SALT RIVER ELECTRIC

111 West Brashear Avenue • Bardstown, Kentucky 40004
(502) 348-3931 • (502) 955-9732 • Fax (502) 348-1993

September 18, 2013



Jeff Dureoun
Executive Director
Kentucky Public Service Commission
P.O. Box 615
Frankfort, KY 40602

Dear Mr. Dureoun:

Enclosed are the originally signed and ten copies of Salt River Electric Cooperative Corporation (Salt River Electric) application for a Certificate of Public Convenience and Need for the construction of a new Nelson County Warehouse / Operations Center. We have only provided one copy of the building plans and supporting documents due to them being so voluminous.

We have a contract with the Bardstown Independent School District to buy our existing 70 acres and current Nelson County Warehouse / Operations Center for $4.5 million. This property carries a book value of $829,376.

We have bought 76 acres adjacent to the Nelson County Industrial Park. We also have a bid to building a new 30,000 square foot warehouse / operations center with an attached 6,000 square foot office, along with a 10,000 square foot building to store wire and transformers and then a 2,000 square foot building to store any leaking transformers. We intend to do all this for $4 million and thereby be able to return money to our members/customers/ratepayers in the form of additional capital credits.

We would appreciate the Commission's attention given to this application as we would like to proceed with construction as quickly as we can. We would like to have this approval by October 26, 2013 if at all possible.

If you have any questions or require any other information, please let us know.

THANKS!

Nicky Rapier
Vice President of Community and Economic Development

Enclosures

COMMONWEALTH OF KENTUCKY
BEFORE THE
PUBLIC SERVICE COMMISSION

| | | |
|---|---|---|
| APPLICATION OF SALT RIVER ELECTRIC COOPERATIVE CORPORATION FOR A CERTIFICATE OF CONVENIENCE AND NECESSITY PURSUANT TO K.R.S. 278.020 (1) AND 807 K.A.R. 5:001, SECTION 9 AND RELATED SECTIONS, AUTHORIZING CERTAIN PROPOSED CONSTRUCTION IDENTIFIED AS THE HEADQUARTERS CONSTRUCTION AND DISTRICT RENOVATIONS | ) | CASE NO. _____ |

APPLICATION

The application of Salt River Electric Cooperative Corporation (Salt River Electric) respectively shows:

1. Salt River Electric is a non-profit membership cooperative corporation without capital stock, duly organized and existing under K.R.S. Chapter 279, engaged in the business of supplying electric energy to its member-consumers in the Kentucky Counties of Anderson, Bullitt, Jefferson, LaRue, Marion, Mercer, Nelson, Shelby, Spencer and Washington.

2. The name and postal address of the Applicant is as follows:

SALT RIVER ELECTRIC COOPERATIVE CORPORATION
111 WEST BRASHEAR
BARDSTOWN, KY 40004

3. Copies of the articles of incorporation of Salt River Electric are filed with the Commission.

4. The Bardstown Independent School District approached Salt River Electric a couple of years ago about the possibility of Salt River Electric selling to the School District our Nelson County Operations Warehouse and the 70 acres on which it is situated, all of which is within

their District. After considerable conversation, the School District offered to buy our building and property for $4,500,000. We have a contract with Bardstown Independent School District to sell to them for that amount.

5. Salt River Electric has bought approximately 76 acres adjacent to the Nelson County Industrial Park for around $581,524. This is an excellent site to which to relocate our Operations Warehouse and from which to conduct our cooperative's distribution and maintenance.

6. Salt River Electric has been working with MSE of Kentucky on the design of our new facility, and project that we should be able to construct a 6,000 square foot office and a 30,000 square foot warehouse for around $3,300,000. With this added to Salt River's land cost, we feel that we should be able to complete the relocation for around $4,000,000. We have a contract with EH Construction to do this project..

7. Salt River Electric will not be filing a loan application to finance this project.

8. Salt River Electric will not be filing a rate increase to finance this project.

9. Salt River Electric intends to receive $4.5 million from the Bardstown Independent School District and intends to build a replacement Nelson County Warehouse / Operations Center for around $4 million and thereby be able to return money to our members/ customers/ratepayers in the form of additional capital credits.

10. Salt River Electric is filing a copy of the building plans with this application.

WHEREFORE, Salt River Electric respectfully requests the Commission to make its order to issue a Certificate of Public Convenience and Necessity authorizing Salt River Electric to proceed with the construction of facilities referred to above, and for such other relief as the Commission may deem appropriate or to which Salt River Electric may appear entitled.

FULTON, HUBBARD & HUBBARD

John Douglas Hubbard
117 East Stephen Foster Avenue
Bardstown, KY 40004
(502)348-6457
Attorney for Salt River Electric

COMMONWEALTH OF KENTUCKY )

COUNTY OF NELSON )

I, Nicky Rapier, state that I am the Vice President of Community and Economic Development for Salt River Electric Cooperative Corporation, that I have personal knowledge of the matters set forth in this application and attached exhibits, and the statements contained in each are true as I verily believe.

This 18th day of September, 2013.

Nicky Rapier

Subscribed and sworn to before me by Nicky Rapier, on this 18 day of September, 2013.

NOTARY PUBLIC, KENTUCKY STATE AT LARGE

My Commission expires: 3/21/2015

DDS:LEGAL:SALT RIVER ELECTRIC091813.APPLICATION

Addendum No. 1
To the
Construction Plans, Specifications and Contract Documents
for the
WAREHOUSE/OPERATIONS CENTER
for
SALT RIVER ELECTRIC
Bardstown, Kentucky
Date: August 28, 2013

MSE Project Request for Bid No. 9551-03
Bid Date: September 3, 2013

Bidder shall conform to the following changes as same shall become binding upon the contract to be issued in response to this Request for Bid.

Item 1. Civil/Site

1. The 24" culvert located a sta. 0+20 on the entrance drive is shown on plan sheet C-8 and should be shown the same on sheet C-1 and C-3.
2. On sheet C-5, the pipe shown to the east (behind) storage building no. 3 is an 8" ADS pipe for collecting roof drainage.

Item 2. Electrical/Lighting

1. Description of Pole Mounted Outside Light Fixture 1: OLF-1, Diecast Pole Mounted Parking Lot Fixture with House Shield. 400 Watt Metal Halide, Lithonia KAD 400M R4, 277 Volt. Steel 4" square pole. Alternate bids may be Lightolier, Day-Brite, or Equal.
2. Reference Sheet U-1, OLF-1 fed by Circuit AA-7: Eliminate this light fixture. Run conduit from panel AA and stub conduit up 12" above finished grade.
3. Reference Sheet U-1, Bid Alternate: To clarify the Bid Alternate, Light Pole Concrete Bases will not be installed if Bid Alternate is accepted. Conduit to be stubbed up 12" above finished grade for each light fixture, and stubbed up 12" above finished grade for continuation to next light.

END OF ADDENDUM NO. 1

Addendum No. 2
To the
Construction Plans, Specifications and Contract Documents
for the
WAREHOUSE/OPERATIONS CENTER
for
SALT RIVER ELECTRIC
Bardstown, Kentucky
Date: August 29, 2013

MSE Project Request for Bid No. 9551-03
Bid Date: September 3, 2013

Bidder shall conform to the following changes as same shall become binding upon the contract to be issued in response to this Request for Bid.

**STRUCTURAL**

1) Column footing for B-1, C-1, E-1 and F-1 are 4' x 4' on plan sheet S-1.
2) Plan Sheet S-6, Column Footing and Pier Schedule. Under column designation, third row down remove G-10. On the fourth row down, delete F-10 and H-10.
3) Plan Sheet S-6, Column Footing and Pier Schedule, Building #2. Under footing size and reinforcing, sixth row down, change E. 7-12 and G. 5-12 to read 4'x 4' x 1'.
4) Plan Sheet S-1 at B. 7-13. Change detail from 7/S-4 to 5/S-4.
5) Plan Sheet S-4 Detail 5/S-4. Change section designation 5/S2.2 to 5/S-3.
6) Bottom of footings and piers shall be 3' 4" below finished floor at the perimeter for all three buildings.

**ARCHITECTURAL**

1) Plan Sheet A-2 and C-5, Front Office. Add down spouts to front of office at 25' on center. Add 8" ADS pipe in front of office area for underground storm system. Tie front office down spouts into 8" ADS storm pipe. Place 8" ADS pipe between sidewalk and building and tie in to underground storm systems on both sides. Use 6" ADS lateral from down spout to 8"ADS pipe.

**SPECIFICATIONS**

1) Specifications. In spec section 16000, page 11, delete part 25.

**CIVIL/SITE**

1) Sheet C-2. Detail is shown for silt check dam Type "D". KY Transportation Cabinet Detail RDX-225, graded rock check may be substituted for this item.
2) Sheet C-4. The concrete pavement joint drawing at the top of the page referenced a dowel assembly detail. The detail requires ½" bars, 18" in length and greased on one side of the joint to allow movement. The joint is to be filled w/joint sealer.

3) Sheet C-6. The trench drain detail shown on the left of the sheet requires 6 L.F. of trench drain which is to be installed in the truck loading dock at the end of the 22.98 L.F. of 18" HDPE shown on sheet C-5.

END OF ADDENDUM NO. 2

Addendum No. 3
To the
Construction Plans, Specifications and Contract Documents
for the
WAREHOUSE/OPERATIONS CENTER
for
SALT RIVER ELECTRIC
Bardstown, Kentucky
Date: August 30, 2013

MSE Project Request for Bid No. 9551-03
Bid Date: September 3, 2013

Bidder shall conform to the following changes as same shall become binding upon the contract to be issued in response to this Request for Bid.

**ELECTRICAL**

1. Description of Pole Mounted Outside Light Fixture 1: OLF-1, Diecast Pole Mounted Parking Lot Fixture with House Shield. 400 Watt Metal Halide, Lithonia KAD 400M R4; 277 Volt. Steel 4" square pole. Alternate bids may be Lightolier, Dabright, or Equal. Pole shall be 20' tall.
2. Reference Sheet E-4, ELECTRICAL DISTRIBUTION RISER DIAGRAM, Power Conduit and Conductors from Riser Pole to Transformer Pad will be installed by Salt River Electric.
3. Reference Sheet E-2: Contractor shall install two 4" Schedule 80 PVC conduits from the Telephone Terminal Board (Room 121) to 6' outside the building, leaving 2' to the left of the door at Lineman Room 112. Salt River Electric will provide conduit to the termination point. Conduit shall be 36" deep and connection shall be made by the Electrical Contractor.

END OF ADDENDUM NO. 3

NOTE TO BIDDERS

If you are viewing these specs and plans with the possibility of bidding the project, please be sure to contact MSE c

Be sure to state the name of the project in your correspondence!

Contact:
Beverly Buford
MSE of Kentucky, Inc.
Email: mseinc@mselex.com
Phone: 859.223.5694
Fax: 859.223.2607

Thank you!

# Report of Geotechnical Exploration

For

# Proposed Facility for Salt River Electric

Nelson County, Kentucky

By

## Consulting Services Incorporated of Kentucky (CSI)

Lexington, Kentucky

June 10, 2013

Prepared for

## MSE of Kentucky

Lexington, Kentucky

CSI Project Number 2516

# Consulting Services Incorporated

250 Gold Rush Road, Lexington, Kentucky 40503


June 10, 2013

MSE of Kentucky, Inc.
624 Wellington Way
Lexington, Kentucky 40503

ATTN: Mr. Glen Ross

Subject: **Report of Geotechnical Exploration**
Proposed Facility for Salt River Electric
Nelson County, Kentucky
CSI Project No. 2516

Dear Mr. Ross:

Consulting Services Incorporated of Kentucky (CSI) is pleased to present our Report of Geotechnical Exploration for the proposed maintenance garage to be constructed in London, Kentucky. We provided our services in general accordance with CSI Proposal Number 2516, dated May 7, 2013.

Our report represents information provided to us, readily available published data relevant to the site and site area, our observations and subsurface conditions encountered and our opinion of primary geotechnical conditions (discussion and recommendations) affecting design, construction and performance of the proposed earth supported portions of the project.

We appreciate the opportunity to provide our geotechnical services to you and the design team. Please do not hesitate to contact us for questions or comments about the information contained herein.

Cordially,

Consulting Services Incorporated of Kentucky,

Thomas J. Duffy, EIT, SI
Staff Professional

STATE OF KENTUCKY
BRUCE L. HATCHER
14,527
LICENSED PROFESSIONAL ENGINEER
6-10-13

Bruce L. Hatcher, PE, SI
Chief Engineer
Licensed Kentucky 14,527

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# INTRODUCTION

## 1 SCOPE OF THE GEOTECHNICAL EXPLORATION

As we proposed, we conducted a geotechnical exploration that is summarized in the following report. Our services included a review of the project information provided, conducting a geotechnical exploration that utilized soil borings and to obtain samples for modeling the soil conditions at the subject site, an analysis of the data and information obtained, and providing recommendations for the soil supported portions of the project site as listed in our proposal. Please note that our foundation design and construction recommendations pertain only to the main proposed building.

