely embed the reinforcement adjacent to the form. Operate a blowpipe and air/water gun, and perform shotcreting to prevent rebound and other loose materials from entering new construction.

3.03 SAMPLING AND TESTING

A. Visual Inspection: Samples shall be visually inspected by the Engineer for delaminations, segregation, voids, honeycombs, sand pockets or lenses, sagging, or incomplete encasement of reinforcement.

B. Testing: The Contractor shall make test panels for every 50 cubic yards of shotcrete placed, but at least one panel per shift. Field cure the panels in the same manner as the work. Cut and test three cores from each panel for compressive strength. Cut and test three beams for flexural strength, and cut and test one core to determine durability factor.

END OF SECTION

SECTION 04200

REINFORCED CONCRETE UNIT MASONRY

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to construct masonry walls as indicated on the Drawings.

1.02 RELATED WORK

A. Section 03300 - Cast-in-place Concrete

PART 2 PRODUCTS

2.01 GLAZED CONCRETE MASONRY UNITS

A. Glazed concrete masonry units shall be two-core units of modular dimensions and shall include all closers, jamb units, lintels and special shapes of the required sizes to complete the Project as indicated.

B. Basic units shall conform to ASTM C 90, Class N, Type I.

C. Glazed surface shall have a smooth satin-gloss finish externally heat polymerized, conforming to ASTM C 744. Color to be selected.

2.02 MASONRY MORTAR

A. Mortar shall comply with the requirements of ASTM C 270, Type S.

B. Cement for mortar shall meet the requirements of ASTM C 150.

C. Hydrated lime shall conform to ASTM C 207, Type N.

D. Aggregate for masonry mortar shall meet the requirements of ASTM C 144.

2.03 GROUT

A. Grout for unit masonry shall comply with the requirements of ASTM C 476, Type Coarse Grout.

B. Grout shall have a 28 day compressive strength of 2,000 psi when sampled and tested in accordance with Uniform Building Code Standard 24-28.

2.04 REINFORCEMENT AND ANCHORAGES

A. Reinforcing steel bars shall conform to ASTM A 615, Grade 40. All bars shall be deformed.

B. Single wythe joint reinforcement shall be truss type, galvanized-steel construction with 3/16 inch side rods and number 9 gauge cross ties.

C. Anchors and ties shall be zinc-coated ferrous metal.

PART 3 EXECUTION

3.01 ERECTION

A. Installation:

1. Masonry shall be laid plumb, true to line, with level courses accurately spaced.

2. Vertical cells to be filled with grout shall have vertical alignment sufficient to maintain a clear, unobstructed, continuous vertical core.

3. Corners and reveals shall be plumb and true.

4. Vertical reinforcing steel shall be accurately positioned in the masonry cells and securely held in place by means of metal or concrete supports, centering clips, spacers, ties, or caging devices adequate to prevent displacement during construction.

5. Horizontal reinforcing shall be steel truss type, centered in mortar joint and completely embedded.

3.02 TOLERANCES

A. Variation from unit to adjacent unit: 1/32 inch maximum.

B. Variation from plane of wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.

C. Variation from plumb: 1/4 inch per 10 feet.

D. Variation from level coursing: 1/8 inch in 3 feet; 1/4 inch in 10 feet; 1/2 inch maximum.

E. Variation of joint thickness: 1/8 inch in 3 feet.

END OF SECTION

SECTION 05120

STRUCTURAL STEEL AND MISCELLANEOUS METAL

PART 1 GENERAL

1.01 WORK INCLUDED

Work specified in this Section includes furnishing, fabricating and erecting all structural steel and miscellaneous metal items indicated on the Drawings.

1.02 RELATED WORK

A. Section 03300 - Cast-in Place Concrete

B. Section 05210 - Steel Joists (TBD)

C. Section 05300 - Metal Decking

D. Section 09900 - Painting

1.03 SUBMITTALS

A. Submit Shop Drawings in accordance with Section 01300.

B. Shop drawings are to be prepared under the direction of a Professional Structural Engineer registered in the state of Nevada.

1.04 FIELD MEASUREMENTS

Verify that measurements on site are as shown on the Drawings prior to shop fabrication.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials including structural-steel members, steel plate, metal pipe, bolts, nuts, washers, welded metal, and other items to be used in the Project shall be of the type, grade, class and size shown on the Drawings and shall meet the requirements of the applicable references.

B. Structural Steel (as defined in the Code of Standard Practice, AISC Manual of Steel Construction): ASTM A 36.

C. Steel tubing: ASTM A500 or A501.

D. Sheet steel: ASTM A446, Grade B, structural quality with a class G90 coating.

E. Bolts, nuts, and washers: ASTM A307, A325 or A490 as noted on the Drawings.

F. Gratings: ANSI A202.1, type as noted on the Drawings.

G. Welding materials: AWS D1.1; type required for materials being welded.

H. Primer: FS TT-P-31, for shop application and field touchup.

I. Touch-up primer for galvanized surfaces: FS TT-P-641 or FS TT-P-645.

J. Floor plate: ASTM A569 or A36; carbon steel with raised lug pattern.

K. Railings: handrail to be fabricated of 1-1/2 inch diameter, Schedule 40 pipe conforming to ASTM A53 or as shown on the Drawings.

L. Dissimilar materials: Where dissimilar metals are in contact, or where aluminum is in contact with concrete or masonry, the surface shall be protected with a coat of bituminous paint or asphalt varnish.

2.02 FABRICATION

Fabrication shall be in accordance with the applicable provisions of the AISC Manual of Steel Construction.

2.03 FINISH

Prepare structural component surfaces in accordance with SSPC.

PART 3 EXECUTION

3.01 ERECTION

Erection of structural steel shall be in accordance with the applicable provisions of the AISC Manual of Steel Construction.

END OF SECTION

SECTION 05300

METAL DECKING

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Metal Decking as indicated on the Drawings.

1.02 RELATED WORK

A. Section 05120 - Structural Steel and Miscellaneous Metal

B. Section 03300 - Cast-in-Place Concrete

C. Section 07200 - Insulation

PART 2 PRODUCTS

2.01 MATERIALS

A. Decking shall be manufactured from steel conforming to ASTM A 611, minimum yield strength 36 ksi.

B. Prime Painted: Prior to painting, the basic steel shall be chemically cleaned and pre-treated. Following the pre-treatment, the steel shall be roller coat painted to insure an even protective coating with a flexible oven cured primer.

C. Decking gages, corrugation and all accessories shall be as indicated on the Drawings.

D. Accessories:

1. Common Bolts and Nuts: ASTM A 307.

2. Welding Electrodes: AWS D1.1

3. Zinc Coating: ASTM A 123 for steel and ASTM A 153 for threaded products.

E. All materials and accessories for decking assembly shall be of the type, grade, class, and gage indicated on the drawings.

PART 3 EXECUTION

3.01 DECK INSTALLATION

A. Erect decking in accordance with the approved erection drawings.

B. Connections; Provide bolts, sheet metal screws and welded connections to structural steel framing and build them into the connecting work.

C. Roof decking and siding shall be identical corrugation and shall have sufficient strength to with stand all imposed loads as indicated on the approved Drawings.

D. Floor decking, composite or non-composite, shall be installed with complete accessories and shall have sufficient strength to withstand all imposed loads as indicated on the approved Drawings.

E. Bolts, sheet metal screws, and self tapping screws shall be installed and equipped with neoprene washers to form a completely weather tight installation.

3.02 TESTS AND INSPECTIONS

When inspection or testing indicates defects in a weld or other joint, the connection shall be repaired by a qualified installer.

END OF SECTION

SECTION 06100

ROUGH CARPENTRY

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install, complete all rough carpentry as indicated on the Drawings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Lumber:

1. Dimensions: Actual dimensions of lumber shall conform to industry standards.

2. Moisture Content: Unseasoned or 19 percent maximum at time of permanent closing in building or structure.

3. Surfacing: Surface four sides (S4S).

4 Miscellaneous Lumber:

a. Light Framing:

1) For general utility purposes: Economy grade.

2) For blocking and grounds: Economy grade.

B. Preservative Treated Wood Products: Oil-borne preservatives.

C. Rough Hardware:

1. Bolts

2. Nuts

3. Expansion Shields

4. Lag Screws and Bolts

5. Toggle bolts

6. Nails and Staples

7. Bar and Strap Anchors

PART 3 EXECUTION

3.01 INSTALLATION

A. Miscellaneous Framing: Where necessary and as indicated on the Drawings.

B. Pressure-treated Wood Products: Provide pressure-treated wood for all framing, blocking, furring, nailing strips built into masonry walls, and wood in contact with concrete.

END OF SECTION

SECTION 06200

FINISH CARPENTRY

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install complete all Finish Carpentry as indicated on the Drawings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Lumber:

1. Seating Benches: Hardwood species, preservative-treated.

2. Shelving: Fir plywood or particle board for paint finish.

3. Vanities:

a. Solid Wood Members: Birch.

b. Concealed plywood for top: Fir plywood or particle board with water-resistant glue.

c. Plastic Laminate: 1/16 inch.

1) General purpose grade - 10.

2) Finish: TBD.

3) Color and Pattern: As selected.

2.02 FABRICATION

Insofar as practicable, assemble all items under shop conditions.

PART 3 EXECUTION

3.01 INSTALLATION

A. Priming and Finish: Coordinate with Section 09900.

B. Workmanship:

1. Install wood finish straight, plumb, level, in proper alignment, and closely fitted.

2. Securely attach woodwork items to subframes, blocking, or suitably prepared solid surfaces. Do not use wood plugs.

3. Form joints to minimize shrinkage and warpage. Dress to hairline finish.

4 Secure with fine finish nails; set for putty stopping.

END OF SECTION

SECTION 07111

SUMP LINERS

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work under Section includes furnishing all materials, tools, equipment, and labor necessary for the installation of a watertight thermoplastic lining at the bottom of the main sump area as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15161 - Waste Water Pumps, Sump

B. Section 15162 - Waste Water Pumps, Diaphragm

C. Section 15163 - Waste Water Pumps, Submersible

PART 2 PRODUCTS

2.01 MATERIALS

A. Panels: The lining system for each sump shall be of an impermeable material (polyethylene liner or equal), conforming to ASTM D 1248 and D 2103. Panels shall be pre-formed to facilitate handling and to create exact fit as a form liner to the concrete forms for the sump.

Panels shall be 5 mm thick and manufactured with anchor studs thermal welded to one side of the panel(s) on a regular gridded pattern.

B. Accessories: Seam flashing and/or panel connection assemblies, penetrations and other integral system items shall be of the manufacturer's recommended material and configurations.

C. Special Equipment: Thermal welding guns shall be of the type approved by the lining system manufacturer for use in the project installation procedure.

D. Specialty Items: The Contractor shall procure and arrange for delivery of seam flashings and/or panel connection assemblies, thermal welding guns and other integral system items.

PART 3 EXECUTION

3.01 INSTALLATION

System Installation: Installation of the lining system shall be in conformance with the manufacturer's recommendations.

END OF SECTION

SECTION 07200

INSULATION

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Insulation products as indicted on the Drawings.

1.02 RELATED WORK

A. Section 02220 - Excavation, Trenching, and Backfilling

B. Section 07620 - Sheet Metal Flashing and Trim

C. Section 07900 - Caulking and Joint Sealants

D. Section 09260 - Gypsum Board Systems

E. Section 09511 - Suspended Ceiling Systems

F. Section 13120 - Pre-Engineered Structures

G. Section 15410 - Plumbing Piping

H. Section 16050 - General Requirements, Electrical

PART 2 PRODUCTS

2.01 MATERIALS

A. Mineral Fiber Insulation Board: Fed. Spec. HH-I-526.

B. Blanket/Batt Insulation: Inorganic, non-asbestos, mineral fiber, or glass fiber formed with binders into resilient blankets or batts, semi-rigid type.

1. Paper-faced Units: Provide one face with 0.5 perm-rated paper facing.

2. Foil-faced Units: Provide one face 0.5 per-rated reflective aluminum foil facing.

3. Fire-resistant Units: Used in an assembly for fire endurance.

C. Protection Board for Foundation Perimeter Insulation: Premolded, semi-rigid, asphalt and fiber composition board, 1/8 inch thick over rigid fiberglass.

D. Polyisocyanurate Board Insulation: Complying with Fed. Spec. HH-I-1972/1, 20 psi, R value of 8.33 per inch; installed with foil faced to room interior.

PART 3 EXECUTION

3.01 APPLICATION

A. Protection Board: Install protection board before backfilling or placing structural concrete against insulation.

B. Insulation Placement: Support building insulation units by means of adhesive anchorage or mechanical fasteners to ensure permanent placement tight to joints without sag or displacement.

C. Taped Joints: Seal joints on inside face of insulating units with vapor-barrier facing using self-adhesive tape..

D. Insulation Closure: Batt and blanket insulation shall be installed in all spaces between girts and studs.

E. Sound Batting:

1. Sound insulation batts shall be installed within the interior walls from floor to 12 inches above ceiling.

2. Sound insulation batts shall be installed over entire ceiling.

END OF SECTION

SECTION 07900

CAULKING AND JOINT SEALANTS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to apply and install Caulking and Joint Sealants as indicated on the Drawings.

1.02 RELATED WORK

A. Section 08100 - Hollow Metal Doors and Frames

B. Section 08500 - Metal Windows

C. Section 08800 - Glass and Glazing

D. Section 09511 - Suspended Ceiling Systems

E. Section 13120 - Pre-Engineered Structures

PART 2 PRODUCTS

2.01 SEALANTS

A. Materials shall conform to the applicable requirements of intended use.

1. Each container delivered to the project site shall be marked by the manufacturer sufficiently to indicate the intended use.

2. The selected color shall be one of the manufacturer's standard colors.

B. Oil Based: Fed. Spec. TT-C-00598, Type I, single component.

C. Acrylic Emulsion Latex: ASTM C834, single component.

D. Acrylic Sealant: Fed. Spec. TT-S-00230, Type II, Class A; one component, elastomeric compound.

E. Butyl Sealant: Fed. Spec. TT-S-001657, Type I.

F. Polysulphide Sealant: Fed. Spec. TT-S-00227, Type I, self-leveling, Class A, two-component elastomeric compound.

G. Polyurethane Sealant: Fed. Spec. TT-S-00230, Type II, non-sag, Class A; one-component elastomeric compound.

H. Silicone Sealant: Fed. Spec. TT-S-001543, Class A, low modulus; one-component non-sag.

I. Fire Stop Sealant: one part silicone elastomer or silicone RTV foam.

2.02 ACCESSORIES

A. Primer: nonstaining, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: noncorrosive and nonstaining, recommended by sealant manufacturer for compatibility with joint--forming materials.

C. Joint Backing Material: resilient urethane or polyvinyl chloride foam, closed-cell polyethylene foam, closed-cell vinyl or rubber sponge, polychloroprene tubes or beads, polyisobutylene extrusions, or oil-less dry jute or rope yarn.

D. Bond Breaker: pressure-sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install sealant in accordance with manufacturer's instructions.

B. Measure joint dimensions and size materials to achieve width-to-depth ratios required.

C. Install joint backing to achieve a neck dimension no greater than 1/3 the joint width.

END OF SECTION

SECTION 08100

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install metal doors and frames as indicated on the Drawings.

1.02 RELATED WORK

A. Section 08200 - Wood and Plastic Doors

B. Section 08300 - Special Doors

C. Section 08700 - Builder's Hardware

D. Section 08800 - Glass and Glazing

E. Section 09260 - Gypsum Board Systems

F. Section 09900 - Painting

G. Section 13120 - Pre-engineered Structures

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Ceco Door Division

B. Steelcraft

C. Bilt-Rite Steel Door Corp.

2.02 DOORS AND FRAMES

A. Hollow Metal Frames: Fabricate from cold-rolled or galvanized steel.

1. 16 gage for exterior and interior frames.

2. Reinforced for hardware.

3. Types:

a. Flush Frame.

b. Knock-down Frame.

B. Hollow Metal Doors: Fabricate from cold-rolled or galvanized steel.

1. 16 gage for 1-3/4 inch exterior doors.

2. 20 gage for 1-3/8 inch interior doors.

3. Vertical steel stiffeners and reinforced for hardware.

4. Sound deadened.

2.03 ACCESSORIES

A. Louvers: Roll-formed steel material, prepainted.

B. Rubber Silencers:

C: Glazing Stops: Rolled-steel channel shape.

2.04 PROTECTIVE COATINGS

Primer: Baked on rust-inhibiting primer.

2.05 FABRICATION

A. Fabricate frames as welded units or knocked down field assembly types.

B. Fabricate frames and doors with hardware reinforcement plates welded in place.

PART 3 EXECUTION

3.01 INSTALLATION

A. Coordinate with Pre-engineered Structures Contractor.

B. Coordinate with gypsum board wall construction for anchor placement.

C. Coordinate installation of glass and glazing.

END OF SECTION

SECTION 08200

WOOD AND PLASTIC DOORS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Wood and Plastic Doors as indicated on the Drawings.

1.02 RELATED WORK

A. Section 08100 - Hollow Metal Doors and Frames

B. Section 08700 - Builder's Hardware

C. Section 08800 - Glass and Glazing

D. Section 09900 - Painting

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Fenestra Corporation

B. Glenmar Door Manufacturing Co.

C. Weyerhaeuser

2.02 MATERIALS

A. Interior Doors:

1. Particle-board solid core, flush, pre-finished oak veneer facing.

2. Alternate: Plastic laminate covered panels, light oak finish.

B. Fire Rating: 20 minute and 1 hour, as required and noted in the Door Schedule.

C. STC Rating: TBD

PART 3 EXECUTION

3.01 INSTALLATION

A. Coordinate with steel frame manufacturer.

B. Coordinate with builder's hardware supplier.

C. Coordinate installation of glass and glazing.

END OF SECTION

SECTION 08300

SPECIAL DOORS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes Coiling, Airlock, and Access Doors necessary to install Special Doors as indicated on the Drawings.

1.02 RELATED WORK

A. Section 05120 - Structural Steel and Miscellaneous Metal

B. Section 05400 - Cold Formed Metal Framing (TBD)

C. Section 06200 - Finish Carpentry

D. Section 07900 - Caulking and Joint Sealants

E. Section 08700 - Builder's Hardware

F. Section 09900 - Painting

G. Section 13120 - Pre-engineered Structures

H. Section 16050 - Basic Electrical Requirements

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Overhead coiling doors:

1. Cookson Company
2. Kinnear
3. Overhead Door Corp.

B. Access Doors

1. Milcor
2. bilco
3. J. L. Industries

2.02 MATERIALS AND FABRICATION

A. Sheet steel: ASTM A446, Grade A or ASTM A526; with a minimum yield strength of 33,000 (psi) and galvanized in accordance with ASTM A525; prime painted.

B. Inside mounted lock, adjustable keeper, spring-activated latch bar, interior and exterior handle, lock keyed.

C. Continuous rubber, neoprene, or flexible-vinyl adjustable weatherstrip gasket at tops and compressible astragal on the bottoms of each door.

D. Overhead coiling doors:

1. Curtain of interlocking slats designed to withstand required wind loading.

a. Malleable iron casting endlocks, galvanized, secured to curtain slats with galvanized rivets.

b. Malleable iron casting windlocks secured to curtain slats with galvanized rivets.

c. Bottom bar two steel angles, 1-1/2 inches X 1-1/2 inches x 1/8 inch thick, galvanized.

3. Hardware: See Section 08700.

4. Insulate inner core of steel sections.

B. Access Doors: Fabricate frames and flanges of 16 gage steel and door panels of 20 gage steel; pan insulated with noncombustible filler.

2.03 ELECTRIC OPERATORS

A. Electric door operator assemblies of size and capacity recommended and provided by door manufacturer.

1. Complete with electric motor and factory-prewired motor controls, gear reduction unit, solenoid operated brake, clutch, remote control stations, and control devices.

2. Provide 460 V, 3HP, high-starting torque, reversible electric motor with overload protection.

3. Provide 3-button control station with push-button controls labeled "open", "close" and "stop".

B. Provide hand-operated disconnect or mechanism for emergency manual operation.

2.04 FINISHES

Pretreat zinc-coated steel with zinc-phosphate conversion coating.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install overhead doors with electric operators and controls in accordance with manufacturer's instructions.

B. Install door, track, and operating equipment complete with necessary hardware, jamb and head mold stops, anchors, inserts, hangers, and equipment supports in accordance with the project drawings, and manufacturers' instructions.

3.04 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Variation from plumb: 1/16 inch maximum.

C. Variation from level: 1/16 inch maximum.

D. Longitudinal or diagonal warp: ± 1/8 inch from 10 foot long straight edge.

END OF SECTION

SECTION 08500

METAL WINDOWS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing materials, tools, equipment, and labor necessary to fabricate and install Metal Windows as indicated on the Drawings.

1.02 RELATED WORK

A. Section 08500 - Miscellaneous Metals and Metal Fabrications

B. Section 08800 - Glass and Glazing

C. Section 09900 - Painting

D. Section 13120 - Pre-engineered Structures

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Steel Windows:

1. A & S Window Associates
2. Bliss Cashier Metal Products, Inc.
3. De Vac

B. Aluminum Windows:

1. Disco Aluminum Products Co.
2. EFCO Corp.
3. REBCO, Inc.
4. Win Vent, Inc.

2.02 ALUMINUM WINDOWS

A. Extruded aluminum sections, including frames and trim moldings, shall be extruded of 6063-T5 aluminum alloy with a minimum wall thickness of 0.125 inch.

B. Anchors, Clips, and Window Accessories: Aluminum, non-magnetic stainless steel, or hot dipped zinc-coated steel complying with ASTM A 386.

C. Sealant: Type recommended by window manufacturer.

D. Screening: 14/18 mesh, aluminum strands.

E. Weatherstripping: Flexible neoprene type.

2.03 HOLLOW METAL WINDOWS

A. Frames shall be fabricated from cold-rolled or galvanized 16 gage steel in shapes indicated on the Drawings.

B. Fixed Lite Windows: Fixed lite window frames to be provided with 3/4 by 3/4 inch glazing stops.

2.04 STEEL WINDOWS

A. Steel windows shall be ASTM A 36 steel, hot-rolled to form the sash section, with slot for fitting weatherstripping integral with sash section.

B. Steel windows shall conform to Steel Window Institute (SWI) "Recommended Specifications for Steel Windows (1977)".

C. Fixed Lite Windows: Fixed lite window frames to be provided with 3/4 by 3/4 inch glazing stops.

D. Painting shall match door frames for finished materials.

2.05 FABRICATION

A. Fabricate framing, mullions, and sash members with reinforced corners and joints.

B. Form glass stops, exterior sills, closure trim, and weatherstops of same material.

2.06 PREFINISHING

Window frames to be prime-painted or baked enamel finish, as scheduled.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install window in accordance with manufacturer's instructions.

B. Maintain alignment with adjacent work.

3.02 TOLERANCES

A. Variation from plumb and level: 1/8 inch maximum.

B. Variation from longitudinal or diagonal warp: 1/8 inch maximum.

END OF SECTION

SECTION 08700

BUILDER'S HARDWARE

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes the furnishing and installation of all Builder's Hardware as indicated on the Drawings and specified in the following Schedules.

1.02 RELATED WORK

A. Section 08100 - Hollow Metal Doors and Frames

B. Section 13121 - Pre-Engineered Buildings

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURER'S

A. Best Locks

B. Sargent

C. Schlage Lock

2.02 FINISHES

Finishes shall conform to those identified under BHMA 1301, Class A, for mill finish aluminum/stainless steel/cast aluminum, matching materials.

2.03 FASTENINGS

Fastenings of proper type, size, quantity, and finish shall be supplied with each article of hardware.

2.04 HARDWARE FOR FIRE DOORS

Hardware for fire doors shall conform to the requirements of NFPA 80 and NFPA 101. All hardware for fire doors shall be UL listed/FM approved for the fire rating required.

2.05 LOCKS AND LATCHES

A. To the maximum extent possible, locksets, latchsets, and deadlocks shall be the products of a single manufacturer.

B. Cylinder locks: cylinders shall have six pins with paracentric keyways. Cylinders and the locks in which they are used shall be Best locks and shall have removable cores.

2.06 EXIT DEVICES AND ACCESSORIES

Exit devices and accessories shall conform to ANSI A156.3.

2.07 KEYING

Key cylinder locks in sets or subsets as scheduled.

2.08 HARDWARE SETS

Provide hardware at each door to conform to the schedule indicated.

2.09 HINGES AND BUTTS

A. Hinges shall conform to ANSI A156.1. Hinges used on metal doors and frames shall also conform to ANSI A156.7.

B. Firedoor hinges shall be in accordance with NFPA 80, NFPA 80A, and NFPA 101.

2.10 DOOR CLOSING DEVICES

Door closing devices shall conform to ANSI A156.4.