## 2 PROJECT INFORMATION

Project information was provided via e-mail correspondence from you. We were provided with the following document for our review:

- DWG file titled "Conceptual Site Plan - Salt River Electric", depicting the property and proposed structure, undated.

Based on the provided information, the project site is located on the eastern end of the Nelson County Industrial Park between Parkway Drive and the Bluegrass Parkway. Please reference the Site Location Plan in the Appendix for details. We understand that the proposed project will consist of three new, pre-engineered metal framed buildings with approximate square footges of 33,000 sf (square feet), 10,000 sf, and 2,000 sf. The buildings are for the proposed Salt River Electric Operations and Maintenance Center.

We expect that the structures will be constructed on shallow, soil-bearing foundations with concrete slab-on-grade floors. No finished floor elevations (FFE) were provided to us; however, based on our expectations, minimal cuts and fills (less than 3 feet) will be required to reach finished grades. Structural loading information for the proposed foundations has not been provided to us. However, we have assumed that wall loads will not exceed 5 kips per lineal foot and column loads will be less than 100 kips. No maximum floor slab loads were supplied to us. However, we anticipate that the maximum floor slab live load will not exceed 100 psf with no heavy concentrated loads. Also, we have assumed that no basements, partial basements, or pits are included in the project.

We also understand that associated asphalt and concrete pavements are planned for this project. Due to the likelihood of heavy truck traffic, we have included recommendations for both heavy duty and light duty asphalt, which we expect will be used for the drive lanes and some parking stalls, respectively. We have also included recommendations for concrete pavement for the proposed loading dock and dumpster pad (if applicable).

Based on our site visit and our top of boring elevations, the site is relatively level with a maximum elevation difference of 3 feet across the site. As previously stated, we anticipate that the cuts and fills of less than 3 feet will be required to achieve the desired finished grades. No steep cut/fill slopes or retaining walls are expected for this project, thus we have not provided recommendations for these improvements.

If any of the aforementioned information is in error or if the information changes during the course of the project, please contact our office so that we can re-evaluate the new information with respect to our findings and recommendations.

## 3 AREA/SITE INFORMATION

### 3A AREA TOPOGRAPHY/PHYSIOGRAPHY

The site is located in the Outer Blue Grass Region of the Blue Grass Physiographic Region of Kentucky. The Outer Bluegrass Region consists of deeper valleys and flat land compared to the gently rolling hills of the Inner Bluegrass Region. The provided topographic drawing indicates elevations in the site vicinity range from 740 feet to 760 feet. Below is a figure of the location of the site with respect to the regional physiography.

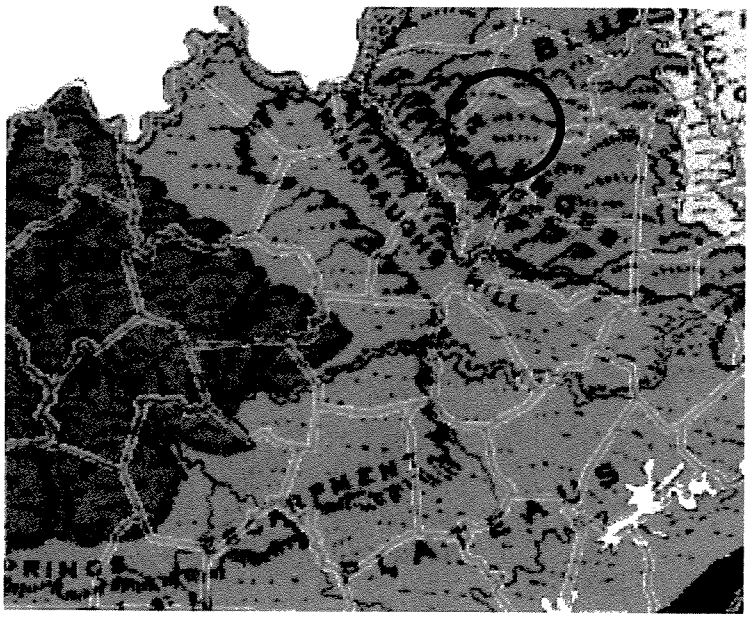


**Figure 1.** Kentucky Physiographic Map (site vicinity shown in circle)

### 3B SITE GEOLOGY

A review of the USGS Geologic Map of the Bardstown Quadrangle, Nelson County, Kentucky (dated 1969) indicates New Albany Shale and Beechwood Limestone Member of the Sellersburg Limestone of the Middle and Upper Devonian aged rock deposits directly underlies the project site.

The New Albany Shale is described as being grayish-black, very carbonaceous, homogenous, and brittle. The shale contains nodules and discontinuous stringers of finely crystalline pyrite and nodules of small geodes of crystalline quartz. The unit is poorly exposed and weathers to reddish-brown soil.

The Beechwood Limestone Member consists of limestone and dolomite. The limestone is described as yellowish gray and weathers grayish orange to light brown, fine to very coarse grained, and contains abundant fossils.

No faults were mapped within 1 mile of the project site. The geologic dip at the project site is less than 1 percent to the southwest. Please reference the geology map below for details.

Please note that signs of New Albany Shale were not observed in our recovered samples or auger cutting during our field operations. Thus, we do not believe this shale is on-site.

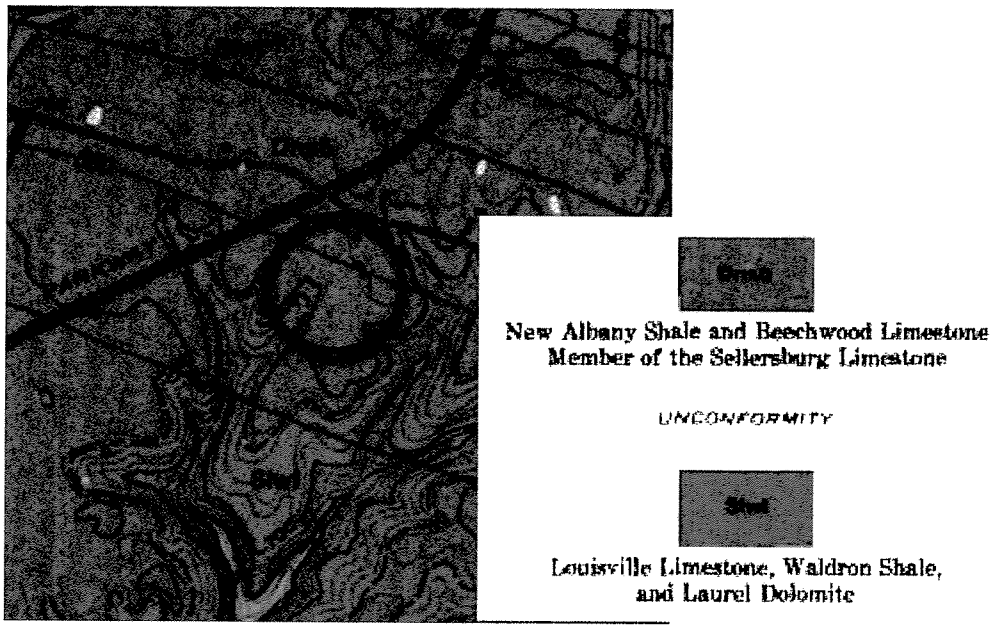



**Figure 2.** Site Geology USGS Bardstown Quadrangle, dated 1969
(site vicinity shown in circle)

As with most of the geology of this portion of Kentucky, Karst (sinkholes, weathered bedrock, caverns, erratic bedrock, etc.) is associated with the site geology. One closed depression was mapped within 1 mile of the site. The surrounding areas have been regraded (due to the development of the industrial park); therefore, obvious signs of sinkholes may have been filled or otherwise occluded. The Nelson County Karst Areas map published by the Kentucky Geological Survey (KGS) indicates that the project site is in an area underlain by rock with a low to moderate potential for Karst development. Please reference the Karst potential map below for details.

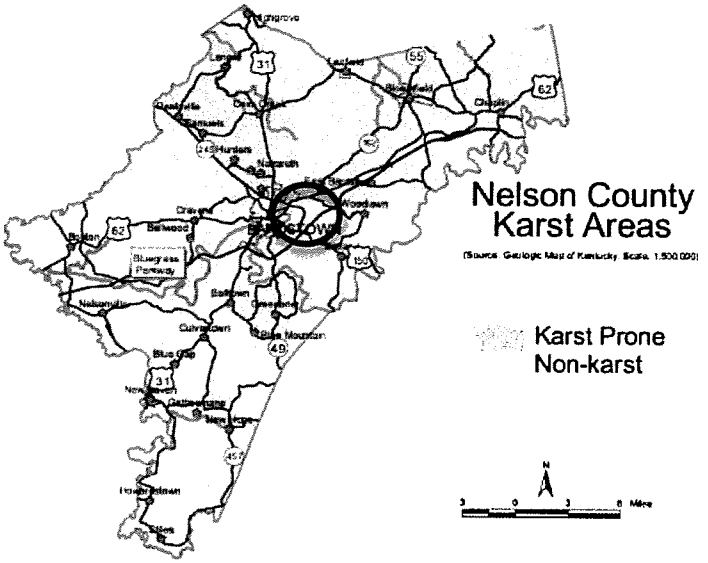



**Figure 3.** Site Karst Potential, KGS
(site vicinity shown in circle)

## 3C PUBLISHED SITE SOIL CONDITIONS

According to the USDA Soil Survey of Nelson County (NRCS website), the soils underlying the project site vicinity consist of the following series:

- Lawrence silt loam (LC)
- Beasley silt loam, 12 to 20 percent slopes (BeD2)
- Pembroke silt loam, 2 to 6 percent slopes (PbB)
- Pembroke silt loam, 6 to 12 percent slopes (PbC)

The following are issues listed as characteristics of these series, which we believe could be of interest to the project:

- Depth to any restrictive feature is generally listed from approximately 20 inches to greater than 80 inches.
- Depth to water table for these soils series is listed as approximately 12 inches to more than 80 inches.
- The soil series PbB and PbC are listed as being not limited to the construction of dwellings without basements while the soils series Lc and BeD2 are listed as very

limited. Particular issues affecting constructions are shrink-swell potential, flooding, ponding, depth to saturated zone, and slope.

- All soil series are listed as being very limited to the construction of streets and roads due to low strength, shrink-swell potential, ponding, flooding, depth to saturated zone, and slope.
- All soil series are listed as being somewhat to very limited to the construction of shallow excavations due to depth to saturated zone, depth to hard bedrock, unstable excavation walls, and slope.
- The soil series BeD2, Lc, and PbC are listed as being very limited to the construction of small commercial buildings while the soil series PbB is listed as not limited. Particular issues affecting construction are shrink-swell potential, ponding, flooding, and slope.

Due to the development within the Nelson County Industrail Park, the soil survey information listed above may no longer be useful since the site soils may have been altered. Thus, the soils described above may be on-site, but not in their natural condition. Additionally, based on the low plasticitcy index (PI) results for near surface soils in our lab testing, we do not believe that shrink-swell potential is of concern for foundations and floor slabs.

Below is the soils map from the USDA website.


**Figure 4.** USDA Soil Survey Map of the Project Site
(site vicinity shown in circle)

## 3D OTHER PUBLISHED SITE INFORMATION

We reviewed aerial photographs of the site dating back to March 1997. The project site is located on the north side of Parkway Drive and just south of Bluegrass Parkway in the Nelson County Industrial Park. The reviewed aerial photographs indicate that between 1997 and 2012 no major develoments have occurred on the site. Parkway Drive was constructed along with one commercial building to the southwest of the project site. The project site was covered in dense, mature trees; therefore, we do not believe there to be any development within the project area. Below are two of the reviewed aerial photographs.

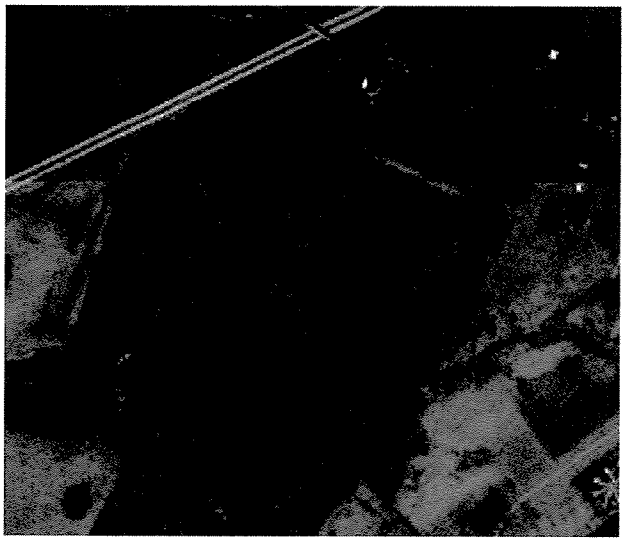


**Figure 5.** Aerial Photo dated March 11, 1997 (DIGITALGLOBE), site shown in circle

**Figure 6.** Aerial Photo dated February 12, 2012 (DIGITALGLOBE), site shown in circle

# FINDINGS

## 4 SITE SURFACE OBSERVATIONS

Mr. Thomas Duffy, EIT of CSI conducted a site visit, performed a field reconnaissance, logged soil borings, and directed drilling operations within the proposed project area on May 21, 2013. CSI personnel observed and documented site surface conditions that could have an impact on the proposed construction.

The project site is located on the eastern end of the Nelson County Industrial Park between Parkway Drive and the Bluegrass Parkway. Upon arrival to the site, access to the site had to be cleared using a CAT 983 bucket loader due to dense vegetation. Based on observations made during our site visit and the top of boring elevations, there is approximately 3 feet of elevation difference across the project site.

No overhead or underground utilities were observed within the project area; however, overhead utilities were observed along the northeastern project boundary. No other utilities were observed or marked in the vicinity of our borings.

The photos below represent the site conditions at the time of our visit.

**Photo 1.** View facing northeast, overlooking project area

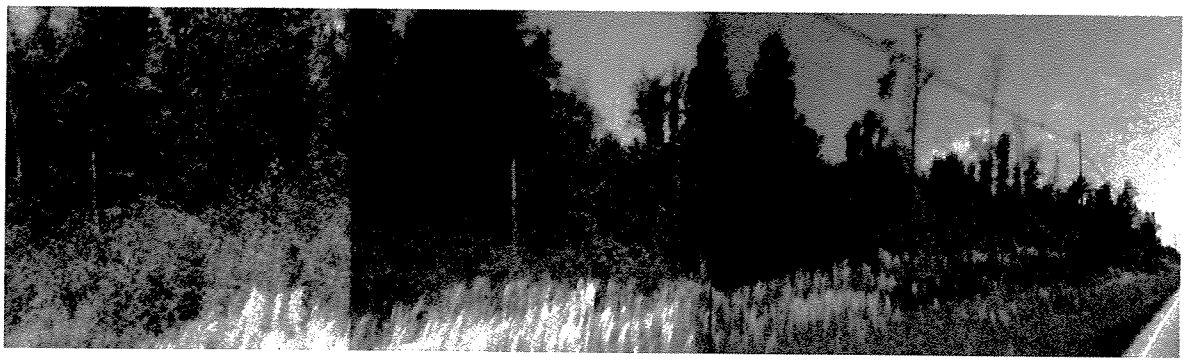


**Photo 2.** View of Site Access from Parkway Drive

# 5 SUBSURFACE CONDITIONS

## 5A SOIL CONDITIONS

During our field exploration, we performed a total of eight soil test borings. Borings labeled B-101 through B-104 were for the proposed pavement areas while borings labeled B-201 through 204 were for the largest proposed building. Please note that no specific structure borings were drilled for the two other new buildings. Seven of the eight borings were advanced to auger refusal (excluding boring B-102, which was terminated at a depth of 15.5 feet). The borings were located as close as possible to the boring locations indicated on the provided Conceptual Site Plan. Due to the dense vegetation on-site, our boring locations should be considered approximate. Please reference the Boring Location Plan in the Appendix for details.

In addition to the soil borings, we also collected two bulk samples from representative areas of the site. The bulk samples were collected from borings B-102 and B-104. Both bulk samples were collected at depths ranging from 0 feet to 4 feet below top of hole elevation.

In general, we encountered topsoil (when encountered), overlying residual soils, overlying weathered rock, overlying apparent bedrock.

Topsoil was encountered at the surface in six of our eight borings and ranged in thickness from 3 inches (at boring B-203) to 6 inches (at boring B-204). Please note that due to the use of a CAT 983 bucket loader to clear access to the site, the surficial topsoil was disturbed or entirely stripped in several areas where we drilled. Thus, reported topsoil thicknesses may be thicker than recorded.

Residual soils were encountered from the base of the topsoil (where applicable) and generally consisted of two horizons: reddish brown lean clay, overlying reddish brown to light brown fat clay. The lean clay horizon ranged in thickness from 3.0 feet (at boring B-204) to 5.6 feet (at boring B-104). The fat clay horizon began just beneath the lean clay horizon and extends to top of weathered rock.

Weathered rock was encountered at all of our boring locations and ranged in thickness from 1.5 feet (at boring B-201) to 4.2 feet (at boring B-203). Where sampled, the weathered rock was a highly weathered light brown and light gray shale.

Auger refusal is typically interpreted as top of hard bedrock. Auger refusal was encountered in seven of our eight borings and ranged in depth from 10.1 feet (at boring B-104) to 14.8 feet (at boring B-202). Please note that boring B-102 was terminated at a depth of 15.5 feet (as stated in our proposal).

The borings were located by means of hand taping, based on existing site features. Please note that due to the dense vegetation on-site the boring locations shown in the Appendix should be considered accurate only to the degree implied by the method used. Top of hole elevations for borings B-102, B-103, B-104, B-201, and B-202 were provided to us by MSE surveying personnel. All other top of hole elevations were interpolated from the provided topographic mapping.

### 5B GROUNDWATER CONDITIONS

Denotations about groundwater levels shown on the Boring Logs represent the conditions upon the completion of drilling at the time of our exploration. The borings were immediately filled upon completion due to safety concerns for the general public. Please be aware that borings may experience some settlement over time, thus they should be monitored and backfilled to grade as necessary.

Groundwater was encountered upon completion of soil augering in three of our eight soil borings. Borings B-101, B-202, and B-203 had water level readings of 5.0 feet, 14.0 feet, and 9.0 feet, respectively. Please note that the relatively shallow groundwater reading in boring B-101 was likely caused by standing water in a near-by low lying area. Thus, we do not believe that this reading is indicative of the true groundwater table.

Groundwater conditions that usually affect construction and performance of projects consist of trapped/perched water zones, which occur in variable areas in the soil mass (especially in old fill), at/near the bedrock bedding planes, or at/near the soil/rock interface. Perched water sources are often not linked to the more continuous relatively stable groundwater table that typically occurs at much greater depths. Finally, water issues are also dependent upon recent rainfall activity and surface and subsurface drainage patterns in the area.

## 6 LABORATORY TESTING

During the course of our work, we selected representative soil samples for laboratory testing. The tests include obtaining data for soil classification testing. Detailed descriptions of these tests and the results of our testing are included in the Appendix. Tests performed included:

- Natural moisture content tests
- Atterberg limits tests
- Percent fines analyses
- California Bearing Ratio tests (including standard Proctor tests)

# GEOTECHNICAL DISCUSSION AND RECOMMENDATIONS

## 7 DISCUSSION-GEOTECHNICAL ISSUES

Based on our experience with similar projects and the conditions observed during our geotechnical exploration, we believe the site is suitable for the proposed construction. The primary geotechnical concerns are:

- Site Clearing
- Possible Shallow Water Conditions
- Soft/Wet Soil Conditions
- High Plastic (FAT) Clays
- Karst

The following sections of this report discuss each issue. However, recommendations to address the issues are contained in later sections of the report.

### 7A SITE CLEARING

Portions of the site are covered in large trees and dense undergrowth. Expect that removal of large root masses will be required during site clearing. The voids left when the root masses are removed will need to be filled. Additionally, trees with large diameter roots were observed. Large diameter roots (greater than 1/2 inch in diameter) will require removal during clearing and grubbing operations.

### 7B POSSIBLE SHALLOW WATER CONDITIONS

A shallow water depth was recorded in one of our borings. Specifically, water was recorded at 5.0 feet in Boring B-101. This shallow groundwater reading is believed to be caused by a near-by, low-lying area that was inundated with water at the time of our site visit. Thus, we do not believe that this reading is indicative of the true groundwater table. Regardless, groundwater levels observed during our field operations should be expected to become shallower during wetter months.

### 7C SOLF/WET SOIL CONDITIONS

Soft/wet conditions were encountered during our field services due to the recent rainfall experienced on-site. This made traversing the site very difficult, even for the ATV mounted drill rig. In one instance, the drill rig had to be pulled from a wet/soft area using the CAT 983 bucket loader. Expect that these soft/wet near-surface soils may require undercutting at the time of construction.

## 7D HIGH PLASTIC (FAT) CLAYS

Our laboratory testing indicated that fat clay (CH) soils are present beneath the lean clays (CL) on-site. The Atterberg limits testing on one of our five samples revealed fat clays (CH) with a Plasticity Index (PI) of 31 percent. Soils with a PI above 30 percent can have a tendency to shrink/swell with changes in moisture content.

Shrinking and swelling of foundation and bearing soils are generally not as severe in the central Kentucky area as in other areas because long periods of excessively wet or dry weather do not normally occur. However, if site grading takes place during the dry summer or fall months, significant drying of the exposed subgrade soils may occur. If these soils re-saturate after completion of construction, structural distress may be experienced. Also, moisture content loss typically results in settlement of soil supported building components. Where the soil moisture fluctuates, movement may be ongoing throughout the building's life, resulting in deterioration and building distress. Strength loss may also affect building components, but is more likely to adversely affect parking lots, especially flexible asphalt pavements. Accumulation of water beneath pavement structures, followed by repeated traffic loads, may result in the failure of both pavement and the subgrade materials. Therefore, the volume change (i.e. - shrink/swell) potential of the soils should be considered for this project.

Due to the depth of these fat clays and our estimation of the final grades, we do not expect them to be of significant concern for your project. However, if deep cuts expose the underliying fay clays, methods to control the adverse effects of these soils include: providing efficient drainage around the structure, implementing more stringent compaction and moisture control specifications for new fill placement, or special construction practices (such as lime treatment) for floor slab and pavement areas.

In addition to the Atterberg limits tests, standard Proctor and California Bearing Ratio (CBR) tests were performed on two selected samples for pavement design. These tests revealed a minimum CBR value of 4.1 percent. This CBR value indicates that the total pavement section thicknesses may be thicker than normal to resist unwanted pavement distress for your project.

## 7E KARST

Although no obvious signs of Karst activity was observed in our samples, auger cuttings or site reconnaissance, the site is located in an area with low to moderate Karst potential. Karst features such as sinkholes, dropouts, weathered bedrock, caverns, erratic bedrock, etc. are typically exposed during grading activities and foundation and/or utility construction. Karst topography consists of limestone or dolomite that is weathered which results in sinkholes (i.e. - closed depressions), irregular top of rock profiles, pinnacled bedrock, slots or troughs in the bedrock, internal drainage systems, and open voids in either the bedrock itself or in the soil

overburden (typically at the soil/rock interface). Additionally, soft/wet soils are commonly encountered at the soil/rock interface and in slots or troughs in the bedrock.

An in-depth Karst study was beyond the scope of this exploration. Regardless of methods used, Karst remediation should be treated on a case-by-case basis and should involve a CSI geotechnical engineer.

Based on our knowledge of the area geology, sinkholes could be exposed during grading activities and foundation/underground utility construction. Detailed site proofrolling and foundation observations are frequently utilized in an attempt to locate incipient soil dropouts. Sinkholes must be evaluated and treated on an individual basis. A CSI geotechnical engineer should be retained for remediation recommendations if a sinkhole is exposed during construction. Procedures for repairing sinkholes or other Karst features should be done on a case-by-case basis and should involve a CSI geotechnical engineer.

## 8 EARTHWORK

Historically, more change orders (in total number and costs) occur during the earthwork portion of construction than in almost any other part of the project. Further, the site preparation phase of construction always affects the future performance of project structures. Additionally, earthwork is the portion of work most influenced by wet weather and unknown conditions. Thus, this section of the report could be the most important to prevent and minimize delays and costs during construction and for the life of the project.

Please review the concerns listed in Section 7 of this report prior to reading the following recommendations. If problems occur that the recommendations do not address or do not adequately remedy, please contact CSI as soon as possible.

### 8A SITE PREPARATION (WORK PRIOR TO FILLING)

- All trees, plants, grass and other organic materials should be removed (cleared) from the proposed construction areas and all structural fill areas. Roots larger than ½ inch in diameter should be removed (grubbed) from the proposed construction area and all structural fill areas. These materials should be wasted off-site.
- Remove/relocate all underground utilities (if any) as required by the construction plans.
- Topsoil should be removed (stripped) from the construction area and all structural fill areas. Topsoil can be stockpiled for later use in landscape areas on-site or can be wasted off-site.
- Areas ready to receive new fill should be proofrolled with a heavily loaded dump truck or similar equipment judged acceptable by the CSI geotechnical engineer.