2.11 MISCELLANEOUS

Metal thresholds

PART 3 EXECUTION

3.02 TEMPLATES

Templates or other information shall be furnished to enable the door-frame manufacturer to provide for the specified hardware.

3.03 PACKING, MARKING, AND LABELING

Hardware shall be delivered to the project in the manufacturers' original packages.

3.04 APPLICATION

A. Hardware shall be located on doors in accordance with DHI LOCN.

B. Hardware for labeled fire doors shall be installed in accordance with the requirements of NFPA Nos. 80 and 101.

C. Door-closing devices shall be installed and adjusted in accordance with the templated and printed instruction supplied by the manufacturer of the devices.

END OF SECTION

SECTION 08800

GLASS AND GLAZING

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Glass and Glazing as indicated on the Drawings.

1.02 RELATED WORK

A. Section 07900 - Caulking and Joint Sealants

B. Section 08100 - Metal Doors and Frames

C. Section 08200 - Wood and Plastic Doors

D. Section 08500 - Windows

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. American Flat Glass

B. Pittsburgh Plate Glass Industries, Inc.

C. Libbey-Owens-Ford Co.

2.02 MATERIALS

A. Glass shall be of the following types, qualities, and thicknesses.

B. Wire glass: 1/4 inch wire glass.

C. Tempered, laminated, 3/16 inch, polished both surfaces.

D. Laminated safety glass: 1/4 inch thick laminate, 2 sheets of clear float glass with a 30 mil film of polyvinyl butyral.

E. Insulating glass, 1 inch thickness of hermetically sealed 2 sheets of glass as follows:

1. Exterior glass, 1/4 inch laminated, color bronze.

2. Interior glass, 9/32 inch laminated.

F. Accessories: as required to provide a complete installation.

1. Provide non-corroding metal accessories.

2. Provide primer sealers and cleaners as recommended by the glass and sealant manufacturers.

G. Setting materials: provide setting materials of the types required for the applicable setting method.

PART 3 EXECUTION

3.01 GENERAL

A. Verify the sizes of glass shown on the Drawings.

1. Measure the actual unit to receive the glass.

2. Each piece of glass shall bear the manufacturer's label to identify its type, thickness, and quality.

3.02 GLASS SETTING

A. Items to be glazed shall be either shop or field glazed using glass of the quality and thickness specified or indicated.

END OF SECTION

SECTION 09260

GYPSUM BOARD SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor necessary to erect and finish light gage metal stud and gypsum board assemblies, as indicated on the Drawings.

1.02 RELATED WORK

A. Section 07200 - Insulation.

B. Section 08100 - Metal Doors and Frames.

C. Section 08500 - Metal Windows.

D. Section 09900 - Painting.

E. Section 13120 - Pre-engineered Structures.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Gold Bond.

B. Georgia Pacific.

C. Dietrich Industries, Inc.

D. Dale/Incor Industries.

2.02 MATERIALS

A. Framing Members: Framing members shall be formed from light gage steel sheets, minimum 25 gage, galvanized or coated with manufacturer's standard protective coating.

1. Studs shall be "C" shaped, 6 inches, 3-5/8 inches, 2-1/2 inches, or 1-1/2 inches wide as indicated on the Drawings.

2. Ceiling and floor runner channels shall be not less than 25 gage thickness with 1-1/4 inch flanges. The channel web shall be sized to nest with comparable steel studs.

B. Gypsum wallboard shall conform to FS SS-L-30D.

1. Regular gypsum wallboard shall be Type III, Grade R, Class 1, Form a, Style 3, taper edged, 5/8 inch thick.

2. Fire retardant wallboard shall be Type III, Grade X, Class 1, Form a, Style 3, 1/2 or 5/8 inch thick as indicated on the Drawings.

3. Aluminum foil backed wall board shall be Type III, Grade R or X, Class 1, Form c, Style 3.

4. Moisture resistant wallboard shall be Type II, Grade W, Class 2, Form a, Style 2.

C. Metal trim features for wallboard shall be formed from zinc coated steel not lighter than 26 gage. Casing beads shall be channel shaped and corner beads angle shaped.

D. Fasteners: Screws for wall board attachment shall be shouldered, flathead design with self-tapping threads and self-drilling points, for use with power driven tools.

E. Reinforcing tape shall be that recommended by the manufacturer of the wallboard.

PART 3 EXECUTION

3.01 INSTALLATION

A. Framing System

1. Non-load-bearing walls and partitions shall be framed with studs and runners in thicknesses indicated on the Drawings.

2. Studs shall be spaced not more than 16 inches on centers.

3. Floor and ceiling runners shall be accurately aligned and securely attached to floors and to the overhead structure.

B. Gypsum Wallboard

1. Begin application only after the structure is completely weathertight.

2. Stagger the boards so that the corners of any four boards will not meet at a common point except in vertical corners.

3. Where specific UL tested assemblies are called out for fire rated assemblies, the gypsum board shall be installed as described in the UL test.

3.02 ATTACHMENT

A. General: Screw attachment shall proceed from central portion of wallboard toward ends and edges.

B. Screw method shall be used for wallboard attachment to steel furring and framing.

C. Double Fastening Method

1. Use only for 2 hour rated application.

2. Make end joints over supporting members.

3.03 JOINT AND FASTENER CONCEALMENT

A. Areas shall be heated to not less than 55° F. for 24 hours prior to commencing treatment.

B. Embedding compound shall be applied to wallboard joints and fastener heads in a thin, uniform layer.
1. Reinforcing tape shall be centered on the joint and embedded in the compound.

2. A second coat of embedding compound shall be applied.

3. Treated areas shall be sanded to eliminate ridges and high points.

C. Finishing Compound

1. A coat of finishing compound shall be applied to joints and fastener heads.

2. Treated areas shall be sanded as necessary to obtain uniformly smooth surfaces.

D. Wall Finish

3.04 CORNER TREATMENT

A. Internal corners shall be treated as specified for joints.

B. External Corners shall have a corner bead.

END OF SECTION

SECTION 09310

CERAMIC TILE

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor necessary to install ceramic tile as indicated on the Drawings.

1.02 RELATED WORK

A. Section 03300 - Cast-in-place Concrete

B. Section 09260 - Gypsum Board Systems

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Tile:

1. American Olean
2. Dal-Tile
3. Monarch

B. Adhesive:

1. American Olean
2. Bonsal
3. Hydroment

C. Mortar and Grout:

1. American Olean
2. Bonsal
3. Hydroment

2.02 MATERIALS

A. Tile

1. Ceramic floor and wall tile shall comply with the requirements TCA/ANSI A137.1 as follows:

   a. Size: 4-1/4 inches X 4-1/4 inches X 5/16 inches.

   b. Edge: Cushioned.

   c. Surface Finish: Unglazed or matte glazed.

   d. Color; As selected.

2. Base: Match floor tile for surface finish, and color; tile length 4-1/2 or 6 inches long by 4-1/4 inches high; and straight top edge.

B. Adhesive: Epoxy, conforming to TCA/ANSI A118.3; thinset bond type.

C. Mortar: Conforming to TCA/ANSI A118.3.

D. Grout: Epoxy, chemical resistant, color to be selected.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify that surfaces are ready to receive ceramic tile.

B. Protect surrounding work from damage and disfiguration.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness.

3.02 INSTALLATION

A. Install adhesive, tile, and grout in accordance with manufacturer's instructions and TCA/ANSI A108.

1. Do not install adhesives in a closed, unventilated environment.

2. Maintain a minimum temperature of 50° F. during, and for 24 hours after, installation.

B. Lay tile in pattern indicated on approved shop drawings.

C. Applications:

1. Install in accordance with manufacturer's instructions.

2. Cut and fit tight to penetrations.

3. Form corners and bases neatly.

4. Align floor, base and wall joints.

D. Special shapes shall be provided as required. Bases or coves shall be solidly backed with mortar.

E. Place tile joint uniform in width.

F. Grout tile joints

3.03 CLEANING

Clean tile surfaces.

3.04 PROTECTION

Protect finished installation.

END OF SECTION

SECTION 09511

SUSPENDED CEILING SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor necessary to erect and install the suspended ceiling systems utilized, as indicated on the Drawings. This shall include acoustical tile panels and gypsum board systems.

1.02 RELATED WORK

A. Section 09260 - Gypsum Board Systems.

B. Section 15300 - Fire Sprinkler Systems.

C. Section 15936 - Air Outlets and Inlets.

D. Section 16500 - Lighting Fixtures.

1.03 SYSTEM DESCRIPTION

A. Lay-in Panel System shall include metal suspension systems for acoustical tile and lay-in ceiling panels.

B. Gypsum Board System shall include steel suspension components for securing the gypsum board ceiling system.

C. Suspension systems, adhesives, and other materials used in the work shall be the standard products of recognized manufacturers and as indicated on the drawings.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Lay-in Suspension System

1. Donn.

2. Chicago Metallic.

3. Armstrong.

B. Gypsum Board Suspension System:

United States Gypsum Company (USG).

C. Acoustical Units

1. Armstrong: Fire Guard.

2. Conwed: Natural Fissured II.

3. United States Gypsum Company (USG): Firecode.

2.02 MATERIALS

A. Suspension Systems (Lay-in)

1. Grid: ASTM C 635, intermediate duty, fire rated exposed tee; components die cut and interlocking, exposed surfaces prefinished.

2. Accessories: Stabilizer bars, clips, splices, edge moldings, hold-down clips and other accessories required for suspended grid system.

B. Suspension System (Gypsum Board)

1. Channels shall be formed steel sheets conforming to Fed. Spec. QQ-S-700D or QQ-S-775E, as applicable. Channels shall be galvanized or coated with manufacturer's standard protective coating.

2. Main runner channels shall be 1-1/2 inch hot or cold rolled steel.

a. Hot-rolled channels shall weigh not less than 1.12 pounds per linear foot.

b. Cold-rolled channels shall be not less than 16 gage with flanges at least 19/32 inch wide.

3. Hangers supporting main runner channels shall be soft steel wire, 8 gage, zinc coated.

C. Acoustical Units

Acoustical panels shall be 24 by 48 inches by 5/8 inch thick.

D. Gypsum Board: As indicated on the drawings and specified in Section 09260.

PART 3 EXECUTION

3.01 INSTALLATION

A. Do not install ceilings until building is enclosed and sufficiently heated.

B. Install system in accordance with industry standards.

C. Install fire rated system in accordance with UL approved assemblies.

D. Hang system independent of walls, columns, ducts, pipes, and conduits.

E. Install edge molding at the intersections of ceilings and vertical surfaces.

F. Fit acoustical units in place.

G. For fire rated ceiling assemblies, install hold-down clips to retain panels tight to grid system within 20 feet of an exterior door.

H. Gypsum board ceiling framing shall consist of 1-1/2 inch steel channels suspended from the structure using hanger wires or straps spaced not more than 4 feet on centers.

I. Channels shall be located within 6 inches of parallel walls and cut 1/2 inch short of abutting walls.

J. Interlock channels at splices:

1. Lap 12 inches at splices in 1-1/2 inch channels.

2. Lap 8 inches at splices in 3/4 inch channels.

3.02 TOLERANCES

Variation from flat and level surface shall not exceed 1/8 inch in 10 feet.

END OF SECTION

SECTION 09650

RESILIENT FLOORING

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing of all materials, tools, equipment, and labor necessary to install resilient flooring as indicated on the Drawings.

1.02 RELATED WORK

A. Section 03300 - Cast-in-place Concrete.

B. Section 09260 - Gypsum Wallboard Systems.

C. Section 10270 - Access Flooring.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Tile Flooring

1. Armstrong

2. Kentile

3. Azrock

B. Base Materials

1. Roppe

2. Burke Flooring Products

3. Johnsonite

2.02 MATERIALS

A. Tile Flooring

1. Vinyl-composition tile: 12 inches by 12 inches by 1/8 inch thick, plain or marbleized design.

2. Vinyl tile: 12 inches by 12 inches by 1/8 inch thick, plain or marbleized design.

B. Base Materials

1. General: Rubber or vinyl, 4 inches high, 1/8 inch thick, top set, coved.

2. Accessories: Premolded end stops and external corners.

2.03 ACCESSORIES

A. Subfloor filler: White premix latex, type recommended by flooring manufacturer.

B. Primers and Adhesives: Waterproof, types recommended by flooring manufacturer.

C. Edge strips: Flooring material.

PART 3 EXECUTION

3.01 SCHEDULING

Flooring shall be scheduled after all other work which would damage the finished surface of the flooring.

3.02 SURFACE CONDITIONS

Flooring shall be installed only on surfaces that are suitable and permit a proper installation.

3.03 INSTALLATION

A. Tile Flooring and wall base shall be installed in accordance with the instructions of the manufacturer.

1. Tile lines and joints shall be kept square, symmetrical, tight, and even.

2. Flooring shall be cut and fitted around all permanent fixtures, built-in furniture, and cabinet, pipes, and outlets.

3. Edges shall be cut, fitted, and scribed to walls and partitions.

4. Plastic strips shall be secured with adhesive.

B. Base Material

1. Fit joints tight and vertical.

2. Miter internal corners and use premolded units at external corners.

3. Install on solid backing.

END OF SECTION

SECTION 09686

CARPETING

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes the furnishing of all materials, tools, equipment, and labor necessary to install carpeting as indicated on the Drawings.

1.02 RELATED WORK

A. Section 03300 - Cast-in-place Concrete.

B. Section 07900 - Caulking and Joint Sealants.

C. Section 09260 - Gypsum Board Systems.

D. Section 09650 - Resilient Flooring.

E. Section 09900 - Painting.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Mohawk

B. Bigelow

C. Burlington Industries: Lee Commercial Carpet

2.02 MATERIALS

A. Carpeting

1. Carpet materials and treatments shall be non-toxic and free of recognized health hazards.

2. Carpet shall conform to the following:

a. Weave: Tufted or woven.

b. Surface texture: Level loop.

c. Gauge: 1/8 inch.

d. Pile height: 0.281 inches.

e. Face yarn: 20% nylon.

f. Face weight: 30 ounces per square yard.

g. Backing material: Primary backing shall be 3.5 ounces per square yard polypropylene; secondary backing shall be 6 ounces per square yard stainless jute or 3.5 ounces per square yard polypropylene.

2.03 ADHESIVES

A. Waterproof, nonflammable, carpet (latex release) adhesive system.

B. Seam adhesive tape shall be waterproof, nonflammable, and nonstaining.

PART 3 EXECUTION

3.01 PREPARATION
Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.

3.02 INSTALLATION

A. Carpet

1. Install in accordance with manufacturer's instructions.

2. Verify carpet match before cutting.

3. Join seams using hot adhesive tape. Form seams straight and fee of gaps.

4. Install one piece gripper edging strip where carpet terminates at other floor coverings and to vertical floor surfaces.

END OF SECTION

SECTION 09900

PAINTING

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work under this Section includes furnishing of all materials, tools, equipment, and labor necessary to paint materials and surfaces as indicated on the Drawings.

1.02 RELATED WORK

A. Section 05120 - Structural Steel and Miscellaneous Metal

B. Section 08100 - Metal Doors and Frames

C. Section 08700 - Builder's Hardware

D. Section 09260 - Gypsum Board Systems

E. Section 15190 - Mechanical Identification

F. Section 16195 - Electrical Identification

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURES

A. Paint:

1. Ameritone Paint Corporation

2. Dunn-Edwards Corporation

3. Sinclair Paint and Wall Covering, Inc.

B. Primer Sealers:

1. Ameritone Paint Corporation

2. Dunn-Edwards Corporation

3. Sherwin-Williams Company

2.02 MATERIALS

A. General: Materials shall conform to the requirements listed in ASTM and Fed. Spec. Standards.

B. Exterior Oil Paint:

1. White:

2. Light Tints:

3. Red or Brown:

4. Other Deep Colors:

C. Ferrous Metal Primer:

D. Fungicide:

2.03 HAZARDOUS MATERIALS RESTRICTION

A. Lead:

B. Mercury:

2.04 COLORS AND TINTS

Colors and tints shall match the respective color specimens.

PART 3 EXECUTION

3.01 PREPARATION

A. General:

1. Items not to be painted shall be removed or protected.

2. Surfaces to be painted shall be cleaned.

B. Concrete Surfaces: Concrete surface shall be treated with paint manufacturer's recommended conditioner.

C. Ferrous Surfaces:

1. Preparation: Ferrous surfaces shall be solvent cleaned.

2. Painting: One coat of zinc chromate primer.

D. Non-ferrous Surfaces: Non-ferrous surfaces shall be solvent cleaned and treated with vinyl wash coat.

E. Gypsum Board:

1. Fill all nail holes, joints, and surface defects. Sand smooth.

2. Apply texture coating specified.

F. Insulation: Fabric covering insulation shall be given a coat of sizing. Add fungicidal agent to the sizing.

3.02 MIXING AND THINNING

A. General: Paints of different manufacturers shall not be mixed.

B. Epoxy: Mix two component systems in accordance with manufacturer's instructions.

C. Vinyl Type Wash Coat:

3.03 APPLICATION

A. General:

1. Paint may be applied by brush, roller, or spray.

2. Surfaces shall be free from runs, ridges, waves, laps, brush marks, and variations in color, texture, and finish.

3. Adequate ventilation shall be provided during paint application.

4. Adjacent areas shall be protected.

3.04 PIPE IDENTIFICATION

A. Color Code Marking:

B. Identification Band Painting:

3.05 CLEANING

A. Upon completion of the work, staging, scaffolding, and containers shall be removed from the site.

B. Paint and other deposits on adjacent surfaces shall be removed.

3.06 PAINTING SCHEDULE

A. The Painting Schedule prescribes the surfaces to be painted, required surface preparation, and the number and types of coats of paint.

1. Gypsum Board:

2. Interior exposed ferrous surfaces:

3. Metal interior trim and doors:

4. Exterior ferrous metal surfaces:

5. Concrete Surfaces:

END OF SECTION

SECTION 10160

METAL TOILET COMPARTMENTS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing materials, tools, equipment, and labor necessary to install Metal Toilet Compartments as indicated on the Drawings.

1.02 RELATED WORK

A. Section 09260 - Gypsum Board System

B. Section 09310 - Ceramic Tile

C. Section 09900 - Painting

D. Section 10800 - Toilet Accessories

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Sonymetal

B. Global Steel Products

C. Ampco Products Inc.

2.02 MATERIALS

A. Toilet Compartment shall be floor mounted of the following components:

1. Panel and door faces: 20 gage.

2. Pilaster faces: 18 gage.

3. Reinforcement: 12 gage.

B. Head rails: hollow steel tube, 1 inch x 1 5/8 inch with cast-socket wall brackets

C. Attachments: heavy-duty, extruded aluminum brackets

D. Screws and bolts: stainless steel, tamperproof

E. Hardware:

1. Chromeplated nonferrous cast pivot hinges, gravity type, nylon bearings.

2. Thumb-turn door latches.

3. Cast-alloy chrome-plated coat hooks.

2.03 FABRICATION

A. Doors: 1 inch thick x 28 inches wide x 58 inches high; sheet-steel faces, pressure bonded to sound-deadening cores

B. Panels: 1 inch thick x 60 inches wide x 58 inches high; sheet-steel faces, pressure bonded to sound-deadening cores

C. Pilasters: 1-1/4 inch thick, constructed same as doors, sized to suit cubicle width and spacing

D. Pilaster shoes: formed stainless steel, conforming to ASTM A167, Type 304; number 4 finish

E. Urinal screens: wall-hung flush type; 1-1/4 inches thick x 18 inches wide x 42 inches high; zinc-coated steel faces.

F. Factory finishing

Painted one prime coat and two finish-coats of baked enamel

PART 3 EXECUTION

3.02 INSTALLATION

A. Install partitions and urinal screens secure, plumb, and level.

B. Conceal floor fastenings with pilaster shoes.

END OF SECTION

SECTION 10270

ACCESS FLOORING

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section covers the furnishing and installing of Access Flooring as indicated on the Drawings.

1.02 RELATED WORK

A. Section 09650 - Resilient Flooring

B. Section 16450 - Secondary Grounding

1.03 PERFORMANCE REQUIREMENTS

A. Pedestals: Support axial load of 5,000 pounds without permanent deformation; minimum ultimate strength shall be twice design load.

B. Floor panels shall be designed for the following criteria:

1. Live Load: 250 pounds per square foot.

2. Maximum Deflection:

a. 0.04 inch at design load.

b. 0.08 inch when concentrated load of 1,00 pounds is applied to one square inch anywhere on the panel.

3. Permanent Deformation: 0.02 inch maximum at design load.

C. Materials shall be tested according to ASTM E 84.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Donn Access Floor Systems

B. Floating Floors, Inc.

C. Tate Architectural Products, Inc.

2.02 MATERIALS

A. Support Components

1. Pedestals:

a. Steel or Aluminum.

b. Flat base plate.

. Threaded supporting rod and vibration-proof lock nut.

2. Stringers: Continuous steel channel, box, or tee sections.

B. Panel Components:

1. Floor Panels:

a. Die-formed galvanized steel top and bottom plates pressure bonded to cores.

b. Size: 24 by 24 inches.

c. Finish: Vinyl tile.

d. Perforated Panels: Same material, size, and construction as standard floor panels.

e. Dampers: Adjustable from top surface of panel.

C. Accessories

1. Electrostatic Grounding Connectors: Solid copper.

2. Cable Cutout Protection: Extruded polyvinyl chloride or neoprene edging, 3/8 inch thick, self-extinguishing.

3. Panel Lifting Devices: Manufacturer's standard design.

4. Gaskets: Preformed, closed cell sponge rubber.

5. Edge Trim: Extruded plastic channels.

2.03 FABRICATION

A. Finished Exposed Metal Surfaces: Baked-enamel.

B. Floor Panel Tolerances:

1. Width or length: $\pm$ 0.02 inch.

2. Flatness: ± 0.02 inch in any direction.

3. Squareness: ± 0.03 inch maximum difference between diagonal dimensions.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install components in accordance with manufacturer's instructions.

B. Secure pedestal base plates to subfloor.

C. Install stringers and floor panels securely on pedestals.

D. Install grilles and perforated panels as indicated on the Drawings.

E. Provide positive electrical grounding of entire floor assembly.

3.02 ADJUSTING

A. Adjust pedestals to level floor.

B. Assure adjacent floor-panel surfaces are flush.

C. Maximum out-of-level tolerance: 1/16 inch in 10 feet.

END OF SECTION

SECTION 10450

PEDESTRIAN CONTROL DEVICES

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Pedestrian Control Devices as indicated on the Drawings.

1.02 RELATED WORK

A. Section 05120 - Structural Steel and Miscellaneous Metal

B. Section 09650 - Resilient Flooring

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Alvarado Manufacturing Co. Inc.

B. Controlled Access Inc.

C. Perey Manufacturing Co.

D. Sentronic International

E. Tomsed Corporation

2.02 MATERIALS

Security Turnstile: Electrically operated interfaced with card reader, floor mounted housing, with 3 arm head.

PART 3 EXECUTION

3.01 INSTALLATION

Install Security Turnstile with electric card reader interface in accordance with manufacturer's instructions.

END OF SECTION

SECTION 10508

METAL LOCKERS AND OVERHEAD BASKETS

PART 1 GENERAL

1.01 WORK INCLUDED

The work specified in this Section includes the furnishing and installation of Metal Lockers and Overhead Baskets as indicated on the Drawings.

1.02 RELATED WORK

A. Section 09260 - Gypsum Board Systems

B. Section 09650 - Resilient Flooring

C. Section 09900 - Painting

D. Section 13120 - Pre-engineered Structures

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Art Metal Products, Inc.

B. List Industries

C. Lyon Metal Products

D. Republic Storage Systems Co.

E. The Moore Company, Inc.

2.02 MATERIALS

A. Lockers: 12 by 12 by 60 inches, single tier, ventilated type, set on concrete base.

B. Benches: 9-1/2 inches wide by 1-1/4 inches thick maple top on heavy duty steel pedestals.

C. Baskets: 14 by 14 by 6-1/4 inches deep, 12 gage steel wire basket, suspended from steel overhead rails and flexible hoisting cable.

PART 3 EXECUTION

3.01 INSTALLATION

Install according to Manufacturer's instructions.

END OF SECTION

SECTION 10605

WIRE MESH PARTITIONS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all material, tools, equipment, and labor necessary to install Wire Mesh Partitions as indicated on the Drawings.

1.02 RELATED WORK

A. Section 03300 - Cast-in-place Concrete

B. Section 05120 - Structural Steel and Miscellaneous Metal

C. Section 08700 - Builder's Hardware

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Acorn Iron and Metal Works

B. Kentucky Metal Products Company

C. Miller Wire Works

D. Standard Wire and Steel Works

2.02 MATERIALS

A. Mesh: 6 gage crimped-steel wire woven into 2 inch mesh, securely attached to frame members.

B. Frames:

1. Framing Members: 1/4 inch minimum thickness, cold-rolled steel.

2. Stiffening Bars: Flat bar stiffener posts between abutting panel frames.

3. Roof-mesh Beams: Connect to corner posts and support the dead load.

4. Floor Shoes: Cast iron.

5. Hardware and lock cylinders supplied by wire-mesh partition manufacturer.

C. Polyvinyl Chloride (PVC) Coated Wire Mesh and Frames:

1. Color as selected.

2. Class 2, bonded, PVC-coated wire primer thermally cured onto galvanized steel wire.

3. Posts and fittings coated to match the fabric.

PART 3 EXECUTION

3.01 INSTALLATION

Erect partitions plumb, level, properly aligned, fastened securely and rigidly in place.

END OF SECTION

SECTION 10800

TOILET ACCESSORIES

PART 1 GENERAL

1.01 WORK INCLUDED

Work specified in this Section includes the furnishing and installation of Toilet Accessories as indicated on the Drawings.

1.02 RELATED WORK

A. Section 09260 - Gypsum Board Systems

B. Section 09310 - Ceramic Tile

C. Section 10160 - Metal Toilet Partitions

1.03 KEYING

A. Supply 4 keys for each accessory.

B. Master key all accessories.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Bobrick Washroom Equipment Inc.

B. Bradley Corporation

C. Charles Parker Company

2.02 MATERIALS

A. Stainless Steel: 22 gage minimum, AISI 302/304, and polished #4 finish.

B. Brass: Leaded and unleaded, flat products Fed. Spec. QQ-B-613; rods, shapes, forgings, and flat products with finished edges, Fed. Spec. QQ-B-626.

C. Sheet Steel: 20 gage minimum; surface preparation and metal pretreatment required for applied finish.

D. Chromium Plating: Nickel and chromium electrodeposited on base metal.

E. Steel Mounting Devices: Galvanized

F. Plastic Laminate: General purpose fire-rated type, 0.125 inch thick; finish, color, and pattern to be selected.

G. Adhesive: Two-component epoxy type, waterproof.

H. Fasteners: Screws, Bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.

I. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer.

2.03 FABRICATION

A. Weld and grind smooth joints of fabricated components.

B. Form exposed surfaces from single sheet of stock.

2.04 FACTORY FINISHING

A. Galvanizing: 1.25 ounces per square yard.

B. Shop-primed Ferrous Metals: One coat primer and bake.

C. Enamel: One coat primer and a minimum of two coats baked enamel.

D. Chrome Plating: Type SC2 satin finish.

E. Stainless Steel: #4 satin finish.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessory units in accordance with manufacturer's instructions.

1. Use fasteners which are appropriate to substrate and recommended by the manufacturer of the unit.

2. Install units plumb and level.

B. Adjust accessories for proper operation and verify that mechanisms function smoothly.

END OF SECTION

SECTION 11210

WATER PUMPS

PART 1 GENERAL

1.01 WORK INCLUDED

The work covered in this Section includes furnishing all materials, tools, equipment, and labor for the installation of the horizontal split case booster pumps and motors as indicated on the Drawings.

1.02 RELATED WORK

A. Section 02665 - Water Distribution Systems

B. Section 13200 - Water Storage Tanks

PART 2 PRODUCTS

2.01 WATER PUMPS

A. Pump construction: Centrifugal water pumps shall be constructed in accordance with the Standards of the Hydraulic Institute, Centrifugal Pump Section.

B. Pump casings: Pump casings shall be cast iron. The casings shall be designed to permit replacement of wearing parts.

C. Impellers: Impellers shall be of enclosed design and shall be constructed of bronze, carefully finished with smooth water passageways, and shall be statically and dymanically balanced.

D. Wearing Rings: Wearing rings of bronze shall be provided for impellers. Wearing rings of a different composition or of a suitable ferrous material shall be provided for pump casings.

E. Shaft: Shaft shall be of high grade steel accurately machined and shall be of sufficient size and strength to perform the work required.

F. Stuffing Boxes: Stuffing boxes shall be water-sealed with renewable bushings and shall be designed to ensure a tight seal without excessive wear or friction on the shaft sleeve and to prevent air leakage into the pump under all conditions of operation.

G. Couplings: Couplings shall be of the heavy-duty flexible type, keyed and locked to the shaft.

H. Balance: All rotating parts of the equipment shall operate throughout the required range with out excessive end thrust, vibration, or noise.

I. Bearings: Bearings shall be ball or roller type, and the main bearings shall take all radial and end thrust.

J. Lubrication: Bearings on horizontal-shaft pumps shall be either oil-bath or grease type.

K. Base Plates: Horizontal-shaft centrifugal pumps shall be provided with a common base for shop mounting each pump and driving unit of the pump on the same base.

L. Cocks, Plugs, and Accessories: The pumps shall be equipped with air cocks, drain plugs, and duplex gauges indicating discharge pressures for all pumps and suction pressures for pumps without suction lift.

M. Piping Connections: The pump suction and discharge shall be provided with flanged connections of suitable size and suitably arranged for the piping shown.

N. Finish: Pumps shall have painted or enameled finish as is standard with the manufacturer (except that fire pumps shall be red in color, either No. 11105 or No. 11136 of Fed. Std. 595B).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the pumps in accordance with the drawings and manufacturer's printed instructions.

B. Field test units as follows:

1. Run pumps four hours minimum prior to test, water shall be used to fill the storage tanks.

2. Test duration - two hours. Water shall be used to fill storage tanks.

3. Record the following data at various flow rates:

   a. Motor voltage and current.

   B. Suction and discharge pressures.

END OF SECTION

SECTION 11514

ROTARY DRILL: ELECTRIC HYDRAULIC-POWERED TRACK-MOUNTED

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work under this Section includes furnishing all materials, tools, equipment, and labor to manufacture, transport, and deliver an Electric Hydraulic-Powered, Track-Mounted Rotary Drill.

1.02 SYSTEM DESCRIPTION

A. Performance Requirements:

1. Rotary speed - 0-125 rpm minimum.

2. Rotational torque - 3200 foot-pounds, at 40 rpm applied by a hydraulically powered top drive unit.

3. Hoisting and feed force (minimum) - 18,000 lbs.

4. Mast inclination - 90° from vertical (horizontal).

5. Capability to drill parallel holes through use of a "Tower Slide" mechanism.

6. Capability to drill up to 12 inch diameter cores or full holes to a minimum depth of 100 feet in any direction using either water or compressed air as the cooling and cuttings removal medium.

7. Capability for use without modification of DCDMA standard wire line coring systems sizes from AW through HW.

8. Operating in the normal mode in a space not greater than 16 feet wide by 20 feet long by 14 feet high.

9. Capability to cut overcores up to 12 inches in diameter.

10. Capability of being easily dismantled into components not exceeding 4'-6" x 6'6" x 12-0" and 8000 lbs. each.

11. Capability to collar and drill horizontal holes from not more than 30 inches above the bottom of the drill track base up to the designer capability of the machine.

B. Required Features:

1. Minimum of four (4) floor leveling jacks and four (4) tower stabilizing jacks (stingers).

2. 24 volt lighting package.

3. Remote control console package.

4. Rod centralizer system capable of use with A, B, N, H, and 12 inch O.D. rod.

5. Gauges: All gauge indications shall be in English Units.

   a. Hydraulic oil temperature gauge

   b. Hydraulic pressure at pump and rotary drive gauges

   c. Torque gauge

   d. Bit weight indicator gauge

   e. Ampere gauge

6. Precise feed pressure, feed rate, rotational speed, and torque application controls.

7. Hydraulically-powered track-mounted tramming system.

8. Electric motor-powered hydraulic system.

9. Full 360° tower rotation actuator.

10. Operational warning lights, signs, and labels.

11. Fire extinguisher.

1.03 SUBMITTALS

A. Drawings and Data: The manufacturer shall submit 10 copies of drawings and data as specified below:

1. General dimensional drawings of the track-mounted drill.

2. Performance characteristics, efficiency, horsepower, flow rate, cooling requirements and fluid capacity of the hydraulic system.

3. Sectional drawings showing typical details of construction and materials.

4. Recommended spare parts list for one (1) year based upon 3000 hours of operation.

5. Individual unit weight information.

6. Electrical system schematic drawings.

7. Motor power factor, efficiency and no load/full load currents at specified voltage.

8. Locked rotor current.

9. Motor heating curves.

10. Start-up and shut-down instructions.

11. Operating Maintenance, Manuals and parts manuals.

12. Manufacturer's data sheets for all Original Equipment Manufacturer (OEM) components purchased for inclusion in or on the drill.

13. Certified test results of manufacturer's operational tests.

14. Certified calibration records of gauges.

B. Guarantee: The guarantee shall cover performance, workmanship, compliance with applicable regulations and OEM items from suppliers other than the drill manufacturer.

1.04 IN-PLANT INSPECTION

A. In-Plant Inspection - Seven days before the scheduled shipment date, the Engineer will be notified. The Engineer may, at his discretion, conduct an in-plant inspection.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Only those manufacturers who have produced a minimum of ten (10) drills of the type and capability specified herein over a minimum period of two (2) years will be considered to be acceptable.

2.02 MATERIALS AND EQUIPMENT

A. General Requirements - This drill, as delivered from the manufacturer, shall be in compliance with all applicable sections of 30 CFR 57.

B. Hydraulic System

1. The hydraulic system shall be capable of using 140 32 hydraulic fluid.

2. All hydraulic fittings and hoses shall have a working pressure rating equal to or exceeding the hydraulic system working pressure.

C. Painting - The finish coat shall be gloss machinery enamel, yellow number 12246, per Fed Std #595A or equivalent.

D. Fire Extinguisher - The drill unit shall be equipped with a multipurpose dry-chemical fire extinguisher.

E. Electrical Motor - The motor shall be TEFC type close coupled 3 phase 230/460 volt, 60 hertz.

F. Electrical Controls - The electrical controls shall be in accordance with ICS2.

G. Steel Fabrication - Welding procedures, welding electrodes, and weld quality shall conform to the applicable provisions of AWS D1.1.

H. The drill mast, drive head, rod holder, and any other equipment interfacing with the drill string shall be capable of use with DCDMA recognized pipe, bit and thread design and sizes.

I. The top drive unit shall be designed in compliance with ANSI B15.1 safety standards for mechanical power transmission apparatus.

PART 3 EXECUTION

3.01 INSTALLATION/APPLICATION/ERECTION

A. The drill shall be delivered in an assembled condition ready for start-up.

3.02 FIELD ADJUSTMENT

A. The supplier shall provide an authorized field representative at the time of drill start-up, to inspect, adjust and advise for a period of not less than five working days.

END OF SECTION

SECTION 11910

TUNNEL BORING MACHINE

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all material, tools, equipment, and labor to design, manufacture, transport, and direct the field assembly of a Tunnel Boring Machine (TBM) and back-up system. The present thinking, at Title I design, is new TBM's will be procured for the Project; this will be revised if DOE changes the requirements.

1.02 RELATED WORK

A. Section 02310 - Tunnel Excavation (TBD)

B. Section 02340 - Tunnel Support Systems (TBD)

C. Section 11920 - Muck Conveyor System

1.03 SERVICE CONDITIONS

The TBM will be used to excavate an underground test facility classified as "non-gassy" in abrasive dust environment. Rock types will vary from welded tuffs to non-welded tuffs.

1.04 SUBMITTALS

Submit complete design drawings and specifications for the component parts for approval of the Engineer, prior to manufacture. Submittal shall include power and water requirements to operate the TBM.

1.05 TBM DESIGN REQUIREMENTS

A. Design TBM with cutter head, cutters, thrust, and torque necessary to bore tunnel full face on alignment and grade indicated.

B. Gripper System: Provide large gripper pads for adequate bearing capacity in jointed or soft rock which may be encountered.

C. Directional Control:

1. Design TBM and supporting equipment with capability to change direction as necessary (both vertically and horizontally) to maintain line and grade.

2. Equip TBM with guidance system to permit continuous control, monitoring, and setting of the alignment and grade.

D. Design TBM so that it can be totally removed from the mine, through the finished tunnel profile, upon completion of the boring.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. The Robbins Company

B. Boretec, Inc.

C. S. S. Tunneling, Inc.

D. Lovat Tunnel Equipment

2.02 MATERIALS

The TBM shall be new, designed and built for this Project. All the various components and systems which make up the TBM shall likewise be new.

2.03 SPARE PARTS

A. Provide with the TBM an inventory of spare parts as recommended by manufacturers of TBM and component sub-systems. Include the following as a minimum inventory.

1. Main bearing assembly and seals.

2. Drive motors.

3. Hydraulic cylinders, hoses, controls, and seals.

4. Bearings and seals for all motors and pumps.

5. Replacement cutters and hubs.

PART 3 EXECUTION

3.01 ASSEMBLY

Provide manufacturer's field engineering service to direct the on-site assembly of the TBM.

3.02 TBM OPERATION

A. Provide instruction and training for operating personnel.

B. Provide soft-start capability for the TBM, to avoid voltage fluctuations on the power network.

3.03 OPERATION MAINTENANCE

A. Provide Operation and Maintenance (O&M) Manuals for the TBM and each major component sub-system.

B. Provide maintenance and parts replacement services for the TBM and all component equipment.

END OF SECTION

SECTION 11920

MUCK CONVEYOR SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment and labor to design, fabricate and supply all conveyor components, belting and drives as indicated on the drawings.

1.02 RELATED WORK

A. Section 02210 - Site Grading

B. Section 02220 - Trenching, Excavation and Backfill

C. Section 02310 - Tunnel Excavation (TBD)

D. Section 05120 - Structural Steel and Miscellaneous Steel

E. Section 11910 - Tunnel Boring Machine

1.03 SERVICE CONDITIONS

The belt conveyors will be used to transport underground excavation rock to the surface. In a mine classified as "non-gassy" abrasive dust environment.

1.04 SUBMITTALS

Submit complete design drawings, design data, calculations and specifications for the conveyor system components and belting for approval of the engineer prior to manufacture.

1.05 CONVEYOR SYSTEM DESIGN CRITERIA

A. Belt conveyors and conveyor components shall be designed according to the following criteria.

1. Criteria as outlined in the publication, Belt Conveyors for Bulk Materials by the Conveyor Equipment Manufacturers Association (CEMA), latest edition.

2. Conveyors shall be designed for a design tonnage as shown on conveyor data sheet drawing.

3. Belt loading shall not extend beyond the CEMA Standard Edge Distance.

4. Selection of all components (belting, pulleys, shafts, etc.) shall be based on tensions as calculated using the motor nameplate horsepower.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Continental Conveyor & Equipment Co.

B. Long Air Dox Co.

C. Rexnord Corporation

2.02 MATERIALS

All the various components for the conveyor system designed and built for this project shall be new and shall conform with the criteria as outlined in belt conveyors for bulk materials as prepared by CEMA latest edition.

2.03 SPARE PARTS

A. Provide with the conveyor system an inventory of spare parts as recommended by the manufacturers. This includes:

1. Drive motors and speed reducers

2. Idlers and pulleys

3. Pully bearing assemblies and shafts

4. Couplings and backstops

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide manufacturer's field engineering service to direct the on-site installation of the conveyor system.

B. Manufacturer's representative shall be consulted regarding the sequence of erection, erection schedule requirements for skills and quantities of personnel, and interpretation of written manufacturer's instruction.

3.02 TESTS

Conveyor equipment and components shall be tested and demonstrated as required by each manufacturers representative to insure correct alignment and installation.

3.03 OPERATION MAINTENANCE

Provide operation and maintenance manuals for each of the major conveyor equipment and components.

END OF SECTION

SECTION 13120

PRE-ENGINEERED STRUCTURES

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor necessary to manufacture, transport, and erect a Pre-engineered Structure as indicated on the Drawings.

1.02 RELATED WORK

A. Section 01300 - Submittals (TBD)

B. Section 02210 - Site Grading

C. Section 02220 - Trenching, Excavation, and Backfill

D. Section 03300 - Cast-in-Place Concrete

E. Section 05120 - Structural Steel and Miscellaneous Metal

F. Section 07200 - Insulation

G. Section 07900 - Caulking and Joint Sealants

H. Section 08100 - Metal Doors and Frames

I. Section 08300 - Special Doors

J. Section 08500 - Windows

K. Section 09260 - Gypsum Board System

L. Section 09900 - Painting

1.03 DESIGN CRITERIA

A. The building components shall be designed to meet the most severe conditions produced by the following load combinations:

1. Building dead load plus live load (or snow).

2. Building dead load plus wing load.

3. Building dead load plus wind load plus one-half roof snow load.

4. Building dead load plus snow load plus one-half wind load.

B. The following criteria shall also be followed in the design of the standard building components.

1. Seismic loading for Zone 4, importance factor 1.

2. Live load on roof = 20 psf.

3. Wind load = 80 mph at 30'.

C. Provide the thermal resistance for roof and wall systems as indicated on the Drawings.

1.07 WARRANTY

Provide a 20 year manufacturer's warranty for exterior prefinished surfaces. Guarantee prefinished coat against chipping, cracking, crazing, blistering, peeling, chalking, or fading.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Butler Manufacturing Company.

B. Star Manufacturing Company.

C. Metalic-Braden Building Company.

2.02 FRAMING MATERIALS

A. Steel, 1/8 inch thick or more, shall conform to ASTM A 36.

B. End wall columns: Factory welded built-up I shapes or cold formed sections.

C. Wind Bracing: ASTM A 36 adjustable threaded steel rods.

D. Secondary framing: Girts, purlins, eave struts, end-wall beams, base channels, sill angles, endwall structural member (except columns and beams), purlin spacers, and flange and sag bracing shall be 16 gage minimum cold-formed galvanized steel.

E. Structural pipe columns shall conform to ASTM A 500 or ASTM A 501.

F. Shop connections: Conform to the AISC Spec. or the AISI Spec. applicable. Welding shall conform to AWS D1.1. Holes for bolts shall be made in the shop.

G. Bolts, nuts and washers: ASTM A 307, ASTM A 325, ASTM A 490, or in accordance with AISC Spec.

2.03 WALL AND ROOF SYSTEM MATERIALS

A. Sheet steel stock: ASTM A 446,Grade A, zinc-coated (galvanized). Sheets shall be not less than 24 gage for siding and 22 gage for roofing.

B. Wall and roof insulation shall be flexible glass-fiber blankets with a vapor barrier.

C. Joint seal gaskets shall be manufacturer's standard type.

D. Fasteners shall be manufacturer's standard type.

E. Sealant shall be manufacturer's standard type.

2.04 DOORS AND WINDOWS

Provide the types and sizes indicated on the drawings with all standard operating and locking hardware.

2.05 FRAMING FABRICATION

Fabricate members in accordance with AISC Spec. for plate, bar, tube, or rolled structural shapes.

2.06 WALL AND ROOF FABRICATION

A. Siding: Lapped with male and female edges and fitted with continuous gaskets.

B. Roofing: Lapped with standing seam roof-joint system.

C. Girts and Purlins: Roll-formed structural shapes, zinc coated.

D. Wall Louvers: Steel frame, with galvanized steel insect screens.

2.07 GUTTER AND DOWNSPOUT FABRICATION

Gutters, downspouts, and scuppers to be zinc coated steel, same finish a metal roofing.

2.08 ROOFING AND SIDING FINISHES

Interior and exterior surfaces to be precoated enamel, color selected from manufacturer's standard range.

PART 3 EXECUTION

3.01 FRAMING ERECTION

Erect framing in accordance with AISC Spec.

3.02 WALL AND ROOF SYSTEM INSTALLATION

Install in accordance with manufacturer's instructions.

3.03 INSTALLATION OF ACCESSORIES

Install door frames, doors, overhead doors, windows, glass, and louvers in accordance with manufacturer's instructions.

3.04 WATER TEST

test all exterior joints, laps, doors, and windows upon completion of the building.

END OF SECTION

SECTION 13200

WATER STORAGE TANKS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all material, tools, equipment and labor for the design, fabrication, erection, and painting of welded steel tanks for water storage, and the disinfection of potable water tanks as indicated on the Drawings.

1.02 RELATED WORK

A. Section 02230 - Aggregate Base Course

B. Section 02665 - Water Distribution Systems

C. Section 03300 - Cast-in-place Concrete

D. Section 11210 - Water Pumps

PART 2 PRODUCTS

2.01 TANK MATERIALS

Tank materials shall comply with the requirements of AWWA D100.

2.02 PAINT

Paint shall comply with the requirements of AWWA D102.

PART 3 EXECUTION

3.01 PAINTING

A. Interior and exterior surfaces of the tanks, including ladders, hatches, vents, pipes, plates, and all other fittings and brackets, shall be sandblasted and painted in accordance with the applicable requirements of AWWA D102.

B. Interior surfaces shall be painted with inside paint system No. 4. This is a four-coat, single-solution, vinyl paint system consisting of a vinyl paint prime coat and three coats of vinyl resin paint. The finish coat for the tank shall be white.

C. Exterior surfaces shall be painted with outside paint system No. 4. This is a four-coat alkyd system consisti of two prime coats of red-lead pigmented alkyd paint followed by two coats of alkyd paint. The finish color for the tank exterior is to be selected.

D. The underside of floor plates shall be painted with a rust-inhibitive primer. Priming of the bottoms of the floor can be accomplished prior to welding; however, car shall be exercised in handling and laying floor plates after priming to avoid damage to the prime coat.

3.02 FIELD QUALITY CONTROL

A. TESTING

1. Hydrostatic: Tank Fabricator shall provide a hydrostatic leak test on completion of the assembly and erection of the tanks in accordance with the requirements of NFPA 22.

2. Holiday testing: All painted surfaces shall be test with an approved electric holiday detector to locate any voids or pinholes in the coatings.

B. DISINFECTION

1. Submit disinfection methods to REECo Industrial Hygiene for approval.

2. After all tank construction, including painting and testing, has been completed, all interior surfaces, including roof and structural members, shall be flushed hosed down, and swept clean to remove all dirt, dust or other sources of possible contaminatio The potable water tank and connecting lines shall th be thoroughly disinfected with chlorine, in accordan with the requirements of AWWA C652, before being placed in operation.

3. Volatile Organic Chemicals (VOC's): Samples shall b taken after disinfection and tested for all regulate and unregulated VOC's in accordance with the requirements of the Safe Drinking Water Act (SDWA).

END OF SECTION

SECTION 13215

UNDERGROUND STORAGE TANKS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install the Underground Storage Tanks, including leak detection system and tank accessories, as indicated on the Drawings.

1.02 RELATED WORK

Section 15485 - Diesel Fuel Piping

1.04 SUBMITTALS

A. Submit shop drawings, manufacturer's catalog data and installation instructions.

B. Drawings shall include critical dimensions and show locations of all fittings and accessories such as manways, ladders, hold-down straps, etc.

PART 2 PRODUCTS

2.01 DOUBLE-WALL FIBER GLASS UNDERGROUND STORAGE TANKS

A. Tank shall meet the following external hydrostatic pressure criteria. Tank shall withstand general buckling with a 5:1 safety factor when buried in ground with 7 feet of overburden.

B. When installed according to manufacturer's installation instructions, tanks will withstand surface H-20 axle loads (32,000 lbs./axle).

C. Tanks shall meet the following internal load criteria. Primary tank and annular space shall withstand independent pressure test of 5 psi on tanks of 4 feet through 10 feet diameters with a 4:1 safety factor against local buckling.

D. Tanks shall be designed to support accessory equipment such as heating coils, ladders, drop tubes, etc. when installed according to manufacturer's recommendations and limitations.

E. All primary tanks must be vented. Tanks are designed for operation at atmospheric pressure only.

F. Tanks shall be capable of storing liquids with specific gravity up to 1.1.

G. Tanks shall be capable of storing gasoline, gasohol (90% gasoline and 10% ethanol mixture), Oxinol-50 (90.5% gasoline, 4.75% methanol, 4.75% GTBA), AV gas, jet fuel, motor oil, kerosene, diesel fuel or potable water at ambient underground temperatures, or fuel oil at temperatures not to exceed 150°F at the tank interior surface.

H. Tanks shall be chemically inert to petroleum products.

2.02 LEAK DETECTION SYSTEM

A. Tanks Monitoring Capabilities: Tanks shall have a space between the primary and secondary shell walls to allow for the free flow and containment of all leaked product from the primary tank. Tank shall be designed with access to the tank bottom between the primary and secondary walls (annular space).

B. Hydrostatic Tank Monitor: The double-wall tank monitor shall be capable of detecting a breach in the inner and/or outer tank.

2.03 TANK ACCESSORIES

A. Anchor Straps: Provide glass fiber-reinforced plastic anchor straps for each tank as indicated on the Drawings.

B. Flanged Manways: Manway shall be 22 inches in diameter.

C. Fill Tubes: Tubes shall be fiberglass-reinforced plastic. Tubes shall be factory installed, 4" diameter, and shall include a 6" steel fitting with a double tapped reducer bushing to 4" diameter.