- The level of proofroll should be determined by the CSI geotechnical engineer on a case-by-case basis.
- Perform the proofrolling after a suitable period of dry weather to avoid degrading the subgrade.
- Areas which pump, rut, or wave during proofrolling may require undercutting, depending on the location of the area and the use of the area, so the CSI geotechnical engineer should be contacted for guidance.
- Backfill of undercut areas should be performed in accordance with Sections 8B and 8C of this report.
- Retain CSI to observe the proofrolling operations and make recommendations for any unstable or unsuitable conditions encountered. This can save time on the construction schedule and save unnecessary undercutting.

We recommend that site grading should take place between about late April to early November. Earthwork taking place outside this time period will likely encounter wet conditions and weather conditions that will provide little to no assistance with drying the soils.

## 8B NEW FILL OPERATIONS (MASS EARTHWORK)

Laboratory testing indicates that both lean clay (CL) and fat clay (CH) are present on-site. The lean clay (CL) on-site soils are an acceptable fill material provided that they are used in accordance with recommendations presented in this section. It is not recommeded to use fat clay (CH) soils as fill matertial. Please note that the fat clays were encountered at the deeper depths in our soil borings.

If any off-site soil fill material is imported to the project site, representative samples should be obtained of the proposed fill material to determine the moisture-density relationship and overall classification of the material. The tests also would assist in determining if the material is suitable for use as structural fill.

After the subgrade has been approved to receive new fill, the fill may commence with the following procedures and guidelines recommended:

- Place fill in maximum 8-inch thick loose lifts.
- Fill lifts should be compacted to at least 95 percent of the soil's maximum dry density (ASTM D 698).
- Maintain the moisture content of compacted fill within 3 percent of its optimum moisture.
- Fill compaction requirements should extend to at least 5 feet outside the proposed building pad area.

- Fill soils with a plasticity index (PI) of greater than 30 should not be used. Thus, soils from excavations on-site (i.e. - fat clays) should not be used as structural fill.
- Maximum particle size of the soil should be limited to 4 inches in any one dimension. Additionally, no concentration of large fragments should be permitted.
- Density testing should be performed as a means to verify percent compaction and moisture content of the material as it is being placed and compacted.
- Density testing should be performed at a rate of at least one per 10,000 square feet per lift with a minimum of 3 tests per lift.
- Soils should not be "overcompacted" and construction traffic should be kept to a minimum to assure compaction is achieved and that the soil is not allowed to "break down".
- Retain a representative of CSI to observe and document fill placement and compaction operations.

### 8C BACKFILL OPERATIONS (UNDERGROUND UTILITIES, ETC.)

These materials are placed in more confined areas than mass earthwork materials or pavement materials and therefore cannot be placed in full compliance with Sections 8A or 8B. The following are general recommendations for these backfill areas:

- Fill lift thicknesses will vary dependent on compaction equipment available and material types, but in no case should exceed 8 inches.
- For crushed stone/aggregate backfills in trenches or wall backfill and when using smaller compaction equipment (such as a plate compactor, trench compactor, or similar) the lift thickness should not exceed 4 inches.
- Compaction/moisture percentages and density testing should be the same as in Section 8B.
- CSI should be retained to provide additional recommendations for backfill.

### 8D GENERAL NOTES

- For all earthwork operations, positive surface drainage is required to keep water from ponding on the surface and to assist in maintaining surface stability.
- The surface should be sealed prior to expected wet weather. This can usually be accomplished with rubber-tired construction equipment or a steel-drum roller.

If any fill placement problems occur, CSI should be retained to provide additional recommendations, as needed.

## 9 SITE DRAINAGE

During construction, water should not be allowed to pond in excavations or undercutting will likely be required. During the life of the project, slope the subgrade and other site features so that surface water flows away from the site structures.

For excavations during construction, most free water from the subsurface conditions could likely be removed via sump pumps and open channel flow (ditches) at or near the source of seepage. However, if normal dewatering measures prove insufficient, CSI should be retained to provide recommendations on the issue.

Wet conditions are possible in excavations on-site during site construction. Daylighting wet zones for drainage or the use of french/rock drains may be prudent or cost effective methods of de-watering wet areas of the site. Pumping with long-flexible hoses day-lighted hundreds of feet away or other types of sumping could also be utilized if necessary. CSI should be retained to observe all excavations in locations of springs or other water-bearing features.

## 10 FOUNDATIONS

Based on the information provided and the conditions encountered, shallow foundations bearing on firm or better residual soil or new fill should be a suitable foundation system to support the proposed main building. If there are any changes in the project criteria or main building location, CSI should be allowed to review the recommendations to determine if any modifications are required.

### 10A SHALLOW FOUNDATIONS ON SOIL

Shallow spread footings may be sized using a maximum allowable bearing pressure of 2,000 pounds per square foot (psf). Foundations should bear on firm or better residual soils or newly placed and properly compacted fill.

A detailed settlement analysis was beyond the scope of this exploration. However, based on the estimated structure loads and our experience with similar projects, we expect that total settlements will not exceed 1 inch, and that differential settlements will not exceed 1/2 inch between columns or along continuous footing distances of 30 feet or less. We recommend the structure be designed to accommodate these magnitudes of total and differential settlements.

Settlement estimates are based, in part, upon the assumption that site preparation is performed in accordance with our recommendations and with good quality control of the earthwork.

Additional design considerations for project foundations are outlined as follows:

- Design all footings with a minimum 24 inches width;

- All exterior footing bottoms should bear at least 24 inches below finished exterior grading; (Table 1805.2.1 of the Kentucky Building Code)
- Interior footings (those not exposed to freezing) may be placed at nominal depths;
- Include control joints at suitable intervals in the walls of structures to help accommodate differential foundation movements.

### 10B SHALLOW FOUNDATIONS ON SOIL - CONSTRUCTION NOTES

Any soils can lose strength if they become wet, so we recommend the foundation subgrades be protected from exposure to water. For foundations construction, we also recommend the following procedures.

- For soils that will remain exposed overnight or for an extended period of time, place a "lean" concrete mud-mat over the bearing areas. The concrete should be at least 4 inches thick. Flowable fill concrete or low-strength concrete is suitable for this cover, as conditions allow;
- Disturbed soil should be removed prior to foundation concrete placement.
- Foundation bearing conditions should be benched level.
- Areas loosened by excavation operations should be recompacted prior to reinforcing steel placement.
- Loose soil, debris, and excess surface water should be removed from the bearing surface prior to concrete placement.
- Retain a CSI geotechnical engineer to observe all foundation excavations and provide recommendations for treatment of any unsuitable conditions encountered.
- The bearing conditions of foundation soils (residual or fill) should be checked by means of portable dynamic cone penetration (DCP) testing at the direction of the CSI geotechnical engineer.

## 11 SEISMIC SITE CLASSIFICATION

The Kentucky Building Code (KBC), as updated was reviewed to determine the Site Seismic Classification. Based on our review of geologic data, our experience, the use of soil bearing foundations and the subsurface conditions encountered, we recommend a Seismic Site Class "C". Our site classification is based on the assumption that foundations for the proposed building will be shallow spread foundations bearing on firm or better residual soils or newly placed and compacted fill.

A detailed geotechnical earthquake engineering analysis was not performed. However, based on a review of published literature and our experience with similar subsurface conditions, we believe the potential for slope instability, liquefaction, and surface rupture due to faulting or

lateral spreading resulting from earthquake motions is low. This potential could be elevated during wet periods of the year unless adequate drainage is provided for as recommended in this report.

## 12 GRADE SUPPORTED FLOOR SLABS

A grade supported floor slab is suitable for the proposed main building, provided the subgrade is prepared according to the recommendations contained within this report. Based on the depth to auger refusal encountered during drilling, we do not expect that rock will be encountered beneath the project floor slab based on our expected final grades.

The following features are recommended as part of grade supported slab construction:

- Provide isolation joints between the slab and columns and along footing supported walls.
- Adequate joint patterns (ACI and ICC guidelines) should be used to permit slab movement due to normal settlement, normal subgrade disturbance, and material expansion/contraction.
- Place a minimum of 4 inches of compacted dense graded crushed stone beneath the slab to provide a working base. The actual thickness of the crushed stone layer should be based on design requirements.
- Keep the crushed stone moist, but not wet, immediately prior to slab concrete placement to minimize curling of the slab due to differential curing conditions between the top and bottom of the slab.
- Retain CSI to review the actual subgrade conditions prior to slab construction and to make recommendations for any unsuitable conditions encountered.
- Note: Slab subgrade conditions are also considered earthwork areas; thus, the recommendations contained in the Earthwork section of the report apply.

## 13 PAVEMENT RECOMMENDATIONS

Adequate soil/subgrade support is critical for any pavement area. Please refer to the Earthwork section of this report for subgrade preparation recommendations. Prior to base stone placement for the pavement areas, we recommend an additional proofroll of the subgrade should be performed to verify subgrade conditions. Recommendations for undercutting/repair of the subgrade can be made at that time by a CSI geotechnical engineer.

Adequate drainage and slope of the pavement subgrade and pavement section should be provided to promote adequate drainage. Edges of the pavement should be provided a means of water outlet by extending the aggregate base course through to side ditches or providing drain pipes and weep holes at catch basin walls.

## 13A ASPHALT PAVEMENT

Typically, pavement design is based on supplied traffic loads and CBR values. However, no traffic loads were provided to us for this project. We expect that light duty asphalt will be used in areas that typically only see passenger cars, while the heavy duty asphalt will be for the main drive lanes and areas exposed to heavier truck traffic. Two CBR tests revealed a minimum CBR value of 4.1 percent. Thus, generalized pavement designs for both light duty and heavy-duty asphalt pavement are given below based on our experience with similar projects.

**Table 1. Light Duty Asphalt Pavement Section**

| Pavement Section Component | Thickness (in) |
|---|---|
| Bituminous Surface Course | 1.5 |
| Bituminous Binder Course | 1.5 |
| Dense Graded Aggregate (DGA)* | 8.0 |

*DGA to be placed in 6-inch thick maximum, compacted lifts

**Table 2. Heavy Duty Asphalt Pavement Section**

| Pavement Section Component | Thickness (in) |
|---|---|
| Bituminous Surface Course | 1.5 |
| Bituminous Binder Course | 2.5 |
| Dense Graded Aggregate (DGA)* | 10.0 |

*DGA to be placed in 6-inch thick maximum, compacted lifts

The dense graded aggregate (DGA) should be placed and compacted in accordance with Kentucky Department of Highways Standard Specifications, latest edition. The asphalt should be mixed, placed, and compacted in accordance with Kentucky Department of Highways Standard Specifications, latest edition. It is common practice to place the base stone and binder course prior to completion of construction without placing the surface course. It should be noted that repeated passes of heavily loaded construction traffic on the binder course will likely decrease the service life of your pavement.

## 13B CONCRETE PAVEMENT

Typically, concrete pavement is used when heavy, repeated loads are expected in a specific area. Concrete pavement is commonly used for entrances/exits, dumpster pads, truck turn-arounds, etc.

We recommend a minimum DGA thickness of 8 inches beneath new concrete pavement and a minimum concrete thickness of 6 inches for new concrete pavement areas. Obviously, thicker pavement concrete sections can be used in select areas where heavy wheel loads are expected. We also recommend that the concrete pavement be reinforced with heavy welded

wire fabric or reinforcing steel. For dumpster pads and refuse container pads, the concrete pads should be large enough to accommodate both the refuse container and all axles of the truck.

## 14 NOTES ON THE REPORT AND RECOMMENDATIONS

We recommend that this complete report be provided to the various design team members, the contractors and the project Owner. Potential contractors should be informed of this report in the "Instructions to Bidders" section of the bid documents. A geotechnical exploration, such as the one we performed, uses widely spaced borings to attempt to model the subsurface conditions at the site. Because no exploration contains complete data or a complete model, there is always a possibility that conditions between borings will be different from those at specific boring locations. Thus, it is possible that some subsurface conditions will not be as anticipated by the project team or contractor. If this report is included or referenced in the actual contract documents, **it shall be explicitly understood that this report is for informational purposes only.** CSI shall not be responsible for the opinions of, or conclusions drawn by, others.