D. Tank Lifting Lugs: Provide lifting lug(s) on all tanks.

E. Threaded Fittings: All threaded fittings on U.L. labeled tanks for storage of petroleum products shall be located in a manway lid or tank mounted within 12" of the tank top center line and be constructed consistent with the requirements of the U.L. label.

PART 3 EXECUTION

3.01 INSTALLATION

A. Tanks shall be tested and installed in accordance with the manufacturer's installation instructions.

B. All rigid internal piping shall be terminated at least 4 inches from the bottom of the tank.

C. See Section 15485 for diesel fuel piping information.

END OF SECTION

SECTION 14600

HOISTS AND CRANES

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to manufacture, deliver, install, and field test the Hoists and Cranes and associated supporting structures specified herein and indicated on the Drawings.

1.02 RELATED WORK

A. Section 05120 - Structural Steel and Miscellaneous Metal

B. Section 13120 - Pre-Engineered Structures

1.03 SERVICE CONDITIONS

The monorail/hoist and jib crane will be used for unloading and loading heavy objects at the shop/warehouse building.

PART 2 PRODUCTS

2.01 MONORAIL

A. Monorail trolley and hoist shall be the overhead traveling type, electrically operated. The monorails shall, as minimum, be in accordance with the requirements of ANSI B30.11 and shall be the manufacturer's standard commercial product.

B. Monorail Capacity: Monorail minimum capacity shall be 5 Tons.

C. Monorail Speeds:

1. Hoist: High speed, 10 ft/minute (fpm) and lift range as indicated on the Drawings.

2. Trolley: High speed of 35 fpm.

D. Design and fabrication of the trolley and the hoist shall be in accordance with HMI-100.

2.02 JIB CRANE

The jib crane shall have 180° swing, electrically operated, and be controlled by a pushbutton station.

2.03 COMPONENTS

Trolley brake, hook, wire rope, trolley controls, and hoist controls shall conform to the applicable mandatory and advisory safety requirements.

PART 3 EXECUTION

3.01 INSTALLATION

Install the monorail and jib cranes in accordance with the manufacturer's instructions and approved shop drawings.

3.02 OPERATIONAL INSPECTION AND TESTS

A. Upon completion, and before final acceptance, the Contractor shall perform operational tests and load tests in accordance with ANSI B30.11, except that test loads shall be in increments of 50, 100, and 125 percent of rated load. Rated speed with 100 percent test load shall be as specified.

B. The Contractor shall demonstrate proper operation of interlocks, limit switches, and safety devices and shall provide operating personnel, instruments, and all other necessary components. The Contractor shall submit certified reports of the test results.

END OF SECTION

SECTION 15140

SUPPORTS AND ANCHORS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install the mechanical Supports and Anchors as indicated on the Drawings.

1.02 RELATED WORK

A. Section 03300 - Cast-in-Place Concrete

B. Section 15242 - Vibration Isolation

C. Section 15260 - Piping Insulation

D. Section 15310 - Fire Protection Piping

E. Section 15410 - Plumbing Piping

PART 2 PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

The material for supports shall be compatible with the characteristics of the piping material so that neither shall have a deteriorating action on the other.

2.02 HANGER RODS

Steel hanger rods: Threaded both ends, threaded one end or continuous threaded.

2.03 INSERTS

Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.04 FLASHING

A. Metal flashing: 22 gauge galvanized steel.

B. Flexible flashing: 47 mil thick sheet butyl; compatible with roofing.

C. Gaps: Steel, 22 gauge minimum; 16 gauge at fire resistant elements.

2.05 SLEEVES

A. Sleeves for pipes passing through exterior walls and concrete slabs on grade: Form with iron pipe.

B. Sleeves for pipes through raised floors: Form with 18 gauge galvanized steel.

C. Sleeves for pipes passing through interior walls and partitions: Form with 24 gauge galvanized steel.

D. Sleeves for ductwork: Form with galvanized steel.

PART 3 EXECUTION

3.01 INSERTS

Where concrete slabs form finished ceiling, provide inserts flush with slab surface.

3.02 PIPE HANGERS AND SUPPORTS

Support horizontal piping commensurate with the weight of the pipe being supported.

3.03 EQUIPMENT BASES AND SUPPORTS

A. Concrete for equipment bases shall comply with the requirements of Section 03300.

B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

3.04 FLASHING

A. Provide flexible flashing and metal counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counterflash and seal.

C. Seal floor drains watertight to adjacent materials.

3.05 SLEEVES

A. Set sleeves in position in formwork. Provide reinforcing around sleeves.

B. Extend sleeves through floors one inch above finished floor level. Caulk sleeves full depth and provide floor plate.

C. Clearance between sleeve and pipe/pipe covering shall be approximately 1/2 inch.

D. Install chrome plated steel escutcheons at exposed finished surfaces.

E. Pipes penetrating exterior walls shall be made weathertight and watertight using oakum packing and non-hardening plastic sealer.

F. Pipes penetrating fire-rated walls shall have sleeves filled with U.L. listed fire-stopping material/assembly equal to the fire-rating of the wall.

END OF SECTION

SECTION 15161

WASTE WATER PUMPS, SUMP

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Waste Water Sump Pumps as indicated on the Drawings.

1.02 RELATED WORK

Section 15492 - Underground Waste Water System

PART 2 PRODUCTS

2.01 SUMP PUMP DESCRIPTION

A. Pump shall be a high head, two stage submersible dewatering pump.

B. Pump shall be equipped with polyurethane lined wear parts for prolonged life, especially for pumping abrasive liquids.

C. Pump shall be equipped with closed multi-vane impellers made of abrasion-resistant modular cast iron (55 Rc Hardness).

D. Shell shall be a cast iron housing. Shaft shall be stainless steel.

E. Shaft sealing system shall incorporate independent double face seals with tungsten carbide faces running in oil for long life.

F. Controls shall provide for both manual and automatic operation as well as overload protection and be mounted in rain-tight NEMA 3 enclosures. Automatic operation shall be actuated by level sensors.

G. Pump shall be capable of delivering 250 gpm at 600 feet of discharge head.

H. Pump motor shall be ___ HP, ___ Volt, 3 phase, 60 Hz.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the pumps in accordance with manufacturer's printed instructions.

B. Field test units using water to fill storage tanks.

C. Test duration shall be two hours.

D. Record discharge flow rates and discharge pressures.

END OF SECTION

SECTION 15162

WASTE WATER PUMPS, DIAPHRAGM

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor required for the installation and testing of the waste water system diaphragm pumps as indicated on the Drawings.

1.02 RELATED WORK

Section 15492 - Underground Waste Water Collection System

PART 2 PRODUCTS

2.01 DIAPHRAGM PUMP DESCRIPTION

A. The pump shall be compressed air-operated, double-diaphragm design with ball check valves.

B. Unit shall be assembled with clamp bands for easy maintenance and quick inspection.

C. Pumping action shall be controlled by an externally serviceable air valve.

D. Pump shall have a 1" suction inlet and 3/4" discharge port.

E. Pump shall be self-priming, capable of high suction lift and able to run dry without damage.

2.02 CONSTRUCTION

A. Wetted parts shall be of aluminum construction.

B. Elastomers shall be of polyurethane diaphragms, valve balls and valve seats.

2.03 CAPACITY

Pump shall be capable of delivering 20 gallons per minute at 165 feet of discharge and 25 feet of wet suction lift using 100 psig and 25 SCFM of compressed air.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the pumps in accordance with manufacturer's printed instructions.

B. Field test units using water to fill storage tanks.

C. Test duration shall be two hours.

D. Record the following data:

1. Air supply pressures.

2. Air consumptions.

3. Discharge flow rates.

4. Discharge pressures.

END OF SECTION

SECTION 15163

WASTE WATER PUMPS, SUBMERSIBLE

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install intermediate Submersible Waste Water Pumps as indicated on the Drawings.

1.02 RELATED WORK

Section 15492 - Underground Waste Water System

PART 2 PRODUCTS

2.01 SUBMERSIBLE PUMP DESCRIPTION

A. Pump shall be a slim, portable dewatering pump capable of pumping clean or abrasive liquids.

B. Pump shall be constructed primarily of aluminum alloy for ease of handling.

C. Pump shall be equipped with open radial type impellers.

D. Lower bearings shall consist of two single-row angular contact ball bearings. Upper bearings shall consist of one deep-grooved ball bearing.

E. Pump shall have two mechanical seals in tandem. The seals work independently of each other and seal off the motor from the pump section.

F. Oil in the oil casing lubricates and cools the seals, acting as a buffer between the pumped liquid and the electric motor.

G. Controls shall be provided for both manual and automatic operation as well as overload protection and be mounted in rain-tight NEMA 3 enclosures. Automatic operation shall be actuated by level sensors.

H. Pumps shall be capable of delivering 100 gpm at 300 feet discharge head.

I. Pump motor shall be ___ HP, ___ Volt, 3 phase, 60 Hz with Class F insulation.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the pumps in accordance with manufacturer's printed instructions.

B. Field test units using water to fill storage tanks.

C. Test duration shall be two hours.

D. Record discharge flow rates and discharge pressures.

END OF SECTION

SECTION 15190

MECHANICAL IDENTIFICATION

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install the Mechanical Identification as specified herein and indicated on the Drawings.

1.02 RELATED WORK

A. Section 15310 - Fire Protection Piping

B. Section 15410 - Plumbing Piping

C. Section 15480 - Shop Compressed Air System

D. Section 15481 - Underground Compressed Air System

E. Section 15491 - Underground Water Distribution System

F. Section 15492 - Underground Waste Water Collection System

G. Section 15890 - Ductwork

PART 2 PRODUCTS

2.01 PIPE MARKERS

A. In conformance with ANSI A13.1, Table 2 and Table 3.

B. Direction of flow arrows are to be included on each marker, unless otherwise specified.

2.02 VALVE TAGS

Valve tags shall be brass, 1-1/2 inch diameter with 1/4 inch stamped black lettering.

2.03 NAME PLATES

Plastic nameplates shall be laminated 1/16 inch plastic with four beveled edges, black with white lettering.

PART 3 EXECUTION

3.01 INSTALLATION

A. Piping Identification: All service piping which is accessible for maintenance operations shall be identified with identification markers.

B. Valve Identification: All valves shall be identified with the appropriate service (i.e., PLBG, F.P., C.W., etc.) and valve designation number with a brass valve tag.

C. Equipment Identification: Identify air handler, fans, pumps, chillers, boilers, etc., with plastic nameplates.

D. Controls Identification: Identify control panels and major control components outside panels with plastic nameplates.

E. Ductwork: Identify ductwork with plastic nameplates. Nameplate shall state air handling unit number and area served.

END OF SECTION

SECTION 15242

VIBRATION ISOLATION

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install equipment Vibration Isolation as indicated on the Drawings.

1.02 RELATED WORK

To Be Determined.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION MOUNTS

A. Type M1 - Ribbed or waffled neoprene pad.

B. Type M2 - Combination ribbed or waffled neoprene and cork pad.

C. Type M3 - Double-deflection neoprene-in-shear floor mount.

D. Type M4 - Open spring floor mount.

E. Type M5 - Open spring floor mount with vertical limit stop.

2.02 VIBRATION ISOLATION HANGERS

A. Type H1 - Open spring hanger support.

B. Type H2 - Open spring hanger support precompressed.

C. Type H3 - Open spring duct isolation hanger support.

2.03 THRUST RESTRAINTS

Type TR1 - Horizontal thrust restraint.

2.04 CONCRETE INERTIA AND STEEL BASES

A. Type B1 - Steel frame for floor-mounted equipment.

B. Type B2 - Steel frame for suspended equipment.

C. Type B3 - Concrete inertia base for floor-mounted equipment.

2.05 FLEXIBLE CONNECTORS

A. Type FC1 - Neoprene flexible connector.

B. Type FC2 - Braided flexible connector.

C. Type FC3 - Braided flexible connector.

2.06 SEISMIC RESTRAINTS

Type SR1 - Seismic restraints: Seismic restraints shall consist of interlocking steel members restrained by shock absorbent rubber materials.

PART 3 EXECUTION

3.01 INSTALLATION

A. Vibration isolation units shall be selected for each item of equipment in accordance with the weight distribution and operating characteristics so as to develop uniform deflection.

B. Size, attachment method, and placement of vibration isolators to be as recommended by the manufacturer.

C. Where identified, seismic restraints shall be firmly connected to the supporting structure and vibration base.

D. Inertia bases shall be suspended on at least 4 isolation mounts.

3.02 APPLICATION

A. Base mounted pumps.

B. In-line hot water pumps.

C. Centrifugal fans.

D. Packaged heat pumps/air-conditioners units.

E. Evaporative coolers.

F. Fan-coil units.

G. Air compressors.

H. HVAC ductwork.

END OF SECTION

SECTION 15260

PIPING INSULATION

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Piping Insulation as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15140 - Supports and Anchors Painting

B. Section 15190 - Mechanical Identification

C. Section 15410 - Plumbing Piping

PART 2 PRODUCTS

2.01 MATERIALS

A. All insulation installed inside buildings shall be tested according to ASTM E84 and UL 723.

B. Tests shall have been performed by an approved, nationally recognized testing laboratory.

C. Material shall have a flame-spread rating not greater than 25 and fuel-contributed and smoke-developed ratings not greater than 50.

2.02 PIPE INSULATION

A. Insulation material shall be fiber glass pipe insulation.

B. Insulation shall be provided with an all service jacket.

C. Fittings, valves, and flanges shall be insulated with PVC fitting covers with fiberglass insulation inserts.

D. All insulated pipes located outdoors shall have a 0.016-inch thick embossed aluminum jacket with a laminated moisture retarder.

H. All pipe insulation shall be continuous through wall and ceiling openings and sleeves.

PART 3 EXECUTION

3.01 INSTALLATION

A. All necessary testing of piping and ducting shall be completed prior to installation of insulation.

B. Install all materials according to the recommendations of the manufacturer.

C. All installation shall be installed over clean, dry surfaces.

3.02 APPLICATION

A. Aluminum jackets on piping shall have joints completely sealed along the longitudinal seam and shall be applied to shed water.

B. Protection shields shall be applied at all hangers and supports for insulated pipe in accordance with Section 15140.

C. Butted ends of insulation must be vapor-barrier protected. Vapor barriers shall overlap a minimum of 2 inches at all seams and be sealed with an appropriate pressure sensitive tape or mastic.

END OF SECTION

SECTION 15280

EQUIPMENT INSULATION

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Equipment Insulation as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15190 - Mechanical Identification

B. Section 15260 - Piping Insulation

PART 2 PRODUCTS

2.01 MATERIALS

A. All insulation installed inside buildings shall be tested according to ASTM E 84 and UL 723.

B. Tests shall have been performed by an approved, nationally recognized testing laboratory.

C. Material shall have a flame-spread rating not greater than 25 and fuel-contributed and smoke-developed ratings not greater than 50.

2.02 EQUIPMENT INSULATION

A. Equipment shall be insulated with semi-rigid fiber glass board bonded to flexible jacketing.

B. At the Contractor's option, calcium silicate block insulation conforming to ASTM C 533 may be used.

PART 3 EXECUTION

3.01 INSTALLATION

A. All necessary testing of equipment shall be completed prior to installation of insulation.

B. Install all materials according to the recommendations of the manufacturer.

C. All installation shall be installed over clean, dry surfaces.

3.02 APPLICATION

A. Do not insulate factory insulated equipment.

B. Do not insulate over nameplate or ASME stamps. Bevel and seal insulation around such.

C. When equipment with insulation requires periodical opening for maintenance, repair, or cleaning, install insulation in such a manner that it can be easily removed and replaced without damage.

END OF SECTION

SECTION 15290

DUCTWORK INSULATION

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Ductwork Insulation as indicated on the Drawings.

1.02 RELATED WORK

A. Section 09900 - Painting

B. Section 15190 - Mechanical Identification

C. Section 15890 - Ductwork

PART 2 PRODUCTS

2.01 MATERIALS

A. All insulation installed inside buildings or in tunnels shall be tested according to ASTM E 84 and UL 723.

B. Tests shall have been performed by an approved, nationally recognized testing laboratory.

C. Material shall have a flame-spread rating not greater than 25 and fuel-contributed and smoke-developed ratings not greater than 50.

2.02 DUCT INSULATION

A. Air Conditioning Ducting

1. Interior rectangular ducting, where indicated on the drawings, shall be lined with 1-inch minimum thickness fiber glass duct liner.

2. Exterior rectangular ducting, where shown on the drawing, shall be lined with 2-inch minimum thickness fiber glass duct liner.

3. Interior round ducting, where shown on the drawings, shall be insulated with 1-1/2 inch fiber glass duct wrap with foil-scrim-kraft or vinyl vapor retarder.

4. Exterior round ducting, where shown on the drawings, shall be insulated with 1-1/2 inch fiber glass duct wrap with foil-scrim-kraft.

5. Flexible ducting shall be insulated per Section 15890.

B. Evaporative Cooler Ducting

1. Exterior evaporative cooler ducting shall be insulated on the outside surface with 1-inch minimum thickness fiber-glass duct board insulation with reinforced foil and paper facing cut and scored to cover standing seams.

2. Interior evaporative cooler ducting shall not be insulated.

C. Exhaust ducting shall not be insulated.

PART 3 EXECUTION

3.01 INSTALLATION

A. All necessary testing of ducting shall be completed prior to installation of insulation.

B. Install all materials according to the recommendations of the manufacturer.

C. All installation shall be installed over clean, dry surfaces.

3.02 APPLICATION

A. Duct Liner: The duct liner shall be applied with 100% coverage of approved fire resistant adhesive. On ducts over 20 inch wide or deep, the liner shall be additionally secured with mechanical fasteners.

B. Exterior Duct Insulation on Exterior Ducting: The insulation shall be applied with adhesive, 16 gauge galvanized wire mesh, insulating cement, and weatherproof coating.

END OF SECTION

SECTION 15310

FIRE PROTECTION PIPING

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Fire Protection Piping as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15140 - Supports and Anchors

B. Section 15190 - Mechanical Identification

C. Section 15242 - Vibration Isolation

D. Section 15330 - Wet-Pipe Sprinkler System

E. Section 16721 - Fire Alarm and Smoke Detection

PART 2 PRODUCTS

2.01 FIRE PROTECTION PIPING - ABOVE GRADE

A. Pipe: Steel Pipe, Schedule 40, black steel, ASTM A 53, seamless pipe.

B. Fittings: Screwed fittings, Malleable iron, ANSI B16.3; 150 Class or cast iron, ASTM A 47, 125 lb., black, screwed.

C. Joint Materials: Threaded Joint Compound.

D. Unions, Flanges, Couplings, Reducers, and Bushings:

1. Unions: Through 2 inches malleable iron, 300 lb. bronze to iron ground joint.

2. Flanges: 150 psi forged steel slip-on flanges for ferrous piping.

3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, designed to permit some angular deflection.

4. Reducers, Bushings: A one-piece concentric tapered reducing fitting shall be used wherever a change is made in the size of pipe.

2.02 FIRE PROTECTION PIPING - BURIED WITHIN 5 FEET OF BUILDING

Pipe: ANSI C151 - ductile iron thickness Class 51 for 4 inch size and Class 50 for 6 inch sizes; cement mortar lined in accordance with ANSI C104.

2.03 VALVES

A. Gate Valves:

1. 2 inches and smaller: 175 lb. bronze screwed gate valve.

2. 2-1/2 inches and larger: 175 lb. flanged gate valve.

B. Check Valves:

1. 2 inches and smaller: 175 lb. bronze screwed swing check.

2. 2-1/2 inches and larger: 175 lb. flanged swing check valve.

3. Mechanical grooved piping system: Silent operating, Dual disc, spring loaded, check valve.

C. Globe Valves:

175 lb., bronze body, screwed, rising stem, screw-in bonnet renewable disc.

PART 3 EXECUTION

3.01 INSTALLATION

A. Screw joint steel piping up to and including 2 inch diameter. Weld piping 2-1/2 diameter and larger, including branch connection.

B. Mechanical grooved joints may be used instead of threaded or welded joints.

3.02 INSTALLATION - VALVES

Install valves with stems upright or horizontal, not inverted.

END OF SECTION

SECTION 15330

WET PIPE SPRINKLER SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install the Wet Pipe Sprinkler Systems as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15140 - Supports and anchors

B. Section 15190 - Mechanical Identification

C. Section 15242 - Vibration Isolation

D. Section 15310 - Fire Protection Piping

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment shall be new and current products of the respective manufacturers.

B. When two or more pieces of equipment which perform the same function are required, they shall be exact duplicates produced by one manufacturer.

2.02 SPRINKLERS

A. Automatic fire sprinklers in areas with ceilings shall be chromium plated with escutcheons or canopies, pendent type 1/2 inch orifice with 165 degrees F rating.

B. Automatic fire sprinklers in exposed areas shall be ordinary finish natural bronze, upright type, 1/2 inch orifice with 212 degrees F rating.

C. Automatic fire sprinklers in computer room areas shall be automatic open-close pendent type.

D. Sprinklers used in restrooms with showers and battery rooms shall be corrosion-resistant type.

2.03 DRAINS

All drains shall terminate with a 45-degree elbow on the exterior of the building except where otherwise shown on the drawings.

2.04 VALVE IDENTIFICATION SIGNS

All control, drain, and test valves, and Fire Department connections shall be provided with identification signs, in accordance with referenced standards.

2.05 INSPECTOR'S TEST VALVE

An inspector's test valve shall be installed for sprinkler system.

2.06 GAUGES

Gauges shall be class 1, Bourdon tube type, with rear safety blowout protection.

2.07 FIRE DEPARTMENT CONNECTION

A two-way standard siamese fire department connection, 4" by 2-1/2" by 2-1/2", shall be provided in accordance with the requirements set forth in NFPA. A single inlet fire department connection, 2-1/2" may be used for building areas of less than 5000 square feet.

2.08 WET PIPE SPRINKLER ALARM VALVE, ALL SIZES

Provide complete assembly with bypasses, pressure gauges and required attachments, including vane type water flow switch for electrical connection to fire alarm system.

PART 3 EXECUTION

3.01 INSTALLATION

The Wet Pipe Sprinkler Systems shall be installed in accordance with NFPA 13.

3.02 HYDROSTATIC TEST AND FLUSHING

Hydrostatic test and flushing shall conform to NFPA 13 and shall be performed on all water lines for final acceptance.

3.03 DISINFECTION OF SPRINKLER SYSTEM PIPING

All wetted portions of the sprinkler system piping shall be disinfected.

3.04 CLEANING AND PAINTING

After the installation has passed a satisfactory hydrostatic test and has been accepted, all exposed piping shall be given one finish coat of paint, which shall be Federal Safety Red.

3.05 OPERATING INSTRUCTIONS AND SPARE SPRINKLERS

A. Two sets of operating instructions shall be provided for the sprinkler system.

B. Stock of spare sprinklers, with accessories in cabinet, shall be installed adjacent to the riser.

END OF SECTION

SECTION 15410

PLUMBING PIPING

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Plumbing Piping as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15140 - Supports and Anchors

B. Section 15190 - Mechanical Identification

C. Section 15260 - Piping Insulation

D. Section 15430 - Plumbing Specialties

E. Section 15440 - Plumbing Fixtures

F. Section 15450 - Plumbing Equipment

PART 2 PRODUCTS

2.01 DOMESTIC WATER PIPING - ABOVE GRADE

A. Pipe:

1. 2 inch nominal and smaller: Type K soft-copper water tube or Type L hard-copper water tube, either conforming to ASTM B 88.

2. 2-1/2 inch to 6 inch: Schedule 40 galvanized conforming to ASTM A 53.

B. Fittings:

1. 2 inch nominal and smaller: Wrought-copper solder joint conforming to ANSI B16.22.

2. 2-1/2 inch and larger: Class 150 galvanized malleable iron screwed conforming to ANSI B16.3.

C. Unions:

1. 2 inch nominal and smaller: Wrought-copper solder joint conforming to ANSI B16.22.

2. 2-1/2 inch and 6 inch: Use flanges.

D. Flanges: Class 150, galvanized cast iron threaded, raised-faced conforming to ANSI B16.5.

2.03 DOMESTIC WATER PIPING - BURIED WITHIN 5 FEET OF BUILDING

A. Pipe:

1. 2 inch and smaller: Type K soft-copper water tube conforming to ASTM B 88.

2. 3 inch to 12 inch: Cement lined ductile iron, 150 pound per square inch (psi), elastomeric compression-type joint, conforming to AWWA C151.

B. Fittings:

1. 2 inch and smaller: Wrought-copper solder joint conforming to ANSI B16.22.

2. 3 inch to 12 inch: Gray iron, bell ends, 250 psi, conforming to AWWA/ANSI C153/A21.53 with elastomeric compression-type joint conforming to AWWA/ANSI C111/A21.11.

2.04 SANITARY WASTE AND VENT PIPING - ABOVE GRADE

A. Piping:

1. 1-1/2 inch and smaller: Schedule 40 galvanized steel conforming to ASTM A 53.