It has been our experience that the construction process often disturbs soil conditions and this process, no matter how much experience we use to anticipate construction methodology, is not completely predictable. Therefore, changes or modifications to our recommendations are likely needed due to these possible variances. Experienced CSI geotechnical personnel should be used to observe and document the construction procedures and the conditions encountered. Unanticipated conditions and inadequate procedures should be reported to the design team along with timely recommendations to solve the problems created. We recommend that the Owner retain CSI to provide this service based upon our familiarity with the project, the subsurface conditions and the intent of our recommendations.

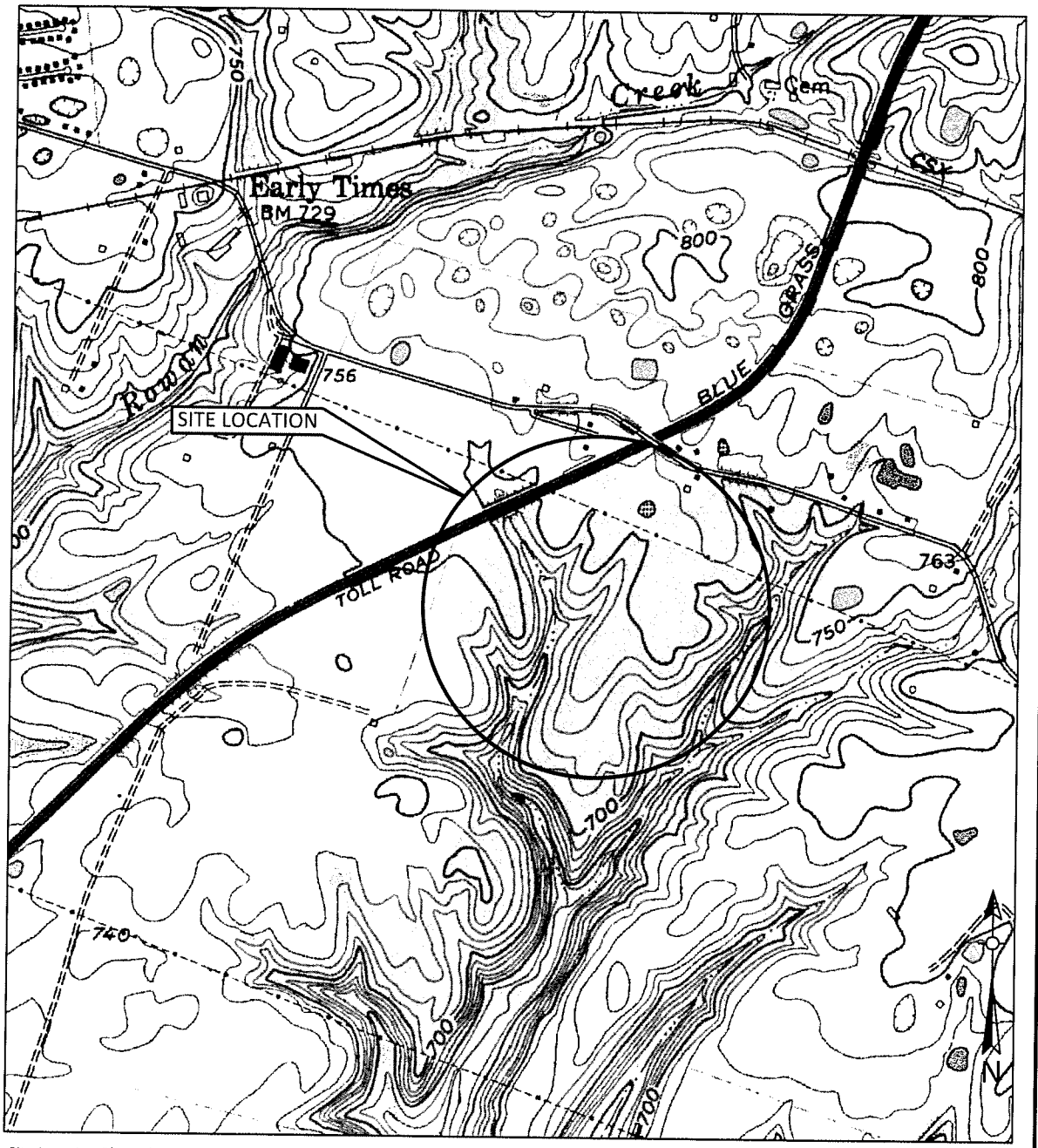
This report is based on the supplied project information, the subsurface conditions observed at the time of the report, and our experience with similar conditions. As such, it cannot be applied to other project sites, types, or combinations thereof. If the Project Information section in this report contains incorrect information or if additional information is available, you should convey the correct or additional information to us and retain us to review our recommendations. Our recommendations may then require modification.

No section or portion of this report (including Appendix information) can be used as a stand alone article to make distinct changes or assumptions. The entire report and Appendix should be used together as one resource. We wish to remind you that our exploration services include storing the soil samples collected and making them available for inspection for 30 days. The soil samples are then discarded unless you request otherwise. Please inform us if you wish to keep any of the obtained samples.

While this report deals with samples of subsurface materials and some comments on water conditions at the site, no assessment of site environmental conditions or the presence of contaminants were performed.

# APPENDIX

Site Location Plan
Boring Location Plan
Geotechnical Boring Information Sheet
Boring Logs
Summary of Soundings
Field Testing Procedures
Laboratory Testing Summary Sheet
Specific Laboratory Test Results
Laboratory Testing Procedures




Site Location Plan adapted from USGS Bardstown Topographic Quadrangle map dated 1967 (photorevised 1987), with further adaptation by CSI personnel.

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250 Gold Rush Road
Lexington, Kentucky 40503
859.309.6021 Office | 888.792.3121 Fax
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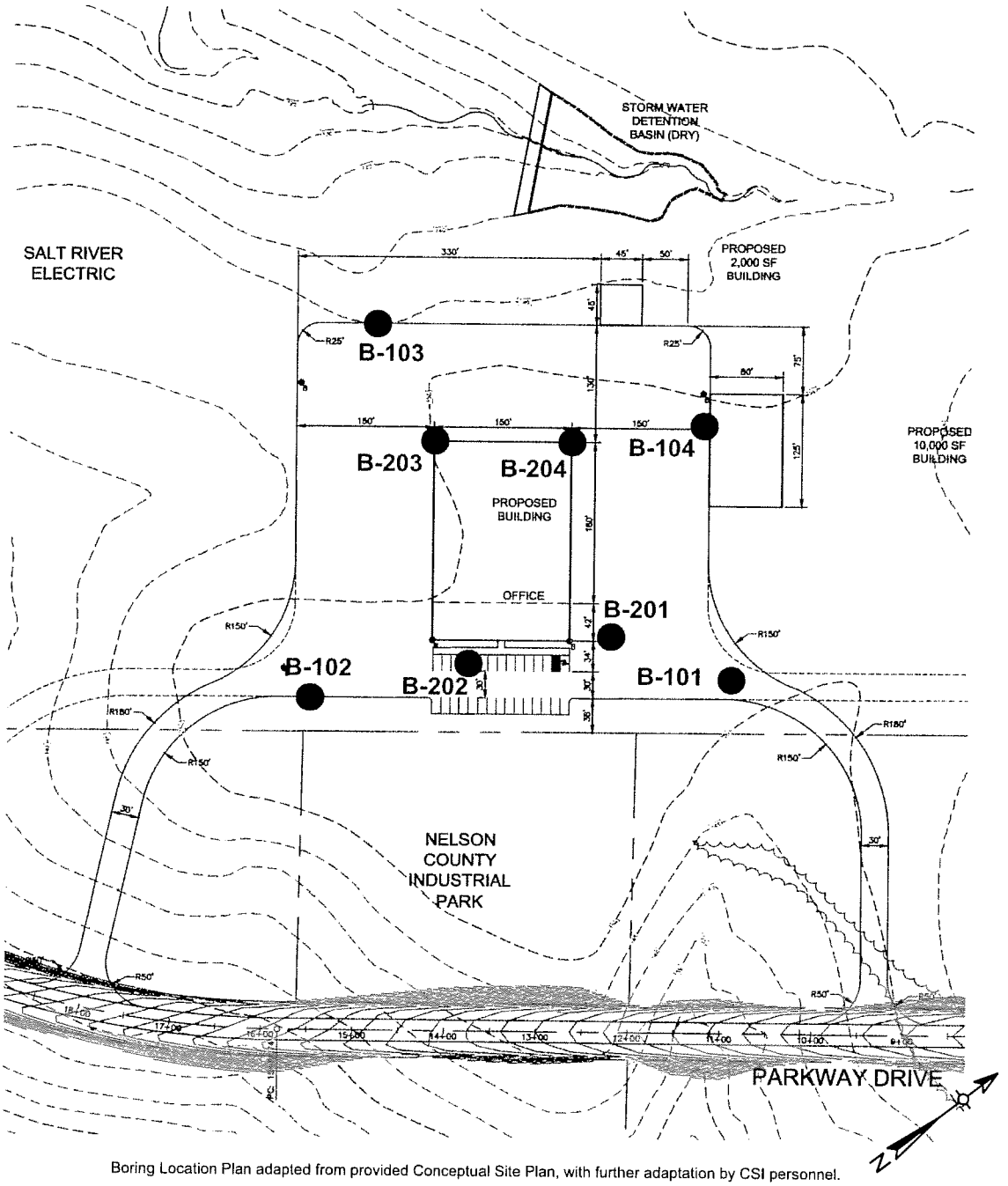
| | | |
|---|---|---|
| TITLE: SITE LOCATION PLAN | Project No: 2516 | Drawn By: JAC |
| PROJECT: PROPOSED FACILITY FOR SALT RIVER ELECTRIC NELSON COUNTY, KENTUCKY | Date: June 10, 2013 | Checked By: TD |
| | Scale: Not To Scale | Drawing No: 1 of 1 |




Boring Location Plan adapted from provided Conceptual Site Plan, with further adaptation by CSI personnel.

Boring locations are approximate due to dense vegetation on site. Elevations for borings B-102, B-103, B-104, B-201 and B-202 were provided by MSE Engineering survey personnel. All other boring elevations were interpolated using provided topographic mapping.

LEGEND

● B-XXX BORING LOCATIONS

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|---|---|---|---|
| TITLE: BORING LOCATION PLAN | | Project No: 2516 | Drawn By: JAC |
| PROJECT: PROPOSED FACILITY FOR SALT RIVER ELECTRIC NELSON COUNTY, KENTUCKY | | Date: June 10, 2013 | Checked By: TD |
| | | Scale: Not To Scale | Drawing No: 1 of 1 |

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# Geotechnical Boring Information Sheet

| Sample Type Symbols | |
|---|---|
| Splitspoon (SPT) | |
| Dynamic Cone Penetrometer (DCP) | |
| Shelby Tube | |
| Grab | |
| Bulk | |
| Rock Core | |

| Surface Symbols |
|---|
| Topsoil |
| Asphalt |
| Concrete |
| Lean Clay |
| Fat Clay |
| Sandy Clay |
| Silt |
| Elastic Silt |
| Lean Clay to Fat Clay |
| Gravelly Clay |
| Sandy Silt |
| Gravelly Silt |
| Sand |
| Gravel |
| Fill |
| Void |
| Limestone |
| Sandstone |
| Shale/Siltstone |
| Weathered Rock |

| Samples Strength Descriptors | |
|---|---|
| **Cohesive Soils:** | N |
| Very Soft | 0-1 |
| Soft | 2-4 |
| Firm | 5-8 |
| Stiff | 9-15 |
| Very Stiff | 16-30 |
| Hard | 31+ |
| **Non-cohesive Soils:** | |
| Very Loose | 0-4 |
| Loose | 5-10 |
| Firm | 11-20 |
| Very Firm | 21-30 |
| Dense | 30-50 |
| Very Dense | 51+ |

## Definitions

SPT-"Splitspoon" or standard penetration test. Blow counts are number of drops required for a 140 lb hammer dropping 30 inches to drive the sampler 6 inches.

N-value is the addition of the last two intervals of the 18-inch sample.

Shelby tubes are often called "undisturbed samples". They are directly pushed into the ground, twisted, allowed to rest for a small period of time and then pulled out of the ground. Tops and bottoms are cleaned and then sealed.

Sample classification is done in general accordance with ASTM D2487 and 2488 using the Unified Soil Classification System (USCS) as a general guide.

Soil moisture descriptions are based on the recovered sample observations. The descriptors are dry, slightly moist, moist, very moist and wet. These are typically based on relative estimates of the moisture condition of a visual estimation of the soils optimum moisture content (EOMC). Dry is almost in a "dusty" condition usually 6 or more percent below EOMC. Slightly moist is from about 6 to 2 percent below EOMC at a point at which the soil color does not readily change with the addition of water. Moist is usually 2 percent below to 2 percent above EOMC and the point at which the soil will tend to begin forming "balls" under some pressure in the hand. Very moist is usually from about 2 percent to 6 percent above EOMC and also the point at which it's often considered "muddy". Wet soil is usually 6 or more percent above EOMC and often contains free water or the soil is in a saturated state.