2. 2 inch and larger: Service cast iron, hub and spigot soil pipe conforming to ASTM A 74 or hubless conforming to CISPI 301.

B. Fittings:

1. 1-1/2 inch and smaller: Cast iron, black screwed drainage fittings conforming to ANSI B16.12.

2. 2 inch and larger: Service cast iron, hub and spigot soil pipe fittings conforming to ASTM A 74 or hubless fittings conforming to CISPI 301.

2.05 SANITARY WASTE AND VENT PIPING - BURIED WITHIN 5 FEET OF BUILDING

A. Piping (all sizes): Service cast iron, coated hub and spigot soil pipe conforming to ASTM A 74.

B. Fittings (all sizes): Service cast iron, coated, hub and spigot soil fittings (use standard radius bends) conforming to ASTM A 74 and ASTM C 564.

2.06 VALVES

A. Gate valves:

1. 2 inch and smaller: Class 125, bronze body, integral seat solid wedge, non-rising stem screwed bonnet, soldered ends.

2. 2-1/2 inch and larger: Class 150, cast iron body; renewable bronze seats OS&Y, bolted bonnet, flanged ends.

B. Globe valves:

1. 2 inch and smaller: Class 125, bronze body, renewable brass compensation disc, rising stem, inside screw, union bonnet, soldered ends.

2. 2-1/2 inch and larger: Class 150, C.I. body, renewable bronze seat, bronze cone-type disc, rising stem, OS&Y bolted bonnet, flanged ends.

C. Check valve:

1. 2 inch and smaller: Class 125, bronze body, integral seat, screwed cap, soldered ends.

2. 2-1/2 inch and larger: Class 150, C.I. body, renewable brass seat, brass-faced disc, bolted cap, flanged ends.

D. Ball valves:

1. 2 inch and smaller: Class 125, bronze body, full port ball, handle operated, teflon seats, threaded ends.

2. 2-1/2 inch and larger: Class 150, cast steel body, chrome plated full port ball, teflon seat, handle operated, flanged ends.

E. Butterfly valves: Class 150, cast steel body, bronze disc resilient replaceable seat, wafer or lug design, lever handle.

F. Relief valves (1/2 inch and larger): Bronze body, teflon seat, steel stem and springs, pressure actuated; ANSI Z21.22.

G. Pressure reducing valves (1/2 inch to 2-1/2 inch): Bronze body, adjustable diaphragm, renewable seat, replacement disc, integral strainer, threaded connections, conforming to ANSI A112.26.2.

PART 3 EXECUTION

3.01 GENERAL

A. The general arrangement of the piping shall be as indicated on the Drawings.

B. Pipe shall be cut accurately to measurements established at the site by the Contractor and shall be worked into place without springing or forcing.

C. Screw joints shall be made with tapered threads.

D. Tubing shall be accurately cut to measure using the proper tools to ensure a square cut.

3.02 FIELD QUALITY ASSURANCE

A. Cleaning: Piping shall be clean, free from scale.

B. Testing: Testing of underground piping shall be accomplished before piping is covered.

C. Sterilization of domestic water piping: The entire potable water system shall be disinfected with chlorine before acceptance for domestic operation.

END OF SECTION

SECTION 15430

PLUMBING SPECIALTIES

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Plumbing Specialties as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15410 - Plumbing Piping

B. Section 15440 - Plumbing Fixtures

C. Section 15450 - Plumbing Equipment

PART 2 PRODUCTS

2.01 FLOOR DRAINS

5-inch diameter, nickel bronze adjustable strainer, cast iron body, and threaded collar, ANSI A112.21.1M.

2.02 FLOOR SINKS

8-1/2 inch square cast-iron medium receptor (6-inch depth) with acid-resistant coated interior, nickel-bronze rim, and 1/2 grate.

2.03 CLEANOUTS

Cleanouts shall conform to ANSI A112.36.2.

2.04 BACKFLOW PREVENTERS

A. 3/4 inch to 2 inch: Double check valve assembly, bronze body construction, strainer, non-rising stem gate valve, ball vale test cocks, replaceable seats.

B. 2-1/2 inch to 3 inch: Double check valve assembly, bronze body construction, removable bronze seats, stainless steel internal parts, bronze strainer.

C. 4 inch to 10 inch: Double check valve assembly, epoxy coated cast-iron body, removable bronze seats, stainless steel internal parts, bronze strainer.

2.05 WATER HAMMER ARRESTERS

Meet performance requirements of ANSI A112.26, sized as indicated on Drawings.

2.06 HOSE BIBBS AND WALL HYDRANTS

A. Interior hose bibbs shall be bronze body with 3/4 inch hose connection with vacuum breaker.

B. Outside fixtures (wall hydrants) shall be non-freeze type with vacuum breaker or anti-siphon.

2.07 TRAP PRIMER SYSTEM

A. Drain trap primer valves: Adjustable to line pressure and desired delivery amount, "O" ring seals, vacuum breaker, and back-flow preventer.

B. Trap primer distribution units: Includes brass fittings, copper reservoir, supply tubes and mounting bracket for use with trap primer valve.

2.08 PRESSURE GAUGES

Gauges shall conform to ANSI B40.1 (Grade A).

2.09 STRAINERS

Strainers shall be Y type with bronze body and 20-mesh stainless screen.

PART 3 EXECUTION

3.01 INSTALLATION

Install plumbing specialties in accordance with the manufacturer's instructions to attain the intended performance.

END OF SECTION

SECTION 15440

PLUMBING FIXTURES

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Plumbing Fixtures as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15410 - Plumbing Piping

B. Section 15430 - Plumbing Specialties

C. Section 15450 - Plumbing Equipment

PART 2 PRODUCTS

2.01 PLUMBING FIXTURES & PIPE CONNECTIONS

A. All exposed, flush, waste, and supply pipes at the fixtures shall be chromium-plated brass pipe, iron pipe size. All faucets shall conform to ANSI A112.18.1M.

B. Enameled cast-iron plumbing fixtures shall conform to ANSI A112.19.1M.

C. Vitreous-china plumbing fixtures shall meet ANSI A112.19.2M.

D. Wall mounted fixture carriers shall conform to ANSI A112.6.1M.

E. Fixtures and trim shall be by the same manufacturer for each product specified throughout.

2.02 WATER CLOSET (WC)

A. Water closet (WC-1), white vitreous china, floor mounted, bottom discharge, siphon jet action, elongated bowl, china bolt caps, and 1 1/2 inch top spud.

B. Water closet 18-inch high (WC-2) for elderly, white vitreous china, floor mounted, bottom discharge, siphon jet action, elongated bowl, china bolt caps, and 1 1/2 inch top spud.

2.03 URINAL (UR)

Vitreous china, wall hung, washout action, integral trap, 3/4-inch top spud inlet, two-inch internal threaded outlet, steel wall hangers.

2.04 WALL MOUNTED LAVATORY (LAV)

A. Lavatory (LAV-1), vitreous china, 20 x 18 inch rectangular basin with soap depression and front overflow, wall hung, 8-inch center faucet holes.

B. Wheelchair Lavatory (LAV-2), vitreous china, 20 x 27 inch rectangular basin with front overflow and concealed arm support, wall hung, 12-inch center faucet holes.

2.05 COUNTERTOP LAVATORY (SK)

Enameled cast iron, 20 x 18 inch rectangular countertop lavatory, soap depressions and front overflow, 8-inch center faucet holes.

2.06 SERVICE SINK (SS)

Enameled cast iron, 22 x 18 inch service sink with rim guard and wall hanger.

2.07 SEMICIRCULAR WASHFOUNTAIN (WF)

Precast terrazzo bowl, 54 inch diameter semi-circular wash fountain.

2.08 SHOWER (SH)

A. COLUMN SHOWER (SH-1)

304 stainless steel, 5-person column shower.

B. SHOWER STALL (SH-2)

Heavy gauge galvanized-bonderized steel walls with baked-on enamel finish. Precast terrazzo floor with 1 1/2 inch shoulders with galvanized-bonderized steel flange for wall attachment. Size 36 inch x 36 inch x 81 inch.

2.09 EYE WASH/SHOWER (EW)

Drench shower and face/eye wash, 10 inch deluge shower head, ABS plastic in "first-aid" green, stainless steel receptor bowl with ABS plastic spray heads, push-type ball valve that stays open until manually closed, 1 1/4 inch I.P.S. supply connection, 1 1/4 inch I.P.S. waste connection.

2.03 URINAL (UR)

Vitreous china, wall hung, washout action, integral trap, 3/4-inch top spud inlet, two-inch internal threaded outlet, steel wall hangers.

2.04 WALL MOUNTED LAVATORY (LAV)

A. Lavatory (LAV-1), vitreous china, 20 x 18 inch rectangular basin with soap depression and front overflow, wall hung, 8-inch center faucet holes.

B. Wheelchair Lavatory (LAV-2), vitreous china, 20 x 27 inch rectangular basin with front overflow and concealed arm support, wall hung, 12-inch center faucet holes.

2.05 COUNTERTOP LAVATORY (SK)

Enameled cast iron, 20 x 18 inch rectangular countertop lavatory, soap depressions and front overflow, 8-inch center faucet holes.

2.06 SERVICE SINK (SS)

Enameled cast iron, 22 x 18 inch service sink with rim guard and wall hanger.

2.07 SEMICIRCULAR WASHFOUNTAIN (WF)

Precast terrazzo bowl, 54 inch diameter semi-circular wash fountain.

2.08 SHOWER (SH)

A. COLUMN SHOWER (SH-1)

304 stainless steel, 5-person column shower.

B. SHOWER STALL (SH-2)

Heavy gauge galvanized-bonderized steel walls with baked-on enamel finish. Precast terrazzo floor with 1 1/2 inch shoulders with galvanized-bonderized steel flange for wall attachment. Size 36 inch x 36 inch x 81 inch.

2.09 EYE WASH/SHOWER (EW)

Drench shower and face/eye wash, 10 inch deluge shower head, ABS plastic in "first-aid" green, stainless steel receptor bowl with ABS plastic spray heads, push-type ball valve that stays open until manually closed, 1 1/4 inch I.P.S. supply connection, 1 1/4 inch I.P.S. waste connection.

2.10 BOOT WASH/FLOOR MOP SINK (BW)

A. Floor service sink, 33L x 21W x 10D inches, #16 gauge stainless steel construction.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install all fixtures in accordance with manufacturer's instructions.

B. Install each fixture (except floor mounted fixtures) with trap easily removable for servicing and cleaning.

C. Provide accessible stops in supply pipes to all fixtures.

D. Install all fixtures and components level and plumb.

E. Where fixtures contact floors or walls, caulk to seal.

END OF SECTION

SECTION 15450

PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Plumbing Equipment as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15410 - Plumbing Piping

B. Section 15430 - Plumbing Specialties

PART 2 PRODUCTS

2.01 ELECTRIC WATER COOLER (EWC)

A. Wall mounted electric water cooler (EWC-1), 8 GPH capacity, 1/8 hp air cooled compressor, heavy gauge steel cabinet, stainless steel top with satin finish and anti-splash ridge, one-piece, chrome-plated, shielded, anti-squirt, angle stream bubbler.

B. Barrier-free electric water cooler (EWC-2), 6.7 GPH capacity, 1/5 hp air cooled compressor, heavy gauge steel cabinet, stainless steel top with satin finish, one-piece, chrome-plated, shielded, anti-squirt, angle stream bubbler, front push bar actuation mechanism.

2.02 ELECTRIC WATER HEATER (EWC)

Commercial electric water heater, (EWH-1), 125 gallons and larger, glass-lined tank with fiberglass insulation, 125 psi working pressure ASME tank construction, lifting lugs, channel skid base, heavy duty, immersion heater elements with incoloy sheathing, pilot switch and light for manual starting and stopping, low water cutoff, 120 volt control circuit, 480 volt, 3 phase, factory installed terminal block.

B. Electric water heater (EWH-2), 120 gallons and smaller, glass-lined tank with R-16 fiberglass or foam insulation, 150 psi working pressure ASME tank construction, heavy duty immersion heater with incoloy sheathing, 120 volt control circuit, 208 volt, 1 or 3 phase.

C. Instant-flow water heater (EWH-3), 208 volt, 1 phase, cast aluminum casing, plastic housing with stainless steel parts, 1/4-inch NPT connections.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install all plumbing equipment in accordance with the manufacturer's installation instructions.

B. Provide accessible shut-off valves in supply pipes to all equipment.

C. Install all equipment level and plumb.

D. Run pressure and temperature relief lines from water heaters to floor sinks with air gaps or to the outside of the building 6 inches above finished floor with a 45 degree elbow to point downward.

END OF SECTION

SECTION 15480

SHOP COMPRESSED AIR SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install the Compressed Air System as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15140 - Supports and Anchors

B. Section 15190 - Mechanical Identification

PART 2 PRODUCTS

2.01 PIPING AND VALVES

A. Pipes, All Sizes:

1. Pipe: ASTM A 53, Grade A or B Schedule 40, black seamless.

2. Fittings, 2 inch and smaller: ASTM A 197, 150 lb., black malleable iron, screwed joint.

3. Fittings, 2-1/2 inch and larger: ASTM A 234 WPB, 150 lb., weld joint.

4. Flanges, all sizes: ASTM A 181, Grade 1, 150 lb., flat faces, slip-on or welded.

B. Block Valves, 2 inch and smaller: 150 lb. bronze gate valve, bronze body, integral seat, double wedge disc, rising stem, union bonnet.

C. Balance Valves, 2 inch and smaller: 150 lb. bronze globe valve, bronze body, bronze disc, rising stem, screwed bonnet.

D. Check Valves, All Sizes: Bronze screwed, swing check valve, 250 lb. SWP, bronze body, integral seat, screwed cap.

2.02 AIR COMPRESSOR AND RECEIVER

A. Air Compressor: Air cooled tank mounted reciprocating compressor, furnished complete with inlet air filter, V-belt drive and totally enclosed guard, open drip-proof 60 Hz motor, auto stop/start control, NEMA 1 pressure switch, pressure gauge, and intercooler relief valve for 2 stage units.

B. Receiver: Rated tank in accordance with ASME Section VIII Pressure Vessels Code, 200 psi.

2.03 FILTER, REGULATOR, AND LUBRICATOR

A. Filter: Zinc die casting body with 1/2" ports, sintered bronze type filter element 5 micron size.

B. Regulator: Zinc die casting body with 1/2" ports; non-rising, locking adjustment knob; 2" diameter metal gauge with 0-160 psi pressure range.

C. Lubricator: Zinc die casting body with 1/2" ports; transparent polycarbonate bowl with mechanical shut off for filling while air line remains pressurized.

PART 3 EXECUTION

3.01 GENERAL

A. The general arrangement of the piping shall be as indicated on the drawings.

B. Pipe shall be cut accurately to measurements established at the site by the Contractor and shall be worked into place without springing or forcing.

C. Screw joints shall be made with tapered, properly cut threads conforming to ANSI B1.1.

D. All pipes shall slope downward at 1/4" per foot in the direction of air flow. Drip legs shall be installed at all low points in the system with a manual petcock drain on the end.

E. All pipes shall be labeled in accordance with Mechanical Identification, Section 15190.

3.02 FIELD QUALITY ASSURANCE

A. Cleaning: Piping shall be clean, free from scale, and thoroughly blown free of all foreign matter with dry compressed air.

B. Testing: Test air piping system before acceptance.

END OF SECTION

SECTION 15481

UNDERGROUND COMPRESSED AIR DISTRIBUTION SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all material, tools, equipment, and labor necessary for the installation of the Underground Compressed Air Distribution System as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15140 - Supports and Anchors

B. Section 15190 - Mechanical Identification

C. Section 15242 - Vibration Isolation

D. Section 15482 - Rotary Screw Air Compressor

E. Section 15483 - Booster Air Compressor Unit

PART 2 PRODUCTS

2.01 PIPE

Pipe shall be ASTM A 53 carbon steel of the sizes and schedules defined in the contract drawings. Pipe shall be roll grooved in accordance with the coupling manufacturer's recommendations.

2.02 COUPLINGS

Couplings joining pipes or joining pipe to components shall be of a proprietary grooved fitting design qualified for normal fluid service in accordance with ANSI B31.3. Couplings shall be of working pressure ratings as defined in the contract drawings.

2.03 FITTINGS

Pipe fittings shall be ASTM A 234 forged carbon steel with a proprietary grooved end design compatible with the couplings.

2.04 VALVES

A. Manual valves shall be ASTM A 181 forged steel with a proprietary grooved end design compatible with the couplings.

1. Globe valves shall be single-ported with non-corroding seats and guides.

2. Ball valves shall have non-corroding seats.

B. Control valves shall be ASTM A 261 cast steel with ANSI B16.5 class 300 flanged ends.

1. Relief valves shall detect inlet air pressure in excess of adjustable setpoint and respond by opening fully automatically. Relief shall reseat automatically when inlet pressure is below setpoint. Relief valves shall have ASME code stamp.

2. Pressure regulation valves shall sense outlet pressure and open or close automatically to maintain that pressure within an adjustable pressure band.

2.05 ADAPTER FLANGES

Adapter flanges shall be ASTM A 216 cast steel conforming to ANSI B16.5 class 300 at the flanged end and with a proprietary grooved end compatible with the couplings.

2.07 SPECIAL COMPONENTS

A. Filters at compressor discharges shall be combination coalescent/absorption type and shall carry ASME code stamp.

B. Filters in compressed air service panels shall be particulate type and shall have indication of filter differential pressure with alarm contacts.

C. Dryer shall be desiccant type utilizing two electrically heated towers and shall have ASME code stamp.

D. Pressure gages shall be solid-front blow-out back design with pressure snubber.

E. Hoses shall have design burst pressure at least 4 times working pressure.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install grooved pipe and components in accordance with coupling manufacturer's instructions.

B. Install flanged connections in accordance with ANSI B31.3.

C. Install hangers and supports in accordance with MSS SP-88.

3.02 INSPECTION AND TESTING

A. Piping joints shall be examined in accordance with ANSI B31.3.

B. Piping system shall be pressure tested in accordance with ANSI B31.3.

END OF SECTION

SECTION 15482

ROTARY SCREW AIR COMPRESSOR

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to deliver, install, and test Rotary Screw Air Compressor as specified herein and indicated on the Drawings.

1.02 RELATED WORK

Section 15481 - Underground Compressed Air Distribution System

PART 2 PRODUCTS

2.01 ROTARY SCREW AIR COMPRESSOR

A. Air compressor shall be rotary screw type, electric-powered with drip proof housing for out-of-door installation.

B. Air compressor shall be capable of delivering a minimum 1500 CFM free air at 125 psig at standard sea level atmospheric pressure and temperature.

C. Air compressor shall be unitized on a single skid with forklift tine openings on skid base.

D. Compressor shall have the following characteristics and/or be equipped as follows:

1. Air/oil reservoir shall be ASME coded and stamped, complete with ASME safety relief valve and blowdown valve with muffler.

2. Acoustical cabinet shall reduce sound emission to a sound level of 85 DBA at 7 meters as measured in accordance with ANSI S1.13.

2.02 AFTERCOOLER

Air compressor shall be provided with air-cooled aftercooler with a 15 degree F approach.

2.03 SEQUENCE CONTROLLER

Sequence controller shall be provided with three air compressor control capability.

PART 3 EXECUTION

3.01 INSTALLATION

A. Mount compressors on vibration isolators as recommended by equipment manufacturer, and provide isolated inertia foundation as recommended by manufacturer.

B. Provide strainers ahead of control valves, pressure reducing valves, and compressors.

3.02 INSPECTION AND TESTING

A. In-plant inspection is required. Manufacturer shall inform the Engineer at least five (5) working days in advance of in-plant start-up and tests.

B. Compressor manufacturer shall provide qualified technical representative for start-up supervision.

END OF SECTION

SECTION 15483

BOOSTER AIR COMPRESSOR UNIT

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to deliver, install, and test Booster Air Compressor Units as specified herein and indicated on the Drawings.

1.02 RELATED WORK

Section 15481 - Underground Compressed Air Distribution System

PART 2 PRODUCTS

2.01 BOOSTER AIR COMPRESSOR UNIT

A. Unit shall consist of two compressors, motors, and drives along with air cooled aftercooler, high pressure air receiver tank, duplex filtration system, and all required controls, including disconnects, motor starters,and control logic.

B. Manufacturer shall supply the entire system, skid mounted, pre-piped and pre-wired. The control panel shall be wired to the compressor motors and all logic and control switches.

C. Unit shall deliver air at a capacity not less than 1350 SCFM operating with an inlet pressure of 100 psig and a discharge pressure of 250 psig.

D. The compressor shall be driven by a ___ HP, three phase, 60 Hz, ___ Volt, 1800 RPM, TEFC electric motor. The motor slide base shall be adjustable to permit proper adjustment of belt tension and shall have guarded belt drives.

E. Unit shall include a lead/lag control panel. If one compressor cannot keep up with the system demand, and the system pressure continues to drop, the second compressor will start automatically. When the 250 psig rating has been achieved, the two compressors will shut off.

PART 3 EXECUTION

3.01 INSTALLATION

A. Contractor shall verify that inlet compressed air has been dried to a pressure dew point that meets the manufacturer's specifications prior to equipment installation.

B. Contractor shall provide outlet air filters, valves and gauges between the compressor and the distribution air lines, as indicated on the drawings.

3.02 INSPECTION AND TESTING

In-plant inspection is required. The Engineer shall be informed at least 5 working days in advance of an in-plant start-up and test.

END OF SECTION

SECTION 15485

DIESEL FUEL PIPING

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Diesel Fuel Piping as indicated on the Drawings.

1.02 RELATED WORK

Section 13215 - Underground Storage Tanks

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

A. Underground diesel fuel piping, including tank fill and tank vent:

1. Pipe: Glass fiber reinforced epoxy, ASTM D 2996.

2. Fittings: Glass fiber reinforced epoxy, compression molded thermosetting resin, bell and spigot.

B. Aboveground diesel fuel piping, including tank vent:

1. Pipe: Steel, ASTM A 53, Grade B, seamless, Schedule 40.

a. 2 inch and smaller, pipe connections shall be threaded.

b. 2-1/2 inch through 10 inch, pipe connections shall be butt welded.

2. Fittings:

a. 2 inch and smaller, steel, ANSI B16.11, threaded.

b. 2-1/2 inch through 10 inch, steel, ANSI B16.9, butt weld.

2.02 VALVES

A. Block Valve, All Sizes: 200 bronze screwed gate valve, 200 lb. SWP saturated, 400 lb. WOG bronze body, exelloy seats, solid wedge disc, rising stem, UL labeled.

B. Balance Valve, All Sizes: 150 lb. bronze screwed globe valve, 150 lb. SWP at 450 degrees F., 400 lb. WOG bronze body, union bonnet, rising stem, composition disc, UL labeled.

C. Check Valves, All Sizes: 150 lb. bronze screwed swing check valve, 200 lb. SWP, saturated, 400 lb. WOG, bronze body, integral seat, screwed cap.

2.03 VALVE BOXES

A. Install cast iron valve box with cast iron cover for each underground valve.

B. Valve box shall be extension type with slide type adjustment and with flared base.

C. Minimum Thickness of Metal: 3/16 inch.

D. Coat interior and exterior surfaces with coal tar, 1/32 inch minimum.

PART 3 EXECUTION

3.01 INSTALLATION

A. Pipe, Valves, and Fittings: Install piping, valves and fittings to make fuel systems complete.

3.02 FIELD QUALITY CONTROL

A. Methods of sampling, inspecting, and testing shall conform to specified codes and NFPA standards.

B. Equipment manufacturer's qualified representative shall monitor and furnish supervisory instructions to ensure proper equipment installation and operations, compliance with warranty requirements, and for preparation for system acceptance.

END OF SECTION

SECTION 15491

UNDERGROUND WATER DISTRIBUTION SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install the Underground Water Distribution System as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15140 - Supports and Anchors

B. Section 15190 - Mechanical Identification

C. Section 15242 - Vibration Isolation

D. Section 15260 - Piping Insulation

E. Section 15310 - Fire Protection Piping

PART 2 PRODUCTS

2.01 PIPE

Pipe shall be ductile iron conforming to ANSI/AWWA C151/A21.51 of the sizes indicated in the contract drawings. Pipe shall be roll grooved in accordance with the coupling manufacturer's recommendations.

2.02 COUPLINGS

Couplings joining pipes or joining pipes to components shall be of a proprietary grooved fitting design listed by UL and approved by FM.

2.03 FITTINGS

Pipe fittings shall be ASTM A 536 ductile iron with a proprietary grooved design compatible with the couplings.

2.04 VALVES

A. Manual valves shall be ASTM A 536 ductile iron with a proprietary grooved end design compatible with the couplings. Gate valves will be single-disc with non-corroding seat.

B. Check valves shall be ASTM A 536 ductile iron with a proprietary grooved end design compatible with the couplings. Check valves shall be a non-slamming spring-loaded disk type.