Silt or Clay is defined at material finer than a standard #200 US sieve (<0.075mm) Sand is defined as material between the size of #200 sieve up to #4 sieve. Gravel is from #4 size sieve material to 3". Cobbles are from 3" to 12". Boulders are over 12".

Rock hardness is classified as follows:

| | |
|---|---|
| Very Soft: | Easily broken by hand pressure |
| Soft: | Ends can be broken by hand pressure; easily broken with hammer |
| Medium: | Ends easily broken with hammer; middle requires moderate blow |
| Hard: | Ends require moderate hammer blow; middle requires several blows |
| Very Hard: | Many blows with a hammer required to break core |

Rock Quality Designation (RQD) is defined as total combined length of 4" or longer pieces of core divided by the total core run length; defined in percentage.

Water or cave-in observed in borings is at completion of drilling each boring unless otherwise noted.

Strata lengths shown on borings represents a rough estimate. Transition may be more abrupt or gradual. Soil borings are representative of that estimated location at that time and are based on recovered samples. Conditions may be different between borings and between sample intervals. Boring information is not to be considered stand alone but should be taken in context with comments and information in the geotechnical report and the means by which the borings are logged, sampled and drilled.

# Consulting Services Inc. of Kentucky — Boring Log

250 Gold Rush Road I Lexington, Kentucky 40503 I 859.309.6021 tel I 888.792.3121 fax



PROJECT: Proposed Facility For Salt River Electric
PROJECT NUMBER: 2516
BORING NUMBER: B-101
LOCATION: Nelson County, Kentucky
WEATHER: Rainy, 70's
DRILL RIG TYPE: CME 550
DRILLER: Geo-Drill
DATE DRILLED: 05-22-2013
DRILLING METHOD: 4" OD SFA
CSI FIELD REP: T. Duffy
CLIENT: MSE of Kentucky

**TOP OF GROUND ELEVATION: 750.5**

| ELEV. (feet) | DEPTH (feet) | Water Level | Strata Description | SOIL TYPE | SAMPLES | SPT Blow Counts | Recovery (in) | RQD (%) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 750.5 | 0 | | LEAN CLAY (CL) - SOFT to VERY STIFF, reddish brown, with black oxide nodules, moist | | | WOH-2-2 | 16 | | WOH = Weight Of Hammer |
| | | | | | | 2-4-4 | 17 | | |
| 747.5 | 3 | | Encountered chert zone from 4.5 to 5.0 feet | | | 7-8-8 | 15 | | |
| | | ▽ | FAT CLAY (CH) - VERY STIFF, light brown, with black oxide nodules, with chert fragments, wet | | | | | | Encountered water at 5.0 feet |
| 744.5 | 6 | | | | | 5-6-12 | 18 | | |
| 741.5 | 9 | | | | | 5-7-10 | 15 | | |
| 738.5 | 12 | | Weathered Rock | | | | | | |
| | | | Auger Refusal at 13.3 feet | | | | | | |
| 735.5 | 15 | | | | | | | | |
| 732.5 | 18 | | | | | | | | |
| 729.5 | 21 | | | | | | | | |

Photo of Approx. Boring Location

Please note: Boring log is for information only. Soil borings only show conditions observed in specific recovered samples at that particular location. Boring locations are approximate due to dense vegetation on site. Elevations for borings B-102, B-103, B-104, B-201 and B-202 were provided by MSE Engineering survey personnel. All other boring elevations were interpolated using provided topographic mapping.

# Consulting Services Inc. of Kentucky — Boring Log

250 Gold Rush Road I Lexington, Kentucky 40503 I 859.309.6021 tel I 888.792.3121 fax



PROJECT: Proposed Facility For Salt River Electric
PROJECT NUMBER: 2516
BORING NUMBER: B-102
LOCATION: Nelson County, Kentucky
WEATHER: Rainy, 70's
DRILL RIG TYPE: CME 550
DRILLER: Geo-Drill
DATE DRILLED: 05-22-2013
DRILLING METHOD: 4" OD SFA
CSI FIELD REP: T. Duffy
CLIENT: MSE of Kentucky

**TOP OF GROUND ELEVATION: 751.4**

| ELEV. (feet) | DEPTH (feet) | Water Level | Strata Description | SOIL TYPE | SAMPLES | SPT Blow Counts | Recovery (in) | RQD (%) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 751.4 | 0 | | TOPSOIL - 5 inches | | | 2-4-4 | 14 | | Dry upon completion of soil augering |
| | | | LEAN CLAY (CL) - FIRM to STIFF, reddish brown, with black oxide nodules, moist | | | 4-5-8 | 15 | | |
| 748.4 | 3 | | | | | 4-5-6 | 17 | | |
| 745.4 | 6 | | FAT CLAY (CH) - VERY STIFF, reddish brown, with black oxide nodules, moist | | | 6-7-11 | 16 | | |
| 742.4 | 9 | | | | | 10-13-10 | 13 | | |
| 739.4 | 12 | | SHALE - HARD, brown, highly weathered | | | 21-50/0.1 | 6 | | |
| 736.4 | 15 | | Boring Terminated at 15.5 feet | | | | | | |
| 733.4 | 18 | | | | | | | | |
| 730.4 | 21 | | | | | | | | |

Photo of Approx. Boring Location

Please note: Boring log is for information only. Soil borings only show conditions observed in specific recovered samples at that particular location.
Boring locations are approximate due to dense vegetation on site. Elevations for borings B-102, B-103, B-104, B-201 and B-202 were provided by MSE Engineering survey personnel.
All other boring elevations were interpolated using provided topographic mapping.

# Consulting Services Inc. of Kentucky

## Boring Log

250 Gold Rush Road | Lexington, Kentucky 40503 | 859.309.6021 tel | 888.792.3121 fax



PROJECT: Proposed Facility For Salt River Electric
PROJECT NUMBER: 2516
BORING NUMBER: B-103
LOCATION: Nelson County, Kentucky
WEATHER: Rainy, 70's
DRILL RIG TYPE: CME 550
DRILLER: Geo-Drill
DATE DRILLED: 05-22-2013
DRILLING METHOD: 4" OD SFA
CSI FIELD REP: T. Duffy
CLIENT: MSE of Kentucky

**TOP OF GROUND ELEVATION: 748.7**

| ELEV. (feet) | DEPTH (feet) | Water Level | Strata Description | SOIL TYPE | SAMPLES | SPT Blow Counts | Recovery (in) | RQD (%) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 748.7 | 0 | | TOPSOIL / ROOT ZONE - 5 inches | | | 2-2-3 | 9 | | Dry upon completion of soil augering |
| | | | LEAN CLAY (CL) - FIRM to STIFF, reddish brown, moist | | | 4-4-4 | 8 | | |
| 745.7 | 3 | | | | | 4-5-7 | 13 | | |
| 742.7 | 6 | | FAT CLAY (CH) - VERY STIFF, brown, with chert fragments, moist | | | 7-8-9 | 6 | | |
| 739.7 | 9 | | SHALE - HARD, highly weathered, light brown and light gray, moist | | | 7-11-50/0.4 | 14 | | |
| | | | Auger Refusal at 11.1 feet | | | | | | |
| 736.7 | 12 | | | | | | | | |
| 733.7 | 15 | | | | | | | | |
| 730.7 | 18 | | | | | | | | |
| 727.7 | 21 | | | | | | | | |

Photo of Approx. Boring Location

Please note: Boring log is for information only. Soil borings only show conditions observed in specific recovered samples at that particular location.
Boring locations are approximate due to dense vegetation on site. Elevations for borings B-102, B-103, B-104, B-201 and B-202 were provided by MSE Engineering survey personnel.
All other boring elevations were interpolated using provided topographic mapping.

# Consulting Services Inc. of Kentucky — Boring Log

250 Gold Rush Road I Lexington, Kentucky 40503 I 859.309.6021 tel I 888.792.3121 fax

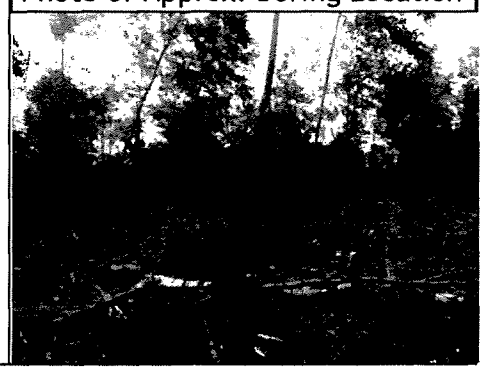


PROJECT: Proposed Facility For Salt River Electric
PROJECT NUMBER: 2516
BORING NUMBER: B-104
LOCATION: Nelson County, Kentucky
WEATHER: Rainy, 70's
DRILL RIG TYPE: CME 550
DRILLER: Geo-Drill
DATE DRILLED: 05-22-2013
DRILLING METHOD: 4" OD SFA
CSI FIELD REP: T. Duffy
CLIENT: MSE of Kentucky

**TOP OF GROUND ELEVATION: 751.2**

| ELEV. (feet) | DEPTH (feet) | Water Level | Strata Description | SOIL TYPE | SAMPLES | SPT Blow Counts | Recovery (in) | RQD (%) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 751.2 | 0 | | TOPSOIL - 4 inches | | | 2-3-4 | 10 | | Dry upon completion of soil augering |
| | | | LEAN CLAY (CL) - FIRM to STIFF, reddish brown, moist | | | 4-6-6 | 12 | | |
| 748.2 | 3 | | LEAN CLAY (CL) - STIFF, reddish brown, with black oxide nodules, moist | | | 3-4-6 | 16 | | |
| 745.2 | 6 | | FAT CLAY (CH) - VERY STIFF, brown, with black oxide nodules, with chert fragments, moist | | | 9-12-14 | 13 | | |
| 742.2 | 9 | | SHALE - HARD, highly weathered, light brown, with chert fragments | | | 50/0.4 | 4 | | |
| | | | Auger Refusal at 10.1 feet | | | | | | |
| 739.2 | 12 | | | | | | | | |
| 736.2 | 15 | | | | | | | | |
| 733.2 | 18 | | | | | | | | |
| 730.2 | 21 | | | | | | | | |

Photo of Approx. Boring Location



Please note: Boring log is for information only. Soil borings only show conditions observed in specific recovered samples at that particular location. Boring locations are approximate due to dense vegetation on site. Elevations for borings B-102, B-103, B-104, B-201 and B-202 were provided by MSE Engineering survey personnel. All other boring elevations were interpolated using provided topographic mapping.

# Consulting Services Inc. of Kentucky

## Boring Log

250 Gold Rush Road I Lexington, Kentucky 40503 I 859.309.6021 tel I 888.792.3121 fax

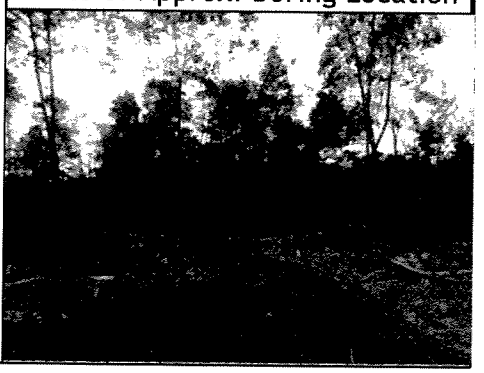


PROJECT: Proposed Facility For Salt River Electric
PROJECT NUMBER: 2516
BORING NUMBER: B-201
LOCATION: Nelson County, Kentucky
WEATHER: Rainy, 70's
DRILL RIG TYPE: CME 550
DRILLER: Geo-Drill
DATE DRILLED: 05-22-2013
DRILLING METHOD: 4" OD SFA
CSI FIELD REP: T. Duffy
CLIENT: MSE of Kentucky

**TOP OF GROUND ELEVATION: 751.6**

| ELEV. (feet) | DEPTH (feet) | Water Level | Strata Description | SOIL TYPE | SAMPLES | SPT Blow Counts | Recovery (in) | RQD (%) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 751.6 | 0 | | TOPSOIL - 4 inches | | | 2-3-3 | 10 | | Dry upon completion of soil augering |
| | | | LEAN CLAY (CL) - FIRM to STIFF, reddish brown, moist | | | 3-4-6 | 7 | | |
| 748.6 | 3 | | LEAN CLAY (CL) - STIFF, reddish brown, with black oxide nodules, moist | | | 3-4-6 | 10 | | |
| 745.6 | 6 | | FAT CLAY (CH) - VERY STIFF, reddish brown, with black oxide nodules, with chert fragments, moist to wet | | | 7-9-18 | 11 | | |
| 742.6 | 9 | | | | | 7-7-11 | 9 | | |
| 739.6 | 12 | | Weathered Rock | | | | | | |
| 736.6 | 15 | | Auger Refusal at 14.4 feet | | | | | | |
| 733.6 | 18 | | | | | | | | |
| 730.6 | 21 | | | | | | | | |

Photo of Approx. Boring Location



Please note: Boring log is for information only. Soil borings only show conditions observed in specific recovered samples at that particular location.
Boring locations are approximate due to dense vegetation on site. Elevations for borings B-102, B-103, B-104, B-201 and B-202 were provided by MSE Engineering survey personnel.
All other boring elevations were interpolated using provided topographic mapping.