C. Control valves shall be ASTM A 126 cast iron conforming to ANSI B16.1 class 250.

1. Line break isolation valves shall detect water flow in excess of adjustable setpoint and respond automatically by immediately stopping all flow.

2. Relief valves shall detect inlet water pressure in excess of adjustable setpoint and automatically open fully. Relief valve shall reseat automatically when inlet water pressure is below setpoint.

2.05 ADAPTER FLANGES

Adapter flanges shall be ASTM A 126 cast iron conforming to ANSI B16.1 class 250 at the flanged end with a proprietary grooved end compatible with the couplings.

2.06 HANGERS AND SUPPORTS

Hangers and supports shall conform to MSS SP-58.

PART 3 EXECUTION

3.01 PIPING INSTALLATION

A. Install grooved end pipes and components in accordance with coupling manufacturer's instructions.

B. Install flanged connections in accordance with ANSI B31.3.

C. Install hangers and supports for piping in accordance with MSS SP-88.

3.02 INSPECTION AND TESTING

A. Piping joints shall be examined in accordance with ANSI B31.3.

B. Piping system shall be pressure tested in accordance with ANSI B31.3.

END OF SECTION

SECTION 15492

UNDERGROUND WASTE WATER COLLECTION SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install the Underground Waste Water Collection System as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15140 - Supports and Anchors

B. Section 15161 - Waste Water Pumps - Sump

C. Section 15162 - Waste Water Pumps - Diaphragm

D. Section 15163 - Waste Water Pumps - Centrifugal

E. Section 15190 - Mechanical Identification

F. Section 15242 - Vibration Isolation

PART 2 PRODUCTS

2.01 PIPE

Pipe shall be ASTM A 53 carbon steel of the sizes and schedules defined in the contract drawings. Pipe shall be roll grooved in accordance with the coupling manufacturer's recommendations.

2.02 COUPLINGS

Couplings joining pipes or joining pipe to components shall be of a proprietary grooved fitting design qualified for normal fluid service in accordance with ANSI B31.3. Couplings shall be of working pressure ratings as defined in the contract drawings.

2.03 FITTINGS

Pipe fittings shall be ASTM A 234 forged carbon steel with a proprietary grooved end design compatible with the couplings.

2.04 VALVES

A. Manual valves shall be ASTM A 181 forged carbon steel with a proprietary grooved end design compatible with the couplings. Gate valves shall be single disk with non-corroding seats.

B. Check valves shall be ASTM A 181 forged carbon steel with a proprietary grooved end design compatible with the couplings. Check valves shall be a non-slamming spring-loaded disk type.

C. Control valves shall be ASTM A 261 cast steel, with ANSI B16.5 class 300 flanged ends. Line break isolation valves shall detect water flow in excess of adjustable setpoint and respond automatically by immediately stopping all flow.

2.05 ADAPTER FLANGES

Adapter flanges shall be ASTM A 261 cast steel conforming to ANSI B16.5 class 300 at the flanged end and with a proprietary grooved end compatible with the couplings.

2.06 HANGERS AND SUPPORTS

Hangers and supports shall conform to MSS SP-58.

PART 3 EXECUTION

3.01 PIPING INSTALLATION

A. Install grooved end pipes and components in accordance with coupling manufacturer's instructions.

B. Install flanged connections in accordance with ANSI B31.3

C. Install hangers and supports for piping in accordance with MSS SP-88.

3.02 INSPECTION AND TESTING

A. Piping joints shall be examined in accordance with ANSI B31.3.

B. Piping system shall be pressure tested in accordance with ANSI B31.3.

END OF SECTION

SECTION 15781

PACKAGED AIR CONDITIONING/HEAT PUMP UNITS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Packaged Air Conditioning/Heat Pump Units as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15242 - Vibration Isolation

B. Section 15890 - Ductwork

C. Section 15910 - Ductwork Accessories

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

Packaged air conditioning/heat pump units with supplemental electric heating elements and factory furnished operating charge of R-22.

2.02 CABINET ASSEMBLY

A. Cabinets: Casing and framework shall be manufactured of galvanized steel with baked enamel finish.

B. Insulation: One inch thick neoprene-coated glass fiber on surfaces where conditioned air is handled.

C. Supply fans: Forward-curved centrifugal type, resiliently mounted with V-belt drive, adjustable variable-pitch motor pulley, and rubber isolated hinge mounted motor.

D. Air filters: Two inch thick glass fiber disposable media.

2.03 ELECTRIC HEATING COIL

Finned tube heating elements or helical nickel chrome resistance wire coil heating elements with refractory ceramic support bushings.

2.04 EVAPORATOR COIL

Copper tube aluminum fin coil assembly with galvanized drain pan and connection.

2.05 COMPRESSOR

Hermetic or semi-hermetic compressor, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gauge ports, and filter drier.

2.06 CONDENSER

Copper tube aluminum fin coil assembly with subcooling rows. Direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor.

2.07 ECONOMIZER

Where indicated on the drawings, units shall be equipped with factory-installed economizer.

2.08 OPERATING CONTROLS

Provide an electronic 24-volt wall-mounted room thermostat, located as indicated on drawings and four feet six inches above finished floor. Heat pump thermostat for units with economizers and supplemental electric heat shall have two stages of cooling and two stages of heating.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Pad-mounted units shall be installed on angle iron support mounting frame two feet above finish slab with vibration isolators. See Section 15242.

C. Roof mounted units shall be installed on manufacturer supplied roof mounting curbs providing watertight enclosures to protect ductwork and utility services.

3.03 MANUFACTURER'S FIELD SERVICES

Provide initial start-up including routine servicing and check-out for all units in excess of 10 tons.

END OF SECTION

SECTION 15782

PACKAGED TERMINAL HEAT PUMP UNITS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Packaged Terminal Heat Pump Units as indicated on the Drawings.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

Packaged, self contained, through the wall heat pump units with wall sleeve, electric refrigeration system, outside air louvers, built-in temperature controls.

2.02 WALL SLEEVES AND LOUVERS

A. Wall sleeves: Galvanized steel with baked-on enamel finish and weather seal gasket.

B. Discharge grille: Four way air flow control.

2.03 CHASSIS

A. Refrigeration system: Direct expansion cooling coil. Hermetically sealed compressor with internal spring isolation, external isolation, permanent split capacitor motor and overload protection.

B. Air system: Centrifugal forward curved evaporator fans with two-speed permanent split capacitor motor, permanent washable filters, positive pressure ventilation damper with concealed manual operator.

C. Supplemental heating coil: Electric.

D. Condensate drain: Drain pan to direct condensate to condenser coil for re-evaporation.

E. Condenser fan: Propeller type with separate permanent split capacitor motor.

2.04 CONTROLS

A. Control module: Unit mounted adjustable thermostat off-heat-auto-cool switch, high-low fan switch.

B. Low ambient lockout control: Below 40°F, outdoor thermostat shall prevent compressor operation and switch to supplemental electric heating mode for heat pumps.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Coordinate installation of units with architectural and electrical work.

END OF SECTION

SECTION 15785

COMPUTER ROOM AIR CONDITIONING UNITS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to deliver, install, and test Computer Room Air Conditioning Units as indicated on the Drawings.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

The computer room air conditioning unit shall be a self-contained factory assembled unit with down-flow air delivery.

2.02 DUAL REFRIGERATION SYSTEM

The compressor shall be semi-hermetic with a suction gas cooled motor, vibration isolators, thermal overloads, oil sight glass, manual reset high pressure switch, pump down low pressure switch, suction line strainer, reversible oil pumps for forced feed lubrication, and a maximum operating speed of 1750 RPM.

2.03 EVAPORATOR COIL

Evaporator coil shall be constructed of copper and aluminum fins.

2.04 INFRARED HUMIDIFIER

The humidifier shall be of the infrared type consisting of high intensity quartz lamps.

2.05 CABINET AND FRAME

Structural frame: Welded steel suitably braced for rigidity, capable of supporting compressors ad other mechanical equipment and fittings; welded tubular steel floor stand with adjustable legs and vibration isolation pads.

2.06 FAN SECTION

A. Fans: Double inlet, forward curved centrifugal fans, statically and dynamically balanced, on steel shaft with self-aligning permanently lubricated ball bearings, and V-belt drive.

B. Motor: Drip proof, permanently lubricated ball bearing motor with built-in current and overload protection.

2.07 FILTERS

The filter chambers shall be an integral part of the system, located within the cabinet serviceable from either end of the unit.

2.08 MICROPROCESSOR CONTROL SYSTEM

Microprocessor shall continuously monitor operation of process cooling system and continuously digitally display room temperature and room relative humidity.

2.09 ELECTRIC REHEAT

Electric reheat coils shall be rigid, fin-tubular design. The reheat shall have ample capacity to maintain room dry-bulb conditions during a system call for dehumidification.

2.10 AIR COOLED CONDENSER

Air cooled condenser shall be the low profile, slow speed, multiple direct drive propeller fan type.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Coordinate installation of computer room air conditioning units with computer room raised floor installer.

C. Provide adequate drainage connections for condensate and humidifier flushing system.

3.02 MANUFACTURER'S FIELD SERVICES

Provide initial start-up including routine servicing and check-out.

END OF SECTION

SECTION 15811

EVAPORATIVE COOLERS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Evaporative Coolers as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15242 - Vibration Isolation

B. Section 15410 - Plumbing Piping

C. Section 15890 - Ductwork

D. Section 15910 - Ductwork Accessories

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

Provide complete factory assembled units or packaged type evaporative air coolers. Units shall consist of cabinets, blowers, motors, evaporative media, pumps, water distribution system, and operating controls.

2.02 PERFORMANCE

Cabinets shall be constructed of hot-dipped, galvanized steel, welded for maximum strength. Cabinet pans, water distributor covers, louvers ad all other parts contacting water shall be protected with an electrostatically-applied, polyester-epoxy coating.

2.03 BLOWER WHEEL, DRIVES, AND MOTORS

A. Unit shall contain a forward, curved blower wheel rigidly constructed of hot-dipped galvanized steel.

B. Blower wheel shall be balanced for quiet operation and extended life. Pulley shall be cast iron and shall have a split taper bushing.

C. Blower shaft shall be solid and shall be seated to the blower pulley with a key and keyway.

D. Blower bearings shall be permanently lubricated sealed ball bearings and shall have a cast iron pillow block.

E. Single-phase motors shall be thermally protected. Starters for three-phase motors shall be provided with magnetic and thermal overload protection. motor mounts shall be adjustable screw type.

2.04 EVAPORATIVE MEDIA

Evaporative media shall consist of specially corrugated cellulose material impregnated with insoluble antirot salts and rigidifying saturants.

2.05 PUMP AND WATER DISTRIBUTION SYSTEM

A. Water shall be distributed to the evaporative media pads via hose and distributor pipe.

B. Pumps shall be evaporative cooler pumps encased in corrosion-resistant flame retardant plastic.

2.06 OPERATION CONTROLS

A. Provide line-voltage cooling thermostat control for fan motor as indicated on the drawings. Mount four feet six inches above finish floor.

B. Provide a manual switch for continuous operation of water-circulating pump when unit is activated for the cooling season.

PART 3 EXECUTION

3.01 INSTALLATION

Install evaporative coolers in accordance with manufacturer's installation instructions.

END OF SECTION

SECTION 15860

CENTRIFUGAL FANS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Centrifugal Fans as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15140 - Supports and Anchors

B. Section 15190 - Mechanical Identification

C. Section 15242 - Vibration Isolation

D. Section 15890 - Ductwork

E. Section 15910 - Ductwork Accessories

F. Section 15990 - Testing and Balancing

PART 2 PRODUCTS

2.01 DIRECT DRIVE FORWARD CURVED CENTRIFUGAL FANS

A. Direct drive fans shall be single width with single inlet housings.

B. The housing shall be constructed of heavy gauge galvanized steel with lock formed seams for no air leakage and shall be field rotatable to any of the eight standard discharge positions.

C. The housing supports shall be constructed of heavy gauge galvanized steel member to prevent vibration and rigidly support the motor and wheel.

D. The fan wheel shall be constructed of heavy gauge aluminum with uniform stamped blades.

E. Wheels shall be statically and dynamically balanced. The wheel cone and fan inlet cone shall be carefully matched for maximum performance and operating efficiency.

F. Motors shall be of heavy duty ball bearing type and the horsepower shall be matched to the fan load.

2.03 BELT DRIVEN CENTRIFUGAL FANS

A. Belted driven centrifugal fans shall be single width with single inlet housings.

B. The housing shall be constructed of heavy gauge steel with lock formed seams for no air leakage and shall be field rotatable to any of the eight standard discharge positions.

C. The housing and bearing supports shall be constructed of welded steel members to prevent vibration and rigidly support the shaft and bearings.

D. Forward curved wheel shall be constructed of die formed steel blades securely riveted to a rigid back pate and rim.

E. Backward inclined wheels shall be constructed of heavy gauge, single thickness blades securely riveted or welded to a heavy gauge backplate and wheel cone.

F. Wheels shall be statically and dynamically balanced. The wheel cone and fan inlet cone shall be carefully matched for maximum performance and operating efficiency.

G. Motors shall be of the heavy duty ball bearing type.

H. The fan shaft shall be ground and polished and mounted in heavy duty, permanently sealed pillow-block ball bearings.

I. Pulleys shall be of the fully machined cast iron type keyed and securely attached to the wheel and motor shafts. The motor pulley shall be adjustable for final system balancing.

J. All structural steel parts shall be phosphatized and finished with an epoxy coating.

2.04 ACCESSORIES

A. Weather hoods: Weather hoods shall be provided for all fans exposed to exterior or adverse conditions.

B. Belt guards: Three-sided steel belt guards shall be provided whenever weather hoods are not provided.

C. Backdraft dampers: Gravity parallel blade backdraft dampers shall be provided where indicated on the drawings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install fans as specified, with resilient mountings and flexible electrical leads. See Section 15242.

B. Install flexible connections specified in Section 15910 between fan inlet and discharge ductwork. Ensure metal bands of connectors are parallel, with minimum one inch flex between ductwork and fan while running.

C. Provide sheaves required for final air balance.

D. Provide safety screen where inlet or outlet is exposed.

G. Provide backdraft dampers on discharge of exhaust fans as indicated.

END OF SECTION

SECTION 15865

WELDING EXHAUST SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install the Welding Exhaust System as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15242 - Vibration Isolation

B. Section 15860 - Centrifugal Fans

C. Section 15890 - Ductwork

D. Section 15910 - Ductwork Accessories

PART 2 PRODUCTS

2.01 EXHAUST FUME HOOD

Furnish and install welding exhaust fume hoods of sizes, slot width, and capacities as indicated on the drawings. The hoods will be fabricated of minimum 22 gage galvanized steel and shall meet the criteria for "Welding Benches" as described in the Industrial Ventilation Manual.

2.02 WELDING FUME RECEPTOR

The welding fume receptor shall be formed from high impact rated ABS thermoset polymer compound with high heat resistance capabilities in a low resistance elliptical air entry design with flanged perimeter.

2.03 FLEXIBLE TUBING

The flexible tubing shall be manufactured using a flame retardant, oil resistant polyester fabric with spatter repellent characteristics. It shall be of single ply, double overlap construction having a totally enclosed nylon helix and shall have a textured wear strip for abrasion resistance.

2.04 WELDING EXHAUST FAN

The fan shall be a belt driven centrifugal fan with single inlet, single width, and shall have a backward inclined fan wheel with single thickness flat blades.

PART 3 EXECUTION

3.01 INSTALLATION

A. Fans shall be provided with vibration isolation in accordance with Section 15242 and vibration isolation rails of size and type to match fan.

B. Fans shall be installed in accordance with Section 15860.

C. Ductwork shall be fabricated and installed in accordance with Section 15890.

3.02 CLEANING, TESTING AND BALANCING

A. Clean duct system in accordance with Section 15890.

B. Air testing and balancing shall be accomplished in accordance with Section 15990.

END OF SECTION

SECTION 15870

POWER VENTILATORS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Power Ventilators as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15190 - Mechanical Identification

B. Section 15242 - Vibration Isolation

C. Section 15890 - Ductwork

D. Section 15910 - Ductwork Accessories

E. Section 15990 - Testing and Balancing

PART 2 PRODUCTS

2.01 ROOF AND SIDEWALL EXHAUSTERS

A. Centrifugal fan unit: V-belt or direct driven, heavy gage aluminum housing on rigid support structure; motor and wheel assembly mounted on vibration isolators; wheels dynamically and statically balanced; wire birdscreen; square base to suit roof curb with continuous curb gaskets; secured with cadmium plated bolts and screws.

B. Motor: Isolated from exhaust air stream; cooling air free from discharge contaminants; heavy duty type with permanently lubricated, sealed ball bearings.

2.02 CEILING AND CABINET EXHAUST FANS

A. Housing: Galvanized steel housing; acoustically lined with 1/2 inch thick insulation; adjustable mounting brackets for ceiling thickness; discharge outlet adaptable to horizontal or vertical positions; backdraft damper provided in throat of discharge; expanded aluminum mesh ceiling grille.

B. Motor: Permanently lubricated shaded pole motor; mounted on resilient elastic grommets; internally mounted terminal box for motor hook-up.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure roof exhausters with lag screws to roof curb.

END OF SECTION

SECTION 15885

AIR TREATMENT EQUIPMENT

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Air Treatment Equipment as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15140 - Supports and Anchors

B. Section 15190 - Mechanical Identification

C. Section 15890 - Ductwork

D. Section 15990 - Testing and Balancing

PART 2 PRODUCTS

2.01 LOW EFFICIENCY FLAT DISPOSABLE FILTERS

Filter media shall be 1-inch thick, spun glass fiber with perforated 28 gauge metal retainer with minimum 82% open area.

2.02 20% MEDIUM EFFICIENCY PLEATED PANEL FILTERS

Filter shall be 1-inch thick, pleated, disposable type. Filter media shall be of the non-woven cotton fabric type with average efficiency of 20% on ASHRAE Test Standard 52-76. It shall have an average arrestance of 85% in accordance with the standard.

2.03 30% MEDIUM EFFICIENCY PLEATED PANEL FILTERS

Filter shall be 2-inch thick, pleated, disposable type. Filter media shall be of the non-woven cotton fabric type with an average efficiency of 25-30% on ASHRAE Test Standard 52-76. It shall have an average arrestance of 90-92% in accordance with that standard.

2.04 FILTER HOUSING

Housing shall accommodate a single-stage filter system up to a depth of 6 inches and be suitable for exterior installation.

2.05 FILTER GAUGES

Provide differential pressure gauge for measuring air pressure drop across filter housings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install air cleaning devices in accordance with manufacturer's instructions.

B. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.

C. Do not operate fan system until filters (temporary or permanent) are in place.

D. Install filter gauge static pressure tips 12 inches upstream and 12 inches downstream of filter housings.

END OF SECTION

SECTION 15890

DUCTWORK

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Ductwork as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15140 - Supports and Anchors

B. Section 15190 - Mechanical Identification

C. Section 15290 - Mechanical Insulation

D. Section 15910 - Ductwork Accessories

E. Section 15990 - Testing and Balancing

1.03 DEFINITIONS

A. Duct sizes: Dimensions shown are net clear inside dimensions.

B. 1-inch pressure class: 1/2 inch to 1 inch water gauge.

C. 2-inch pressure class: 1 inch to 2 inch water gauge.

PART 2 PRODUCTS

2.01 MATERIALS

A. General: Class 0 - non-combustible or conforming to requirements for Class 1 air duct materials having a flame-spread index of not over 25 without evidence continued progressive combustion and a smoke-developed index of not over 50.

B. Steel ducts: ASTM A 525 galvanized steel sheet, lock-forming quality, having zinc coating of 1.25 ounces per square foot for each side.

C. Aluminum ducts: ASTM B 209 aluminum alloy sheet and plate, aluminum gage thicknesses for duct construction shall be shown on Table 1-14 of the SMACNA HDS.

D. Flexible ducts: Flexible duct shall be UL approved and listed as Class 1, UL 181. Duct shall consist of a galvanized wire continuously encapsulated with layers of polyester to form an airtight inner duct, 1-inch thick blanket of fiber glass insulation and tough vinyl jacket sheeting. K factor shall not exceed .24 BTU•in/ft^2•deg F•hr at 75°F mean temperature.

2.02 DUCTWORK

A. Fabricate steel ducting and support in accordance with SMACNA HDCS. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

B. Evaporative cooling system ductwork and exhaust air ductwork from shower rooms shall be of aluminum construction.

C. Size round ducts installed in place of rectangular ducts in accordance with SMACNA HDSD Table 6-1 of equivalent rectangular and round ducts.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide necessary hangers and supports in accordance with SMACNA HDCS, Tables 4-1 to 4-3 and Figure 4-1 to 4-8.

B. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

C. During construction provide temporary closure of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

3.02 ADJUSTING AND CLEANING

A. Clean duct system and force air at high velocity through duct to remove accumulated dust.

B. Clean duct systems with high power vacuum machines.

C. Testing and balancing shall be accomplished in accordance with Section 15990.

END OF SECTION

SECTION 15910

DUCTWORK ACCESSORIES

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install all Ductwork Accessories as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15190 - Mechanical Identification

B. Section 15890 - Ductwork

C. Section 15990 - Testing and Balancing

PART 2 PRODUCTS

2.01 VOLUME CONTROL DAMPERS

Fabricate in accordance with SMACNA HDCS and as indicated.

2.02 FIRE DAMPERS

A. Provide UL listed curtain-type fire dampers of galvanized steel with interlocking blades.

B. Provide UL listed ceiling dampers at ceiling diffuser/grille HVAC penetrations of all 2-hour or less UL rated ceiling assemblies.

2.03 BACKDRAFT DAMPERS

A. Gravity backdraft dampers, size 18 x 18 inches or smaller, furnished with air moving equipment, may be air moving equipment manufacturer's standard construction.

B. Fabricate multi-blade, parallel action gravity balanced backdraft dampers of 16 gage galvanized steel or extruded aluminum with center pivoted blades of maximum 6 inches width, with felt or flexible vinyl sealed edges, lined together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.04 MOTORIZED DAMPERS

A. Blades shall be 6-inch, 16 gage and mounted horizontally with nylon bearings.

B. Frames shall be constructed of 13 gage galvanized steel channel with spring-loaded stainless steel side seals.

C. Unit shall be provided with 4-inch long, 1/2 inch diameter extendable axles for use with externally mounted motor.

D. Unit shall be complete with damper linkage assembly and motor control as indicated on the drawings.

2.05 AIR TURNING DEVICES

A. Extractor: Multi-blade device with radius blades attached to pivoting frame and bracket, steel or aluminum construction with rotary operated knob.

B. Turning Vanes: Provide turning vanes in square or mitered elbows in rectangular ducts.

2.06 FLEXIBLE DUCT CONNECTIONS

Fabricate in accordance with SMACNA HDCS and provide where indicated on the drawings.

2.07 DUCT ACCESS DOORS

Fabricate in accordance with SMACNA HDCS and provide where indicated on the drawings.

2.08 DUCT TEST HOLES

A. Cut or drill temporary test holes in ducts as required.

B. Permanent test holes shall be factory fabricated, air tight flanged fittings with screw cap.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions.

B. Use splitter dampers only where indicated.

C. Provide balancing dampers where indicated.

D. Provide fire dampers at locations indicated.

E. Provide backdraft dampers on exhaust fans where indicated.

F. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.

G. Provide duct access doors as indicated.

END OF SECTION

SECTION 15930

VARIABLE AIR VOLUME CONTROL SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Variable Air Volume Control System as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15781 - Packaged Air Conditioning/Heat Pump Units

B. Section 15890 - Ductwork

C. Section 15990 - Testing and Balancing

PART 2 PRODUCTS

2.01 CENTRAL SYSTEM CONTROLLER

A. Central system controller shall replace the thermostat function for the packaged air conditioning/heat pump unit.

B. Unit shall be capable of controlling up to 16 zone VAV dampers.

2.02 VARIABLE AIR VOLUME DAMPER

Damper shall be complete with an individual zone controller.

2.03 ZONE THERMOSTAT

A. Zone controller shall sense zone temperature through a thermistor element located in the zone thermostat.

B. Zone thermostat shall have a communications jack to communicate with the zone controller.

PART 3 EXECUTION

3.01 INSTALLATION

Install units in accordance with manufacturer's instructions.

3.02 MANUFACTURER'S FIELD SERVICES

A. Provide initial start-up by a factory authorized technical following manufacturer's instructions.

B. Provide a warranty certificate attesting that the equipment has been installed in accordance with the manufacturer's installation instructions.

END OF SECTION

SECTION 15936

AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Air Outlets and Inlets as indicated on the Drawings.

1.02 RELATED WORK

A. Section 15890 - Ductwork

B. Section 15990 - Testing and Balancing

PART 2 PRODUCTS

2.01 ROUND CEILING DIFFUSERS

Round, stamped or spun, multicore diffuser to discharge air in 360 degree pattern, with sectorizing baffles where indicated.