# Consulting Services Inc. of Kentucky

## Boring Log

250 Gold Rush Road | Lexington, Kentucky 40503 | 859.309.6021 tel | 888.792.3121 fax



PROJECT: Proposed Facility For Salt River Electric
PROJECT NUMBER: 2516
BORING NUMBER: B-202
LOCATION: Nelson County, Kentucky
WEATHER: Rainy, 70's
DRILL RIG TYPE: CME 550
DRILLER: Geo-Drill
DATE DRILLED: 05-22-2013
DRILLING METHOD: 4" OD SFA
CSI FIELD REP: T. Duffy
CLIENT: MSE of Kentucky

**TOP OF GROUND ELEVATION: 750.5**

| ELEV. (feet) | DEPTH (feet) | Water Level | Strata Description | SOIL TYPE | SAMPLES | SPT Blow Counts | Recovery (in) | RQD (%) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 750.5 | 0 | | LEAN CLAY (CL) - SOFT to FIRM, brown, wet to moist | | | 2-2-2 | 16 | | |
| | | | | | | 3-3-4 | 14 | | |
| 747.5 | 3 | | FAT CLAY (CH) - STIFF to VERY STIFF, reddish brown, with black oxide nodules, with chert fragments, moist | | | 4-4-5 | 13 | | |
| 744.5 | 6 | | | | | 5-8-10 | 10 | | |
| 741.5 | 9 | | | | | 9-11-11 | 18 | | |
| 738.5 | 12 | | SHALE - HARD, highly weathered, various shades of brown, wet | | | 50/0.2 | 1 | | Encountered water at 14.0 feet |
| 735.5 | 15 | ▽ | Auger Refusal at 14.8 feet | | | | | | |
| 732.5 | 18 | | | | | | | | |
| 729.5 | 21 | | | | | | | | |

Photo of Approx. Boring Location

Please note: Boring log is for information only. Soil borings only show conditions observed in specific recovered samples at that particular location.
Boring locations are approximate due to dense vegetation on site. Elevations for borings B-102, B-103, B-104, B-201 and B-202 were provided by MSE Engineering survey personnel.
All other boring elevations were interpolated using provided topographic mapping.

# Consulting Services Inc. of Kentucky

# Boring Log

250 Gold Rush Road I Lexington, Kentucky 40503 I 859.309.6021 tel I 888.792.3121 fax



PROJECT: Proposed Facility For Salt River Electric
PROJECT NUMBER: 2516
BORING NUMBER: B-203
LOCATION: Nelson County, Kentucky
WEATHER: Rainy, 70's
DRILL RIG TYPE: CME 550
DRILLER: Geo-Drill
DATE DRILLED: 05-22-2013
DRILLING METHOD: 4" OD SFA
CSI FIELD REP: T. Duffy
CLIENT: MSE of Kentucky

**TOP OF GROUND ELEVATION: 748.6**

| ELEV. (feet) | DEPTH (feet) | Water Level | Strata Description | SOIL TYPE | SAMPLES | SPT Blow Counts | Recovery (in) | RQD (%) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 748.6 | 0 | | TOPSOIL - 3 inches | | | 2-3-5 | 16 | | |
| | | | LEAN CLAY (CL) - FIRM to STIFF, reddish brown, moist | | | 5-5-5 | 15 | | |
| 745.6 | 3 | | FAT CLAY (CH) - FIRM to VERY STIFF, reddish brown, with black oxide nodules, moist | | | 4-4-4 | 18 | | |
| 742.6 | 6 | | | | | 8-14-11 | 10 | | |
| | | | FAT CLAY (CH) - VERY STIFF, reddish brown, with black oxide nodules, with chert fragments, moist | | | | | | |
| 739.6 | 9 | ▽ | SHALE - VERY STIFF, highly weathered, light brown to light gray, moist | | | 7-10-13 | 10 | | Encountered water at 9.0 feet |
| 736.6 | 12 | | Auger Refusal at 12.7 feet | | | | | | |
| 733.6 | 15 | | | | | | | | |
| 730.6 | 18 | | | | | | | | |
| 727.6 | 21 | | | | | | | | |

Photo of Approx. Boring Location

Please note: Boring log is for information only. Soil borings only show conditions observed in specific recovered samples at that particular location.
Boring locations are approximate due to dense vegetation on site. Elevations for borings B-102, B-103, B-104, B-201 and B-202 were provided by MSE Engineering survey personnel.
All other boring elevations were interpolated using provided topographic mapping.

# Consulting Services Inc. of Kentucky

## Boring Log

250 Gold Rush Road I Lexington, Kentucky 40503 I 859.309.6021 tel I 888.792.3121 fax



PROJECT: Proposed Facility For Salt River Electric
PROJECT NUMBER: 2516
BORING NUMBER: B-204
LOCATION: Nelson County, Kentucky
WEATHER: Rainy, 70's
DRILL RIG TYPE: CME 550
DRILLER: Geo-Drill
DATE DRILLED: 05-22-2013
DRILLING METHOD: 4" OD SFA
CSI FIELD REP: T. Duffy
CLIENT: MSE of Kentucky

**TOP OF GROUND ELEVATION: 751.1**

| ELEV. (feet) | DEPTH (feet) | Water Level | Strata Description | SOIL TYPE | SAMPLES | SPT Blow Counts | Recovery (in) | RQD (%) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 751.1 | 0 | | TOPSOIL - 6 inches | | | 1-2-3 | 13 | | Dry upon completion of soil augering |
| | | | LEAN CLAY (CL) - FIRM to STIFF, reddish brown, moist | | | 3-4-6 | 8 | | |
| 748.1 | 3 | | FAT CLAY (CH) - STIFF to VERY STIFF, reddish brown, with black oxide nodules, moist to wet | | | 5-7-7 | 10 | | |
| 745.1 | 6 | | | | | 7-9-15 | 10 | | |
| 742.1 | 9 | | | | | 7-8-9 | 11 | | |
| 739.1 | 12 | | Weathered Rock | | | | | | |
| | | | Auger Refusal at 13.2 feet | | | | | | |
| 736.1 | 15 | | | | | | | | |
| 733.1 | 18 | | | | | | | | |
| 730.1 | 21 | | | | | | | | |

Photo of Approx. Boring Location

Please note: Boring log is for information only. Soil borings only show conditions observed in specific recovered samples at that particular location.
Boring locations are approximate due to dense vegetation on site. Elevations for borings B-102, B-103, B-104, B-201 and B-202 were provided by MSE Engineering survey personnel.
All other boring elevations were interpolated using provided topographic mapping.

## FIELD TESTING PROCEDURES

Field Operations: The general field procedures employed by CSI are summarized in ASTM D 420 which is entitled "Investigating and Sampling Soils and Rocks for Engineering Purposes." This recommended practice lists recognized methods for determining soil and rock distribution and ground water conditions. These methods include geophysical and in situ methods as well as borings.

Borings are drilled to obtain subsurface samples using one of several alternate techniques depending upon the subsurface conditions. These techniques are:

a. Continuous 2-1/2 or 3-1/4 inch I.D. hollow stem augers;

b. Wash borings using roller cone or drag bits (mud or water);

c. Continuous flight augers (ASTM D 1425).

These drilling methods are not capable of penetrating through material designated as "refusal materials." Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

The subsurface conditions encountered during drilling are reported on a field test boring record by the chief driller. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observations between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are on file in our office.

The soil and rock samples plus the field boring records are reviewed by a geotechnical engineer. The engineer classifies the soils in general accordance with the procedures outlined in ASTM D 2488 and prepares the final boring records which are the basis for all evaluations and recommendations.

The final boring records represent our interpretation of the contents of the field records based on the results of the engineering examinations and tests of the field samples. These records depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at these boring locations. The lines designating the interface between soil or refusal materials on the records and on profiles represent approximate boundaries. The transition between materials may be gradual. The final boring records are included with this report.

The detailed data collection methods using during this study are discussed on the following pages.

Soil Test Borings: Soil test borings were made at the site at locations shown on the attached Boring Plan. Soil sampling and penetration testing were performed in accordance with ASTM D 1586.

The borings were made by mechanically twisting a hollow stem steel auger into the soil. At regular intervals, the drilling tools were removed and soil samples obtained with a standard 1.4 inch I.D., 2 inch O.D., split tube sampler. The sampler was first seated 6 inches to penetrate any loose cuttings, then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot was recorded and is designated the "penetration resistance". The penetration resistance, when properly evaluated, is an index to the soil strength and foundation supporting capability.

Representative portions of the soil samples, thus obtained, were placed in glass jars and transported to the laboratory. In the laboratory, the samples were examined to verify the driller's field classifications. Test Boring Records are attached which graphically show the soil descriptions and penetration resistances.

Core Drilling: Refusal materials are materials that cannot be penetrated with the soil drilling methods employed. Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

Prior to coring, casing is set in the drilled hole through the overburden soils, if necessary, to keep the hole from caving. Refusal materials are then cored according to ASTM D 2113 using a diamond-studded bit fastened to the

end of a hollow double tube core barrel. This device is rotated at high speeds, and the cuttings are brought to the surface by circulating water. Core samples of the material penetrated are protected and retained in the swivel-mounted inner tube. Upon completion of each drill run, the core barrel is brought to the surface, the core recovered is measured, the samples are removed and the core is placed in boxes for storage.

The core samples are returned to our laboratory where the refusal material is identified and the percent core recovery and rock quality designation is determined by a soils engineer or geologist. The percent core recovery is the ratio of the sample length obtained to the depth drilled, expressed as a percent. The rock quality designation (RQD) is obtained by summing up the length of core recovered, including only the pieces of core which are four inches or longer, and dividing by the total length drilled. The percent core recovery and RQD are related to soundness and continuity of the refusal material. Refusal material descriptions, recoveries, and RQDs are shown on the "Test Boring Records".

Hand Auger Borings and Dynamic Cone Penetration Testing: Hand auger borings are performed manually by CSI field personnel. This consists of manually twisting hand auger tools into the subsurface and extracting "grab" or baggie samples at intervals determined by the project engineer. At the sample intervals, dynamic cone penetration (DCP) testing is performed. This testing involves the manual raising and dropping of a 20 pound hammer, 18 inches. This "driver" head drives a solid-1¾ inch diameter cone into the ground. DCP "counts" are the number of drops it takes for the hammer to drive three 1¾ inch increments, recorded as X-Y-Z values.

Test Pits: Test pits are excavated by the equipment available, often a backhoe or trackhoe. The dimensions of the test pits are based on the equipment used and the power capacity of the equipment. Samples are taken from the spoils of typical buckets of the excavator and sealed in jars or "Ziplock" baggies. Dynamic Cone Penetration or hand probe testing is often performed in the upper few feet as OSHA standards allow. Refusal is deemed as the lack of advancement of the equipment with reasonable to full machine effort.

Water Level Readings: Water table readings are normally taken in conjunction with borings and are recorded on the "Test Boring Records". These readings indicate the approximate location of the hydrostatic water table at the time of our field investigation. Where impervious soils are encountered (clayey soils) the amount of water seepage into the boring is small, and it is generally not possible to establish the location of the hydrostatic water table through water level readings. The ground water table may also be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should be expected with variations in precipitation, surface run-off, evaporation and other factors.

The time of boring water level reported on the boring records is determined by field crews as the drilling tools are advanced. The time of boring water level is detected by changes in the drilling rate, soil samples obtained, etc. Additional water table readings are generally obtained at least 24 hours after the borings are completed. The time lag of at least 24 hours is used to permit stabilization of the ground water table which has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using an electrical probe to detect the water level surface.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the caved-in zone. The cave-in depth is also measured and recorded on the boring records.