2.02 PERFORATED FACE CEILING DIFFUSERS

Perforated face with fully adjustable two-way, three-way, or four-way grille behind removable perforated faces. Deflection type shall be as noted on drawings.

2.03 PERFORATED FACE RETURN AIR GRILLES

Perforated face with 1-1/4 inch flat border for lay-in tee bar ceiling.

2.04 CEILING SUPPLY REGISTERS/GRILLES

Streamlined and individually adjustable curved blades to discharge air along face of grille, two-way, three-way, or four-way deflection as noted on drawings.

2.05 CEILING GRID CORE EXHAUST AND RETURN REGISTERS/GRILLE

The core shall be an egg crate type grid with 1/2 x 1/2 inch square openings. Core shall be 1/2 inch deep.

2.06 WALL SUPPLY REGISTERS/GRILLES

Streamlined and individually adjustable blades, depth of which exceeds 3/4 inch vertical front face, double deflection.

2.07 WALL EXHAUST AND RETURN REGISTERS/GRILLES

Streamlined blades, depth of which exceeds 1/2 inch spacing, horizontal deflection vanes set at 35 degree angle.

2.08 LINEAR SLOT DIFFUSERS

Designed to mount over the "T" of most standard, exposed "T" suspended ceilings. Constructed of 26 gage galvanized steel.

2.09 FLOOR GRILLES

Aluminum construction with 3/16 inch by 3/4 inch bars spaces on 1/2 inch centers.

2.10 DOOR GRILLES

V-shaped louvers of 20 gage steel, one inch deep on 1/2 inch centers. Double flat frame with 1-1/4 inch margin. Adjusts to fit door thickness from 1-3/8 inch to 2 inch.

2.11 OUTSIDE AIR INTAKE LOUVERS

A. Provide 4 inch deep louvers with "J" blades on 30 or 45 degree slope, heavy channel frame, birdscreen with 1/2 inch square mesh.

B. Fabricate of steel or extruded aluminum, welded assembly, with factory prime coat and baked enamel finish per SMACNA HDCS.

2.12 ROOF HOODS

A. Fabricate air inlet or exhaust hoods in accordance with SMACNA HDCS.

B. Fabricate of galvanized steel, minimum 16 gage base and 20 gage hood or aluminum, minimum 16 gage base and 18 gage hood; suitably reinforced; with removable hood; birdscreen with 1/2 inch square mesh for exhaust and 3/4 inch square mesh for intake; factory baked-enamel finish on steel, color anodized finish on aluminum.

PART 3 EXECUTION

3.01 INSTALLATION

Install items in accordance with manufacturer's instructions.

END OF SECTION

SECTION 15990

TESTING AND BALANCING

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to perform the required Testing and Balancing of the Heating, Ventilating, and Air Conditioning (HVAC) systems to the performance criteria indicated on the Drawings.

1.02 RELATED WORK

Section 15890 - Ductwork

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

3.01 PREPARATION

A. The Contractor shall procure the services of an independent Air Balancing and Testing Agency (ABTA), approved by the Engineer. The ABTA shall obtain from the Contractor the following:

1. Contract drawings.
2. Applicable specifications.
3. Addendas.
4. Change orders.
5. Approved HVAC shop drawings.
6. Approved HVAC equipment manufacturer's submittal data.
7. Approved temperature control drawings.

B. The Contractor is responsible for start-up and operation of systems during testing and balancing. Start-up shall include the following:

1. All equipment operable in safe and normal condition.

2. Temperature control systems installed complete and operable.

3. Proper thermal overload protection in place for electrical equipment.

4. Air systems

   a. Final filters clean and in place. If conditions warrant, the Contractor shall install temporary media in addition to the final filters.

   b. Duct sytems clean of debris.

   c. Correct fan rotation.

   d. Fire and volume dampers in place and open.

   e. Coil fins cleaned and combed.

   f. Access doors closed and duct end caps in place.

   g. All outlets installed and connected.

   h. Duct system leakage shall not exceed the rate specified.

C. If it is determined by the ABTA that drive changes are required, the supplier of the equipment shall obtain and install all necessary new components.

D. The ABTA shall coordinate services with work of various trades to ensure rapid completion of services.

E. The ABTA shall verify control system operation as specified; however, shall limit its activities to setting controls to a proper fixed mode to prevent any changes during the balancing procedure.

F. The ABTA shall promptly report to the Engineer any deficiencies noted during performance of services to allow immediate corrective action.

3.02 AIR BALANCING

A. The ABTA shall perform the following tests and balance all air handling systems in accordance with the following requirements:

1. Test and adjust blower rpm to design requirements.

2. Test and record motor full load amperes.

3. Test and record system static pressures.

4. Perform duct traverses and record air flows.

5. Test and adjust each supply diffuser to within -5% to +10% of design requirements. Measure CFM at each exhaust grille.

   a. Identify each diffuser and grille as to location and area.

   b. Identify and list sizes, types, and manufacturers of diffusers, grilles, and all testing equipment. Use manufacturers ratings on all equipment to make required calculations.

   c. In readings and tests of diffusers and grilles, include required FPM velocity and test FPM velocity and required CFM and test CFM after adjustments.

6. Adjust outside air automatic dampers, outside air, return air and exhaust dampers for design conditions.

7. In cooperation with the control manufacturer's representative, set adjustments of automatically operated devices to operate as specified, indicated, and noted.

8. Evaluate building and room pressure conditions to determine adequate supply and return air conditions.

9. Adjust all diffusers, grilles, and registers to minimize drafts in all areas.

10. Mark all balancing dampers and cocks.

3.03 FINAL REPORT

A. Systems acceptance is predicated upon successful completion of specified work, receipt by the Engineer of certified data summarizing the performance of all systems within design intent, and approval thereof.

   1. Data shall be arranged by system and identified apparatus and items, utilizing standard forms where possible and supplementing with reasonable facsimiles where necessary.

B. Following final acceptance of reports by the Engineer, the setting of all valves splitters, dampers, and other adjustment devices shall be permanently marked by the ABTA

so that adjustment can be restored if disturbed at any time.

C. Test reports shall be provided on all air and water systems tested, and shall include data for the following items (as applicable):

1. Air Moving Equipment Test Sheets.

2. Exhaust Fan Data Sheets.

3. Static Pressure Profile Sheets.

4. Return Air/Outside Air Data Sheet.

5. Duct Traverse Readings.

6. Duct Traverse Zone Totals.

7. Air Monitoring Station Data.

8. Air Distribution Test Sheet.

END OF SECTION

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 WORK INCLUDED

The work included in this Section describes Basic Electrical Requirements specifically applicable to Division 16 Sections. This Section applies to all Sections of Division 16 unless specified otherwise in the individual section.

PART 2 PRODUCTS

2.01 DELIVERY AND STORAGE: Equipment and materials shall be properly stored and adequately protected and carefully handled to prevent damage before and during installation.

2.02 CATALOGED PRODUCTS: Materials and equipment shall be the cataloged products of manufacturers regularly engaged in production of such material or equipment and shall be manufacturer's latest standard design that complies with the specifications requirements.

PART 3 EXECUTION

3.01 MANUFACTURER'S RECOMMENDATIONS

Where installation procedures are specified to be in accordance with the recommendations of the manufacturer of the material or equipment being installed, printed copies of these recommendations shall be furnished to the DOE prior to installation.

3.02 COORDINATION WITH MECHANICAL SPECIFICATION REQUIREMENTS

The interconnecting power wiring and conduit, control wiring with a rated 600 volts insulation class and conduit, the motor-control equipment forming a part of motor-control centers, of switchgear assemblies, and the electrical power circuits are included under this Division. The electrical components of mechanical equipment, such as motors, motor starters, control or push-button stations, float or pressure switches, solenoid valves, and other circuits rated 100 volts or less shall be as specified in Division 15 covering such work rather than in Division 16.

3.03 COORDINATION

Electrical work shall be coordinated with other trades involved in the construction project.

END OF SECTION

SECTION 16110

CONDUIT

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install electrical Conduit as indicated on the Drawings.

1.02 RELATED WORK

A. Section 16050 - Basic Electrical Materials and Methods

B. Section 16121 - Electrical Cable & Wire

PART 2 PRODUCTS

2.01 CONDUIT

A. Rigid Steel Conduit (Zinc Coated): ANSI C80.1.

B. Rigid Non-metallic Conduit: PVC Type EPC-40 in accordance with NEMA TC2, or UL approved Fiberglass Reinforced Epoxy (FRE).

C. Intermediate Metal Conduit (IMC): UL 1242, zinc coated steel only.

D. Electrical metallic tubing (EMT): ANSI C80.3

E. Plastic-coated Rigid Steel and IMC Conduit: NEMA RN1, Type 40.

F. Flexible Metal Conduit: UL 1

G. Liquid-tight Flexible Metal Conduit (Steel): UL 360.

H. Minimum conduit size shall be 1/2 inch trade diameter above ground and 1 inch trade diameter in or under floor slabs.

2.02 FITTINGS

A. Fittings for metal conduits, electrical metallic tubing, or flexible metal conduit shall be cadmium or zinc coated in accordance with UL 514.

B. Fittings for rigid metal conduit and IMC shall be threaded type. Split couplings are not acceptable.

2.03 CONDUIT AND FITTINGS

Conduit and fittings embedded in concrete, including all end bells, couplings, bends, etc. shall be specially manufactured for use with the conduit installed.

PART 3 EXECUTION

3.01 INSTALLATION

A. All electrical installations shall be installed in a neat and workmanlike manner by competent, trained personnel in accordance with the Specifications, the Drawings, the National Electrical Code (NFPA 70), and the manufacturer's written instructions.

B. The Contractor shall be responsible for coordinating conduit work to avoid interference between the trades.

3.02 FIELD QUALITY CONTROL

Field inspection shall be performed while work is in progress to ensure compliance with these specifications and other applicable documents.

END OF SECTION

SECTION 16121

ELECTRICAL CABLE & WIRE

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all material, tools, equipment, and labor necessary for the installation, inspection, and testing of all power, control, and instrumentation cable and wire.

1.02 RELATED WORK

A. Section 16050 - Basis Electrical Materials and Methods

B. Section 16376 - Subsurface Electrical Distribution

1.03 SERVICE CONDITIONS

All materials described in this Section shall be suitable for installation in abrasive dust laden atmosphere in underground mine and in tunnels. Temperature limits are from 0°C TO 50°C and Humidity variations from 10% to 90%.

PART 2 PRODUCTS

2.01 CABLE CONSTRUCTION

A. Medium-Voltage (15 kV) Mine Feeder Cable: 15 kV power cable shall be used on a 12.47 kV, 60 Hz, resistance-grounded system having maximum short circuit current to be determined. Cable shall be suitable for continuous operation at a conductor temperature of 90°C (194°F) in a wet or dry location and suitable for installation in abrasive dust environment. General type shall be "MPF-GC".

B. Medium-Voltage (5 kV) Mine Feeder Cable, Subsurface: 5 kV power cable shall be used on a 4.16 kV, 60 Hz, resistance grounded system having maximum short circuit current to be determined. Cable shall be capable of continuous operation at a conductor temperature of 90°C (194°F) in a wet or dry location and suitable for installation in abrasive dust environment. General type shall be "MPF-GC".

C. Low Voltage (600 V) Power and Lighting Cable, Surface: Power and lighting cable shall be single conductor rated

600 V, 60 Hz, suitable for continuous operation at conductor temperature of 90°C (194°F) for dry locations and 75°C (167°F) for wet locations, to be used in raceways at the surface facilities.

D. Low-Voltage (600 V) Power and Lighting Cable, Subsurface: Power and lighting cable shall be multi-conductor, rated 600 V, 60 Hz, capable for continuous operation at conductor temperature of 90°C (194°F) for wet and dry locations below ground surface.

E. Low-Voltage (600 V) Control Cable, Surface and Subsurface: Control cable shall be multi-conductor, rated 600 V, 60 Hz, capable of continuous operation at a conductor temperature of 90°C (194°F) in wet and dry locations. Cable shall consist of multi-conductors as shown or required with a minimum size of No. 14 AWG.

F. Instrument Wire and Cable: UL listed, shielded 600 V grade, single or multiple twisted pair, coated stranded copper conductors, ethylene-propylene insulation, aluminum tape shield with coated copper drain wire over each pair and aluminum mylar shield over cable, inner neoprene jacket, continuous smooth aluminum sheath and outer flame retardant neoprene or hypalon jacket in conformance with NEMA WC 8.

PART 3 EXECUTION

3.01 INSTALLATION

A. Codes and Standards: Wire and cable shall be installed to comply with ANSI C2 and NFPA 70. Cables in mine shall in addition comply with 30 CFR 18, 30 CFR 57, and as applicable to specific requirements.

3.02 FIELD QUALITY CONTROL

A. Field Inspection: Inspection shall be performed while work is in progress to ensure compliance with the technical and quality requirements of these specifications and other applicable documents.

B. Field Testing: The Contractor shall perform the tests specified in accordance with applicable testing requirements contained in applicable codes and standards, or defined elsewhere in this specification.

END OF SECTION

SECTION 16200

STANDBY POWER GENERATION

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to deliver, install, and field test the Standby Power Generation equipment as specified herein and indicated on the Drawings.

1.02 RELATED WORK

A. Section 16050 - Basic Electrical Materials and Methods

B. Section 16121 - Electrical Cable & Wire

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

All materials and equipment shall be UL listed, where such UL listings are established, and shall meet the requirements of all applicable codes and standards.

2.02 DIESEL-ELECTRIC GENERATING UNITS AND AUXILIARY EQUIPMENT

A. Each generating unit shall consist of a diesel engine directly connected to an alternating current generator having a brushless excitation system. Assemble the engine-generator with all necessary accessories and auxiliary equipment into a complete self-contained unit capable of operating independently or in parallel with other units and the servicing utility.

B. Each generating unit shall operate satisfactorily in parallel with any combination of units on the system. Provide all control devices necessary to synchronize the generators with utility power source for power transferring from emergency power to normal or to synchronize generators for parallel operation.

C. Factory mount diesel generating unit and its auxiliaries, except the fuel tank and exhaust silencer, on a common base fabricated of structural steel sections. The structural base shall be of the skid type and shall have adequate strength and rigidity to maintain alignment of the equipment mounted thereon without dependence on a

concrete foundation. Exhaust silencer to be field erected. All necessary piping to make a complete installation shall be furnished.

2.03 MISCELLANEOUS EQUIPMENT AND PIPING

A. Each generator shall be equipped with standard manufacturer's space heater to prevent moisture buildup in generator windings.

B. One fuel oil day tank of standard manufactured volume shall be provided for each generating unit.

PART 3 EXECUTION

3.01 INSTALLATION

A. Installation of Diesel Generating Unit: Install diesel generating unit on a concrete foundation. Manufacturer of diesel-generator skid mounted unit shall submit ten copies of calculations of all design loads, including a torsional analysis for use in the design of a suitable foundation.

B. Anchor Bolts and Sleeves: Provide anchor bolts and sleeves for installation of the unit on concrete foundation.

3.02 FIELD TESTS AND INSPECTIONS

Perform all field tests and trial operations and conduct all field inspections.

END OF SECTION

SECTION 16315

4160/480 V MINE POWER CENTER

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to manufacture, deliver, install, and field test the 4160/480 V Mine Power Center as specified herein and indicated on the Drawings.

1.02 RELATED WORK

A. Section 16050 - Basic Electrical Materials and Methods

B. Section 16121 - Electrical Cable & Wire

C. Section 16376 - Subsurface Electrical Distribution

D. Section 16671 - Grounding and Lightning Protection System

1.03 FUNCTIONAL REQUIREMENTS

A. Primary service to the 4.16 kV/480 V subsurface mine power center is derived from a 4.16 kV, 3-phase, 60 Hz grounded system, secondary wye connected with the neutral grounded through a 25 amp continuous rated resistor.

B. The secondary power from the mine power center shall be 480 V, 3-phase, 3-wire, 60 Hz, neutral grounded through a 25 amp. continuous rated resistor.

C. All medium and low voltage mine power center switchgear shall be a non-walk-in indoor type and shall form a line-up of connected freestanding, floor mounted, metal enclosures.

D. The switchgear line-ups shall include a full length copper ground bus provided with a clamp type terminal having a range of 40 to 500 MCM.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURES

A. Westinghouse - Secondary Unit Substation

B. General Electric - Secondary Unit Substation

C. Square D Company - Secondary Unit Substation

2.02 MATERIALS AND EQUIPMENT

A. 5.0 kV Load-Break Switchgear

B. 4160/480-277 V Dry-Type Transformers

C. 480 V Low Voltage Bus Duct

D. 480 V Low Voltage Switchboards

E. Nameplates and Signs

2.03 Supplier's Quality Control

A. Factory Inspection - Factory inspection shall be performed to the extent necessary.

B. Factory Testing - Perform the tests specified in accordance with applicable testing standards.

C. Shop inspection by DOE.

PART 3 EXECUTION

3.01 INSTALLATION/APPLICATION/ERECTION

A. Installation shall be in accordance with ANSI C2, NFPA 70, and MSHA 30 CFR 57 requirements.

B. Erection: Underground distribution substation shall be installed as shown on the Drawings and in accordance with the manufacturer's written recommendations.

3.02 MANUFACTURER'S FIELD SERVICE

A. Training: Prior to the final systems acceptance, the CONTRACTOR shall conduct training sessions in order to familiarize operational personnel with proper operating procedures for the systems. The duration and the agenda of the training sessions shall be according to the Vendor's standard training program.

END OF SECTION

SECTION 16316

PORTABLE, SKID MOUNTED 4160/480 V SUBSURFACE POWER CENTER

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to manufacture, deliver, install, and field test the Portable, Skid Mounted 4160/480 V Subsurface Power Center as specified herein and indicated on the Drawings.

1.02 RELATED WORK

A. Section 16050 - Basic Electrical Materials and Methods

B. Section 16121 - Electrical Cable & Wire

C. Section 16376 - Subsurface Electrical Distribution

D. Section 16671 - Grounding and Lightning Protection System

1.03 GENERAL REQUIREMENTS

A. 5.0 kV metal enclosed switchgear with accessories.

B. 4.16 kV - 480 Y/277 V, dry-type, ventilated transformer with accessories.

C. 25 amp continuous rated neutral grounding resistor internally installed, as required.

D. 480 V switchboard with main breaker and feeder breaker (4 each) item and instrumentation metering.

E. 480 V phase and ground over-current protective devices, ground check monitors and instrumentation metering.

1.04 FUNCTIONAL REQUIREMENTS

A. Primary service to the portable, skid mounted 4.16 kV/480 V subsurface mine power center is a 4.16 kV, 3-phase, 60 Hz grounded system, secondary wye connected with the neutral grounded through a 25 amp continuous rated resistor.

B. The secondary power from the portable power center shall be 480 V, 3-phase, 3-wire, 60 Hz, neutral grounded through an internal 25 amp continuous rated resistor.

C. All medium and low voltage portable mine power center switchgear shall be a nonwalk-in indoor type and shall form a line-up of connected freestanding, skid mounted, metal enclosures. The power center shall be made as low profile as possible for portability.

D. The skid shall be of adequate design to support all components of the power center and shall allow bolting of all electrical components to the skid. Strength of the assembly shall be made adequate to allow lifting by fork lift or other means.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Westinghouse - Secondary Unit Substation

B. General Electric - Secondary Unit Substation

C. Square D Company - Secondary Unit Substation

2.02 MATERIALS AND EQUIPMENT

A. 5.0k V Load-Break Switchgear

B. 4160/480-277 V Dry-type Transformer

C. 480 V Low Voltage Bus

D. 480 V Low Voltage Switchboards

E. Nameplates and Signs

2.03 SUPPLIER QUALITY CONTROL

A. Factory Inspection - Factory inspection shall be performed to the extent necessary.

B. Factory Testing - Perform the tests specified in accordance with applicable testing standards.

PART 3 EXECUTION

3.01 INSTALLATION

Installation shall be in accordance with ANSI C2, NFPA 70, and MSHA 30 CFR 57 requirements.

3.04 MANUFACTURER'S FIELD SERVICE

Training: Prior to the final systems acceptance, the CONTRACTOR shall conduct training sessions in order to familiarize operational personnel with proper operating procedures for the systems. The duration and the agenda of the training sessions shall be according to the Vendor's standard training program.

END OF SECTION

SECTION 16361

MEDIUM VOLTAGE CONTROLLERS AND FUSED DISCONNECTS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all material, tools, equipment, and labor necessary for the installation, inspection, and testing of medium voltage controllers, line-ups, and 5 kV fused disconnects as indicated on the Drawings.

1.02 RELATED WORK

A. Section 16050 - Basic Electrical Materials and Methods

B. Section 16121 - Electrical Cable & Wire

Part 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

All materials and equipment shall be NEMA listed where listing is applicable.

2.02 MEDIUM VOLTAGE CONTROLLER LINE-UP

A. The controller line-up shall conform to the requirements of applicable ANSI, NEMA IC6 and UL 347.

B. The medium voltage controller line-up enclosure will be a free-standing, dead front, metal enclosed unit, NEMA Type 4, outdoor, water and dust tight.

2.03 INDIVIDUAL CONTROLLERS

A. Controllers shall conform to the requirements of applicable NEMA ICS 1, NEMA ICS 2, UL 347, and UL 508.

2.04 MOTOR PROTECTION SYSTEM

All 5 kV motor controllers will include a solid state programmable motor multifunction protection module.

2.05 EQUIPMENT REQUIREMENTS

A. Panel wiring, including front panel wiring, shall be coated, stranded, flexible, switchboard type No. 14 AWG 90°C minimum.

B. Terminal blocks for connection of external wires shall be conveniently located in the control voltage compartment in a vertical column.

2.06 FUSED LOAD-BREAK SWITCHES

A. A line-up of fused load-break switches will be required to service the compressed air system.

2.07 FACTORY INSPECTION AND TESTING

A. Factory Inspection: Factory inspection shall be performed to the extent necessary.

B. Factory Testing: Perform the tests specified in accordance with applicable testing standards.

PART 3 EXECUTION

3.01 INSTALLATION

A. The controller line-up shall be installed in a neat and workmanlike manner and in accordance with the manufacturer's written recommendations.

B. Erection: Indoor controller line-ups shall be installed as shown on the Drawings and in accordance with the manufacturer's written recommendations.

3.02 FIELD INSPECTION AND TESTING

A. CONTRACTOR's Field Inspection: Inspection shall be performed while work is in progress to ensure compliance the technical and quality requirements of this specification and other applicable documents.

B. CONTRACTOR's Field Testing: The Contractor shall perform the tests specified in accordance with applicable testing requirements.

END OF SECTION

SECTION 16376

SUBSURFACE ELECTRIC DISTRIBUTION

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install the Subsurface Electric Distribution system as indicated on the Drawings.

1.02 RELATED WORK

A. Section 16050 - Basic Electrical Materials and Methods

B. Section 16121 - Electrical Cable & Wire

C. Section 16471 - Power Distribution Cables

D. Section 16671 - Grounding and Lightning Protection System

1.03 SERVICE CONDITIONS

The underground electric distribution system shall be installed in a mine classified as "non-gassy" in abrasive dust environment.

PART 2 PRODUCTS

2.01 IN TUNNEL DISTRIBUTION

A. Mine Power Feeder 12.47 kV.

B. Mine Power Feeder 4.16 kV.

C. Mine Communication and Data Collection Cables.

D. Connection Boxes, Outlet and Support

2.02 SUBSURFACE DISTRIBUTION

A. Permanently placed cables and conductors shall be installed either open or in PVC conduit as required, secured to messenger cable with coated cable hangers mounted to the drift wall or roof by suitable cable supports, or attached to support structures mounted on the drift wall.

B. Wall mounted devices are fastened to a steel framework which is attached to the wall by cad-plated anchors. Floor-mounted equipment is placed on a concrete pad or shall be skid mounted.

C. All electrical enclosures for underground electric distribution shall be NEMA 3.

D. The dry type transformer shall be insulated with insulation to 185°C and temperature rise of 115°C with 40°C maximum ambient temperature. Insulation materials shall be flame retardant and shall not support combustion as defined in ASTM Standard Test Method D 635.

E. The conditioned power transformer shall combine the common mode and normal mode noise rejection characteristics with the voltage regulating properties.

F. Conduit and Fittings:

1. Rigid Steel Conduit: Shall be provided in accordance with ANSI C80.1.

2. Rigid Nonmetallic Conduit: PVC Type EPC-40 in accordance with NEMA TC2, TC3 or UL approved fiberglass reinforced epoxy (FRE).

3. Intermediate Metal Conduit (IMC): UL 1242, zinc-coated steel only.

4. Plastic-Coated Rigid Steel and IMC Conduit: NEMA RN1, Type 40 (40 mils thick).

5. Flexible Metal Conduit: UL 1

6. Liquid-Tight Flexible Metal Conduit (Steel): UL 360.

G. Cabinets, Junction Boxes, and Pull Boxes.

H. Breakers Used as Switches.

I. Pilot Lights.

J. Disconnect Switches: NEMA KS1.

K. Fuses.

L. Nameplates, Tags and Markers.

PART 3 EXECUTION

3.01 INSTALLATION

A. All electrical installations shall be installed in a neat and workmanlike manner and in accordance with the manufacturer's written instructions and the National Electrical Code (NFPA 70).

B. Installation of the mine distribution system shall be in accordance with 30 CFR 57, the Drawings, and ANSI-C2.

C. All terminations and splices shall be in accordance with 30 CFR 57.

D. Wiring Methods: Wiring method shall be insulated cables installed on messenger cable, except where specifically indicated or specified otherwise.

G. Cable Tray Installation: Install cable trays as indicated.

H. Boxes, Outlets, and Supports: Provide boxes in the wiring or raceway systems where required.

3.02 FIELD QUALITY CONTROL

A. Field Inspection: Inspection shall be performed while work is in progress to insure compliance with the technical and quality requirements of this specification and the Drawings.

B. Field Testing: The Contractor shall perform the tests specified on the distribution systems in accordance with applicable testing standards.

END OF SECTION

SECTION 16405

ELECTRICAL MOTORS, 460 VOLT

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all material, tools, equipment, and labor necessary for the installation of the 460 volt Electrical Motors as indicated on the Drawings.

1.02 RELATED WORK

Section 16050 - Basic Electrical Materials and Methods

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. All Motors: Totally enclosed fan-cooled (TEFC) equipped with breather and drain. Suitable for continuous duty on 480 V, 60 Hz, 3 phase power system operating at a maximum elevation of 4,500 feet AMSL and a maximum temperature rise of +40°C above ambient.

1. Frames: NEMA MG1 standard frame sizes.

2. Locked-rotor and breakdown tongues, locked-rotor currents and temperature rise to be in accordance with NEMA standard MG1.

3. Service Factor: 1.15 minimum.

4. Insulation Class: Class F or better.

5. Starting: Full voltage, across the line.

6. Shaft: High grade machine steel or steel forging, grease lubricated anti-friction ball bearings.

7. Rotors: High grade steel laminations.

8. Stator Windings: Random or form wound high conductivity copper.

B. Frames and Conduit Boxes: Cast iron or heavy fabricated steel.

C. Motor Leads: Mechanical compression type or terminal lugs, depending on HP.

D. Power Factor Correction Capacitors: Dry metallized film, dielectric type with internal discharge capacitor rated for service on a 480 V, 3 phase, 60 Hz power system.

E. Enclosures for Capacitors: Welded Aluminum suitable for outdoor applications.

F. Motor Nameplate: Stainless steel.

2.02 FABRICATION

Frame size shall be in accordance with NEMA standards for each HP rating.

PART 3 EXECUTION

3.01 INSTALLATION

Installation shall be in accordance with NFPA 70, National Electrical Code, and MSHA 30 CFR 57.

3.02 FIELD TESTING AND INSPECTION

Final acceptance will be made only after all field tests and inspections are complete and acceptable.

END OF SECTION

SECTION 16406

ELECTRICAL MOTORS, 4160 VOLT

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all material, tools, equipment, and labor necessary for the installation of the 4160 volt Electrical Motors as indicated on the Drawings.

1.02 RELATED WORK

Section 16050 - Basic Electrical Materials and Methods

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. All Motors: Totally enclosed fan-cooled (TEFC) equipped with breather and drain. Suitable for continuous duty on 4160 V, 60 Hz, 3 phase power system operating at a maximum elevation of 4,500 feet AMSL and a maximum temperature rise of +40°C above ambient.

1. Frames: NEMA MG1 standard frame sizes.

2. Locked-rotor and breakdown tongues, locked-rotor currents and temperature rise to be in accordance with NEMA standard MG1.

3. Service Factor: 1.15 minimum.

4. Insulation Class: Class F or better.

5. Starting: Full voltage, across the line.

6. Shaft: High grade machine steel or steel forging, grease lubricated anti-friction ball bearings.

7. Rotors: High grade steel laminations.

8. Stator Windings: Random or form wound high conductivity copper.

B. Frames and Conduit Boxes: Cast iron or heavy fabricated steel.

C. Motor Leads: Mechanical compression type or terminal lugs, depending on HP.

D. Power Factor Correction Capacitors: Dry metallized film, dielectric type with internal discharge capacitor rated for service on a 4160 V, 3 phase, 60 Hz power system.

E. Enclosures for Capacitors: Welded Aluminum suitable for outdoor applications.

F. Motor Nameplate: Stainless steel.

2.02 FABRICATION

Frame size shall be in accordance with NEMA standards for each HP rating.

PART 3 EXECUTION

3.01 INSTALLATION

Installation shall be in accordance with NFPA 70, National Electrical Code, and MSHA 30 CFR 57.

3.02 FIELD TESTING AND INSPECTION

Final acceptance will be made only after all field tests and inspections are complete and acceptable.

END OF SECTION

SECTION 16471

POWER DISTRIBUTION PANELS AND PANELBOARDS

PART 1 - GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Power Distribution Panels and Panelboards as indicated on the Drawings.

1.02 RELATED WORK

Section 16050 - Basic Electrical Materials and Methods

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - PANELBOARDS

A. Westinghouse

B. General Electric

C. Square D

2.02 DISTRIBUTION PANELBOARDS - 120/240 Volts, 3 Phase, 3 Wire; 120/208 Volts, 3 Phase, 4 Wire; 277/480 Volts, 3 Phase, 4 Wire; and 480 Volts, 3 Phase, 3 Wire.

A. Panelboards shall be "Dead Front" construction, NEMA 3 [Dust Resistant] and suitable for surface mounting.

B. Panelboard enclosures will be in accordance with NEMA-PB-1, distribution Panelboards suitable for use in a 208Y/120 volt, 3 phase, 4 wire system.

C. Panelboards will be supplied with a minimum of 36 circuits.

D. Panelboards shall be equipped with main breakers, sized as shown in the schedules and provided with ground fault protection in accordance with UL 1053.

E. Panelboards to be circuit breaker equipped.

2.03 LIGHTING PANELS

A. Lighting Panels: UL 50. Panelboards for use as service disconnecting means shall additionally conform to UL 869.

B. Buses: Support bus bars on bases independent of the circuit breakers. Main buses and back pans shall be designed so that breakers may be changed without machining, drilling, or tapping.

C. Circuit Breakers: Ambient-compensated thermal magnetic type with interrupting capacity (as indicated) (of 10,000 amperes symmetrical minimum).

D. Circuit Breaker with Ground-Fault Circuit Interrupter: UL 1053 and NFPA 70.

E. Panelboards shall be 120/240 volt, 3 phase, 3 wire; 120/208 volt, 3 phase, 4 wire; 277/480 volt, 3 phase, 4 wire, or 480 volt, 3 phase, 3 wire; with main lugs or main circuit breaker and type of branch circuits as indicated on lighting schedules.

2.04 POWER PANELS (LOAD CENTERS)

A. All power panels will be dead front enclosed, surface mounted or free standing, as indicated.

B. All power panels will be of dust-resistant (NEMA 3) construction.

C. Power Panels will be 480 volt, 3 phase, 4 wire with copper bus, rated as shown and braced for 20,000 amperes, minimum Integrated Short Circuit Rating.

D. Power Panels are to be provided with molded case circuit breakers with a common trip handle for all poles.

E. All power panels will be provided with a main circuit breaker.

F. All power panels will be equipped with molded case circuit breakers to be used for circuit interrupters.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install panelboards plumb in conformance with NEMA PB1-1.

B. Provide filler plates for unused spaces in panelboards and power panels.

3.02 FIELD QUALITY CONTROL

A. Measure steady state loads currents at each panelboard and/or power panel feeder.

B. Inspect for physical damage, proper alignment, anchorage and/or mounting rigidity, and grounding.

C. Check for correctness of nameplates and circuit directories in panelboards.

END OF SECTION

SECTION 16481

MOTOR STARTERS, 480 V

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all material, tools, equipment, and labor necessary for the installation of the 460 volt Motor Starters as indicated on the Drawings.

1.02 RELATED WORK

A. Section 16050 - Basic Electrical Materials and Methods

B. Section 16376 - Subsurface Electric Distribution

PART 2 PRODUCTS

2.01 MATERIALS

All materials and equipment will be NEMA listed where listing is applicable.

2.02 MOTOR STARTERS - 480 V

A. All motor starters, 480 VAC, will be combination, magnetic motor starters, full voltage, non-reversing except where otherwise noted.

B. All motor starters will be housed in single NEMA 3 (dust tight & watertight) enclosures.

C. All 480 V motor starters will be equipped with the following:

1. Start pushbutton with an indicating light and red lens.

2. Stop pushbutton with an indicating light and green lens.

3. External reset pushbutton.

4. One 150 VA control transformer.

5. One combination magnetic starter.

6. One motor protection system.

7. One 2" high, black-on-white Phenolic identification tag.

8. 2 N.O. and 2 N.C. spare auxiliary contacts

D. Control Transformer: All motor starters will be provided with a 150 VA control transformer, 480/120 volts.

E. Magnetic Starter: All motor starters will have magnetic starters, sized to accommodate the motor HP indicated.

F. Molded Case Circuit Breaker: All motor starters will have molded case thermal-magnetic circuit breakers, NEMA AB.1.

G. Motor Protection System: All motors 2 HP and above will be provided with thermal overload protection.

2.03 OVERCURRENT PROTECTION AND DISCONNECTING MEANS

A. Molded Case Thermal-Magnetic Circuit Breakers.

B. Motor Circuit Protector.

C. Nonfusible Switch Assemblies.

D. Fusible Switch Assemblies.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install motor control equipment in accordance with manufacturer's instructions.

B. Motor Starter Panelboard Installation: In conformance with NEMA PB 1.1.

C. Install fuses in fusible switches.

D. Select and install heater elements in motor starters to match installed motor characteristics.

E. Motor Data: Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

END OF SECTION

SECTION 16484

MOTOR CONTROL CENTERS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all material, tools, equipment, and labor necessary for the installation of the Motor Control Centers as indicated on the Drawings.

1.02 RELATED WORK

Section 16050 - Basic Electrical Materials and Methods

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Ratings:

1. 480 Volts, (600 V max.) 3 phase, 3 wire with ground bus.

2. 42,000 Amps rms minimum bracing.

3. 600 Amp main bus continuous current minimum.

B. Motor circuit protector type breakers with magnetic only trips.

C. Three phase, thermal overload relays.

D. Starters shall also have:

1. Control circuit transformer.

2. Door mounted "run" light, red lens.

3. Two N.O. and two N.C. auxiliary contacts.

4. Pull-apart type terminal blocks.

2.02 FABRICATION

480 Volt Motor Control Centers shall be of standard 20 inch by 20 inch sections for front mounting only.

PART 3 EXECUTION

3.01 INSTALLATION

Installation shall be in accordance with NFPA 70, National Electrical Code and MSHA 30 CFR 57.

3.02 FIELD INSPECTION AND TESTING

Final acceptance will be made after field inspection indicates no deficiencies.

END OF SECTION

SECTION 16511

LIGHTING SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all material, tools, equipment, and labor necessary for the installation of the Lighting Systems as indicated on the Drawings.

1.02 RELATED WORK

A. Section 16050 - Basic Electrical Materials and Methods

B. Section 16471 - Power Distribution Panels and Panelboards

PART 2 PRODUCTS

2.01 FLUORESCENT LIGHTING SYSTEMS

Fluorescent Lighting Fixtures: UL 1570, except lighting fixtures for damp and wet locations shall conform to UL 57 with lamp type conforming to ANSI C78.1.

2.02 HIGH-INTENSITY-DISCHARGE LIGHTING SYSTEMS

High-Intensity-Discharge Lighting Systems: UL 1572, except lighting fixtures for damp and wet locations shall conform to UL 57. Provide lamp types conforming to UL 1572.

2.03 EMERGENCY LIGHTING SYSTEM

A. Self-Powered Emergency Lighting (Battery Type): Provide with automatic power failure device, test switch, pilot light and fully automatic high/low trickle charger in a self-contained power pack. Battery shall be sealed wet or gel electrolyte type, shall operate unattended and shall require no maintenance for a period of not less than 5 years.

B. Lamps shall be 40 watt fluorescent. Upon loss of AC power, the lamps will be powered by the self-contained battery, specified above.

C. Batteries shall be capable of maintaining lighting for a minimum period of 90 minutes.

D. Fixtures for emergency lights will be gasketed and sealed against the ingress of dust.

E. Ballast shall be High Efficiency, DC fluorescent, and shall allow lamp to generate 100% to initial maximum 65% @ 10.5VDC of its rated AC output.

PART 3 EXECUTION

3.01 INSTALLATION

A. Conditions of Service: The lighting systems shall be installed indoors, in a mine, in a heavy dust environment.

B. Suspended Fixtures: Provide hangers capable of supporting twice the combined weight of the adjoining fixtures.

C. Workmanship: All electrical installations shall be installed in a neat and workmanlike manner and in accordance with this specification, the Drawings, the manufacturer's written instructions, the National Electrical Code (NFPA 70), the National Electrical Safety Code (ANSI C2) and the Illuminating Engineer's Society: IES 87 Handbook.

3.02 FIELD INSPECTION AND TESTING

A. Field Inspection

Inspection will be performed while work is in progress to insure compliance with the technical and quality requirements of this specification and the Drawings.

B. Field Testing

The Contractor shall perform an operating test to demonstrate conformance on the lighting systems in accordance with applicable testing requirements contained in referenced codes and standards or defined elsewhere in this specification.

C. Test Equipment

All inspection and testing shall be performed with appropriately calibrated equipment which is of the proper type and range.

SECTION 16671

GROUNDING & LIGHTNING PROTECTION SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all material, tools, equipment, and labor necessary for the installation of the Grounding and Lightning Protection Systems as indicated on the Drawings.

1.02 RELATED WORK

Section 16050 - Basic Electrical Materials and Methods

1.03 SERVICE CONDITIONS

All materials specified in this section shall be suitable for installation in a mine classified as "non-gassy" according to 30 CFR 57 in abrasive dust environment. Materials for the surface ground and lightning protection systems shall be suitable for installation above and underground at elevation 4130 feet AMSL, in dusty environment with temperature range from -10°C to +50°C.

PART 2 PRODUCTS

2.01 MATERIALS

A. General: The surface grounding system shall comply with Article 250 of the NFPA 70, IEEE 142, and shall comply with CFR, Title 30, Part 57.

B. Conductors used for ground grid of the surface systems shall be No. 2/0 AWG bare stranded soft drawn copper. Wires enclosed in raceways shall have 600 V green insulation, solid to size No. 8 AWG and stranded for sizes larger than No. 8 AWG.

C. Ground rods shall comply with UL 467 and shall be 3/4 inches x 10 feet-0 inches long, cone-pointed, copper-clad steel.

D. Safety ground system shall be connected to a separate ground isolated from the substation grounding system and from the instrument/computer grounding system in accordance with CFR Title 30, Part 57.

E. Air terminals used for the lightning protection system shall comply with Class II systems as defined by NFPA 78

and shall be copper, 0.5 inch in diameter and not less than 24 inches in length.

F. Main conductors for the lightning protection system shall be Class II, stranded copper, sized according to NFPA 78.

PART 3 EXECUTION

3.01 INSTALLATION:

A. All electrical installations shall be installed in a neat and workmanlike manner and in accordance with this specification, the Drawings and the manufacturer's written instructions.

B. All metal structures shall be provided with lightning protection.

C. All metal equipment and the metal enclosures of all electric equipment shall be grounded.

3.02 FIELD QUALITY CONTROL

A. Field Inspection: Inspection shall be performed while work is in progress to insure compliance with the technical and quality requirements of this specification and the Drawings.

B. Field Testing: The Contractor shall perform the tests specified below on the grounding systems in accordance with applicable testing requirements contained in referenced codes and standards or defined elsewhere in this specification.

END OF SECTION

SECTION 16675

GROUND FAULT PROTECTION

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all material, tools, equipment, and labor necessary for the installation of the Ground Fault Protection system as indicated on the Drawings.

1.02 RELATED WORK

A. Section 16050 - Basic Electrical Materials and Methods

B. Section 16200 - Standby Power Generation

C. Section 16671 - Grounding & Lightning Protection Systems

1.03 SYSTEM DESCRIPTION

A. Ground fault protection systems shall be capable of continuous operation at a maximum elevation of 4,500 feet AMSL and a maximum temperature rise of +40°C above ambient.

B. The ground fault protection system shall be designed to detect and localize a ground fault for personnel safety and minimizing equipment damage.

C. The ground fault protection systems shall operate on a 3 phase, 60 Hz, solidly-grounded system on the 208 volt surface equipment, and a 3 phase, 60 Hz, resistance-grounded system for all the 12,470, 4160, and 480 volt systems.

D. The ground fault protection systems shall be capable of operating in an environment in accordance with the applicable codes and standards imposed by this Project.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. 12,470 volt surface and subsurface power system grounded through 25 amp resister.

B. 4160 volt subsurface power system grounded through 25 amp resistor.

C. Feeder breaker shall have:

1. 5 amp ground fault sensor.

2. Solid state trips (or shunt trips).

2.02 FABRICATION

The ground fault protection system shall be coordinated with a standby diesel generator power system.

PART 3 EXECUTION

3.01 INSTALLATION

Installation shall be in accordance with NFPA 70, National Electrical Code, and MSHA 30 CFR 57.

3.02 FIELD INSPECTION AND TESTING

Final acceptance will be made after all field inspection and testing is complete and satisfactory.

END OF SECTION

SECTION 16880

ELECTRIC INFRARED HEATING SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install the Electric Infrared Heating System as indicated on the Drawings.

1.02 RELATED WORK

A. Section 16050 - Basic Electrical Materials and Methods

B. Section 16110 - Conduit

C. Section 16121 - Electrical Cable & Wire

PART 2 PRODUCTS

2.01 QUARTZ LAMP INFRARED HEATERS

A. Units shall have 24 gage corrosion-resistant aluminized steel housing.

B. Heat patterns shall be 30°, 60°, and 90° symmetrical, 30° asymmetrical offset, or 30° and 60° asymmetrical as noted on the drawings.

C. Capacities and voltages shall be as noted on the drawings.

2.02 CONTROL ASSEMBLIES

A power control panel shall be provided to handle the heating load (kW) for the given infrared installation, since infrared heaters do not have contactors built into the units.

PART 3 EXECUTION

3.01 INSTALLATION

Install electric infrared unit heaters and control assemblies in accordance with manufacturer's instructions.

END OF SECTION

SECTION 16890

ELECTRIC HEATERS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to install Electric Heaters as indicated on the Drawings.

1.02 RELATED WORK

A. Section 16050 - Basic Electrical Materials and Methods

B. Section 16110 - Conduit

C. Section 16121 - Electrical Cable & Wire

PART 2 PRODUCTS

2.01 HORIZONTAL DISCHARGE UNIT HEATERS

A. Housing shall be heavy gage steel with baked enamel finish. Unit shall be completely packaged with wall-mounting brackets or ceiling suspension swivel bracket as shown on the drawings.

B. Heating elements shall be the totally enclosed fin-tube type.

C. Fan motor shall be totally enclosed with permanently lubricated bearings.

D. Single phase units in the 2.6 to 5.0 kilowatt (kW) range shall be provided with line voltage load carrying wall thermostats.

E. Larger three-phase unit heaters shall be provided with contactors, built in 24-volt control transformers and 24-volt wall thermostats.

F. Capacities (kW), voltage, phase, and setpoints shall be as shown on the drawings.

2.02 WALL-MOUNTED BASEBOARD HEATERS

A. Baseboard heaters shall be commercial grade and designed to mount flush on any floor surface or wall mount above floor level.

B. Heaters shall have 18 gage front cover and brackets, baked-on enamel finish, noise-free heating elements, and built-in wireways.

C. Heaters shall be provided with single-pole line-voltage thermostats mounted on end junction boxes.

D. Voltage, capacities, and accessories shall be as noted on the drawings.

2.03 DUCT HEATERS

A. Electric duct heaters shall utilize finned tubular elements mounted in an aluminized steel frame.

B. The heaters shall be for slip-in mounting through the side of a duct.

C. The heaters shall be UL listed for zero clearance to combustible surfaces.

D. Heaters shall be rated for the capacities (kW), voltage, phase, and number of heating stages indicated on the drawings.

E. Heaters shall be furnished with thermal cutouts, airflow switch, magnetic contactors, fuses (if over 48 amps), 120 volt control circuit transformer, and built-in disconnect switch.

F. A 120-volt three-stage room thermostat shall be provided with mercury switches, built-in thermometer, 40° - 80°F setpoint range and 2°F differential between stages.

G. Where indicated on the drawings, a programmable electronic time switch and night setback thermostat shall be provided to maintain a lower setpoint during unoccupied periods.

2.04 LOW TEMPERATURE RADIANT HEATING PANELS

A. Panels shall be constructed of a 24 gage steel.

B. Heating elements shall be a carbon (graphite) elements.

C. The surface shall be a multi-faceted crystalline type which will provide a watt density between 62.5 watts/square foot and 95 watts/square foot.

D. Panel capacities (watts), voltages, and phase shall be as noted on the drawings.

E. Panels are controlled by line voltage wall-mounted thermostats with heat anticipators.

PART 3 EXECUTION

A. Install electric heaters and thermostat controls in accordance with manufacturer's instructions.

B. Coordinate installation with architectural and electrical work.

C. Maintain UL-required clearances from ceilings, vertical walls, and objects.

END OF SECTION

SECTION 16941

INSTRUMENTATION AND MONITORING SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

The work under this Section includes furnishing all materials, tools, equipment, and labor to fabricate and install various types of instrumentation devices such as sensors, transmitters, indicators and switches indicated on the Drawings that are not a part of any vendor supplied system or package unit. The description of the instruments that are part of such a system or package is contained in the respective specification of package unit or system.

1.02 RELATED WORK

A. Section 16050 - Basic Electrical Materials and Methods

B. Section 16121 - Electrical Cable and Wire

C. Section 16376 - Subsurface Electric Distribution

D. Section 16671 - Grounding and Lightning Protection Systems

PART 2 - PRODUCTS

2.01 DESCRIPTION OF INSTRUMENTS

A. The various components of instrumentation that shall be furnished for the project are detailed in the individual specification forms for Process Measurements and Control Instruments.

B. Local control panels, indication, alarm, and control instrumentation are specified in the respective system or unit package specifications.

C. All sensors, indicators, and switches utilized for this project shall be of standard manufacturer's design, available as off-the-shelf items.

2.02 ANNUNCIATION AND RECORDING

A. There is no centralized instrument control system for operational and maintenance purposes of the ESF.

B. The trouble alarm signal from any system or package unit provided by vendor shall be of a general nature, nondiscriminating as far as what caused this alarm.

C. The annunciation system shall consist of the written announcement appearing on the computer CRT and an audible alarm signal to alarm the operator of abnormal conditions.

2.03 TEMPERATURE GAUGES AND TEMPERATURE TRANSMITTERS

2.04 PRESSURE SWITCHES AND PRESSURE GAUGES

A. Pressure Switches: The pressure switches detect and alert, depending on service, upon any low or high discharge pressures of various pumps within the facility.

B. Pressure Gauges: The pressure gauges detect and indicate in-line pressures at various locations.

2.05 LEVEL SWITCHES

The level switches detect and alarm upon pre-set levels in Main Test Area waste water sumps and control respective pump operations for surface and subsurface facilities.

2.06 SUBSURFACE MONITORING SYSTEM

The real time monitoring system shall be installed in subsurface facilities in order to monitor the environment in mine for presence of different gases as described below and for air velocity, temperature and humidity.

2.07 FACTORY TESTING

Complete testing and calibration shall be performed on the instruments. Certified copies of the factory tests shall be provided.

PART 3 - EXECUTION

3.01 ASSEMBLY

Instrument fabrication, manufacture and assembly are to be the manufacturer's own design.

3.02 TAGGING AND IDENTIFICATION

In addition to Manufacturer's nameplate, each instrument shall be equipped with a stainless steel tag which has the instrument identification tag number stamped upon it.

3.03 ACCURACY AND REPEATABILITY

The manufacturer shall give a written guarantee that these instruments have the specified accuracy and repeatability within the constraints of the specified operating conditions.

3.04 INSTALLATION

Prior to installation, complete installation diagrams showing the interconnection of the entire instrumentation arrangement shall be submitted for review.

3.05 FIELD COMMISSIONING

Every instrument and control circuit shall be checked.

3.06 FIELD TRAINING FOR OPERATING PERSONNEL

Field training on instrumentation for operating personnel shall be conducted by factory trained servicemen.

END OF SECTION