Consulting Services Incorporated
250 Gold Rush Road, Lexington, Kentucky 40503



# LABORATORY TESTING SUMMARY SHEET

Proposed Facility For Salt River Electric - Nelson County, Kentucky
CSI PROJECT NUMBER - 2516

| Boring No. | Depth (feet) | Sample Type* | USCS Classification | Natural Moisture Content % | % Finer No. 200 | Atterberg Limits Information LL | PL | PI | CBR (% @ 0.10) | Max. DD (pcf) | OMC (%) | Qu (psf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-102 (Bulk) | 0.0-4.0 | BULK | CL | 25.4 | 91.1 | 42 | 20 | 22 | 4.1 | 103.8 | 20.2 | |
| | | | | | | | | | | | | |
| B-104 (Bulk) | 0.0-4.0 | BULK | CL | 25.0 | 95.4 | 42 | 20 | 22 | 4.9 | 103.8 | 21.1 | |
| | | | | | | | | | | | | |
| B-201 | 0.0-1.5 | SS | | 27.2 | | | | | | | | |
| | 1.5-3.0 | SS | CL | 27.0 | 92.3 | 42 | 20 | 22 | | | | |
| | 4.0-5.5 | SS | CL | 27.3 | 92.6 | 48 | 22 | 26 | | | | |
| | 6.5-8.0 | SS | CH | 27.4 | 88.8 | 58 | 27 | 31 | | | | |
| | 9.0-10.5 | SS | | 32.6 | | | | | | | | |
| | | | | | | | | | | | | |
| B-202 | 0.0-1.5 | SS | | 31.0 | | | | | | | | |
| | 1.5-3.0 | SS | | 26.2 | | | | | | | | |
| | 4.0-5.5 | SS | | 27.1 | | | | | | | | |
| | 6.5-8.0 | SS | | 28.6 | | | | | | | | |
| | 9.0-10.5 | SS | | 37.1 | | | | | | | | |
| | | | | | | | | | | | | |
| B-203 | 0.0-1.5 | SS | | 25.1 | | | | | | | | |
| | 1.5-3.0 | SS | | 25.8 | | | | | | | | |
| | 4.0-5.5 | SS | | 28.5 | | | | | | | | |
| | 6.5-8.0 | SS | | 28.0 | | | | | | | | |
| | 9.0-10.5 | SS | | 23.4 | | | | | | | | |
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* SS = splitspoon sample, UD = undisturbed (Shelby tube) sample, BULK = bulk sample, GRAB = grab sample

AASHTO R18 AMRL ACCREDITED LABORATORY

Consulting Services Incorporated
250 Gold Rush Road, Lexington, Kentucky 40503

# LABORATORY TESTING SUMMARY SHEET

Proposed Facility For Salt River Electric - Nelson County, Kentucky
CSI PROJECT NUMBER - 2516

| Boring No. | Depth (feet) | Sample Type* | USCS Classification | Natural Moisture Content % | % Finer No. 200 | Atterberg Limits Information LL | PL | PI | CBR (% @ 0.10) | Max. DD (pcf) | OMC (%) | Qu (psf) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-204 | 0.0-1.5 | SS | | 23.9 | | | | | | | | |
| | 1.5-3.0 | SS | | 25.8 | | | | | | | | |
| | 4.0-5.5 | SS | | 26.3 | | | | | | | | |
| | 6.5-8.0 | SS | | 33.7 | | | | | | | | |
| | 9.0-10.5 | SS | | 30.8 | | | | | | | | |
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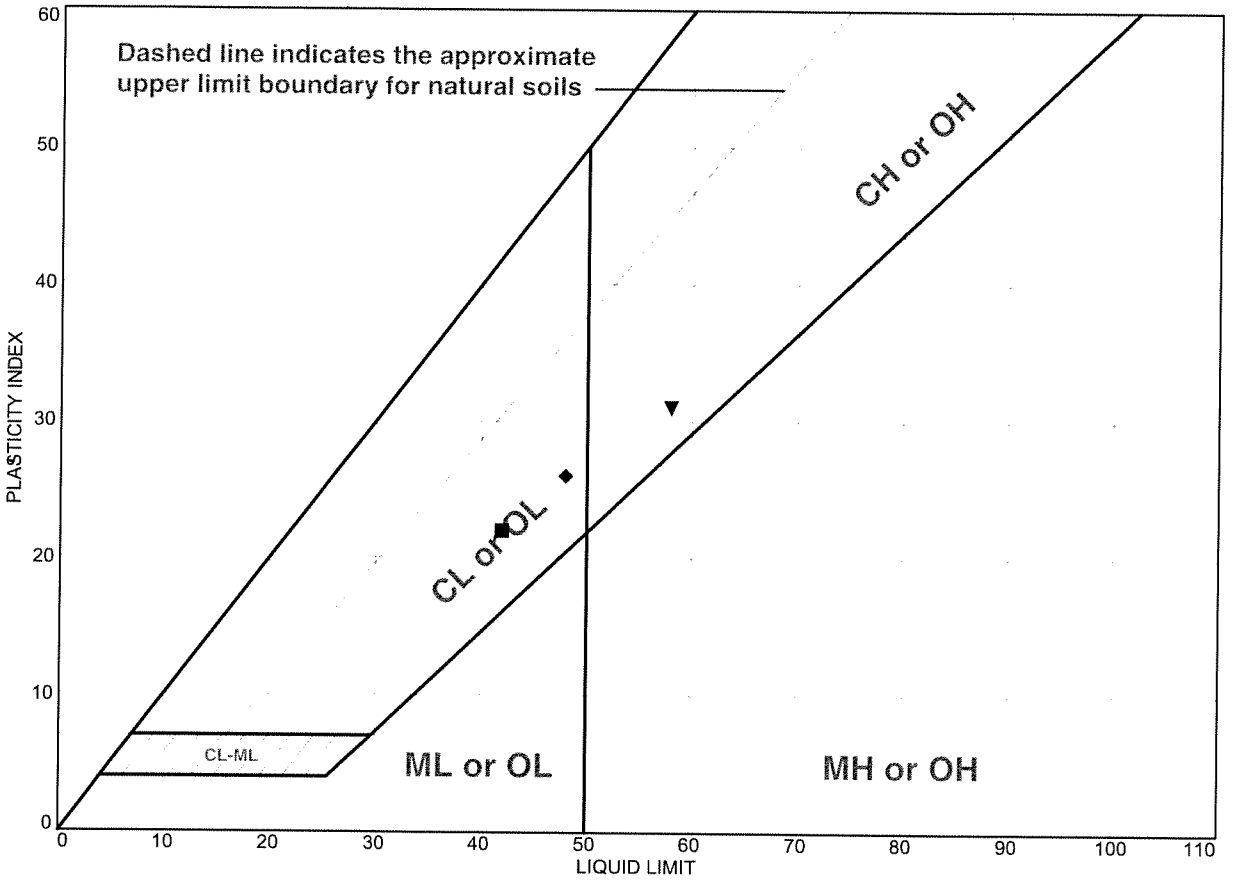
* SS = splitspoon sample, UD = undisturbed (Shelby tube) sample, BULK = bulk sample, GRAB = grab sample

# LIQUID AND PLASTIC LIMITS TEST REPORT




| | MATERIAL DESCRIPTION | LL | PL | PI | %<#40 | %<#200 | USCS |
|---|---|---|---|---|---|---|---|
| ● | reddish brown LEAN CLAY | 42 | 20 | 22 | | 91.1 | CL |
| ■ | reddish brown LEAN CLAY | 42 | 20 | 22 | | 95.4 | CL |
| ▲ | reddish brown LEAN CLAY | 42 | 20 | 22 | | 92.3 | CL |
| ◆ | reddish brown LEAN CLAY | 48 | 22 | 26 | | 92.6 | CL |
| ▼ | reddish brown FAT CLAY | 58 | 27 | 31 | | 88.8 | CH |

**Project No.** 2516 **Client:** MSE Engineering **Remarks:**

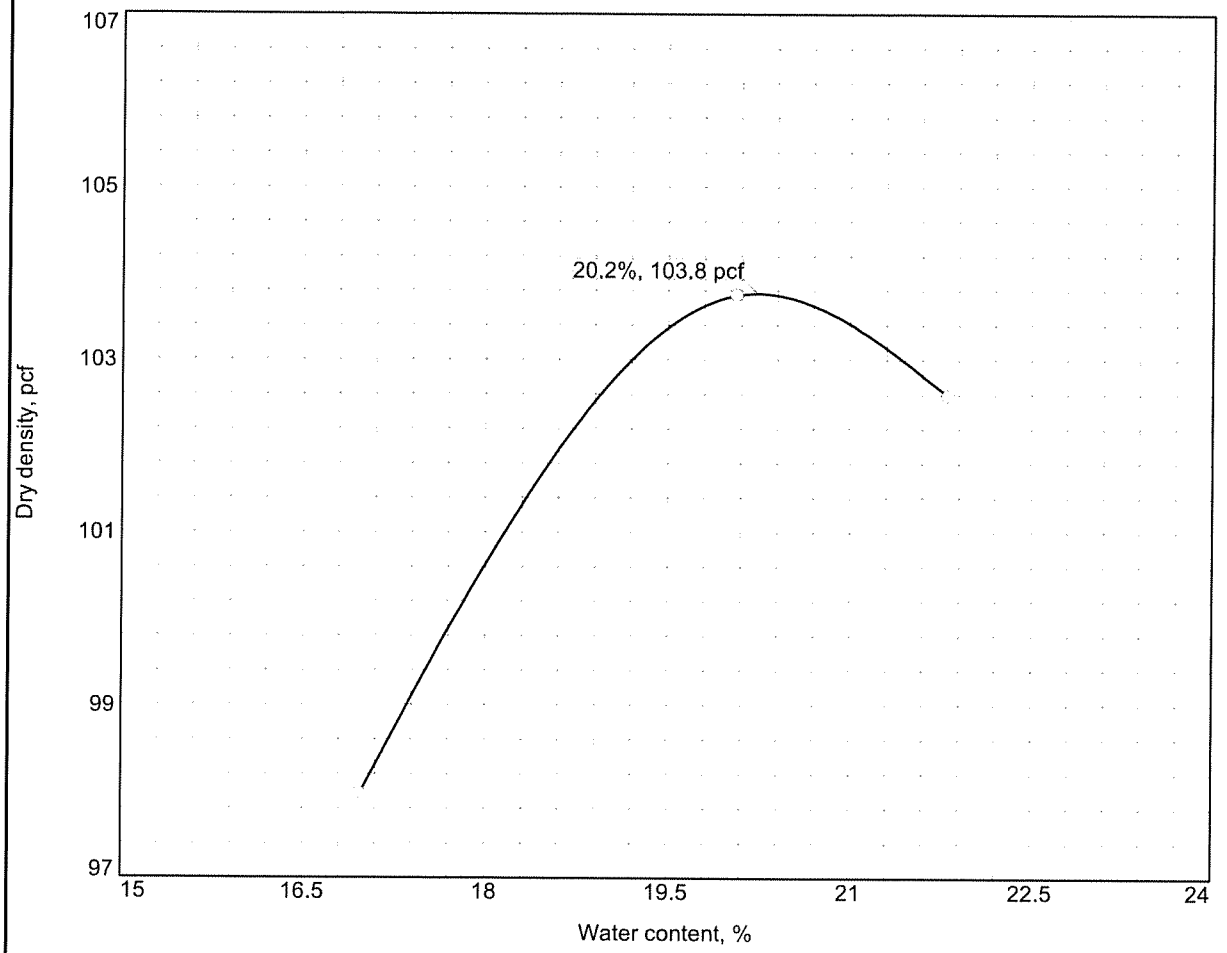
**Project:** Proposed Facility For Salt River Electric - Nelson County, Kentucky

●**Source:** Borings **Depth:** 0.0-4.0 **Sample No.:** B-102 (Bulk)
■**Source:** Borings **Depth:** 0.0-4.0 **Sample No.:** B-104 (Bulk)
▲**Source of Sample:** Borings **Depth:** 1.5-3.0 **Sample Number:** B-201
◆**Source of Sample:** Borings **Depth:** 4.0-5.5 **Sample Number:** B-201
▼**Source of Sample:** Borings **Depth:** 6.5-8.0 **Sample Number:** B-201

CSI of Kentucky
Lexington, KY

Figure

# COMPACTION TEST REPORT




Test specification: ASTM D 698-00a Method A Standard

| Elev/ Depth | Classification | | Nat. Moist. | Sp.G. | LL | PI | % > #4 | % < No.200 |
|---|---|---|---|---|---|---|---|---|
| | USCS | AASHTO | | | | | | |
| 0.0-4.0 | CL | | 25.4 | | 42 | 22 | | 91.1 |

**TEST RESULTS**

Maximum dry density = 103.8 pcf

Optimum moisture = 20.2 %

**MATERIAL DESCRIPTION**

reddish brown LEAN CLAY

**Project No.** 2516 **Client:** MSE Engineering

**Project:** Proposed Facility For Salt River Electric - Nelson County, Kentucky

**Remarks:**

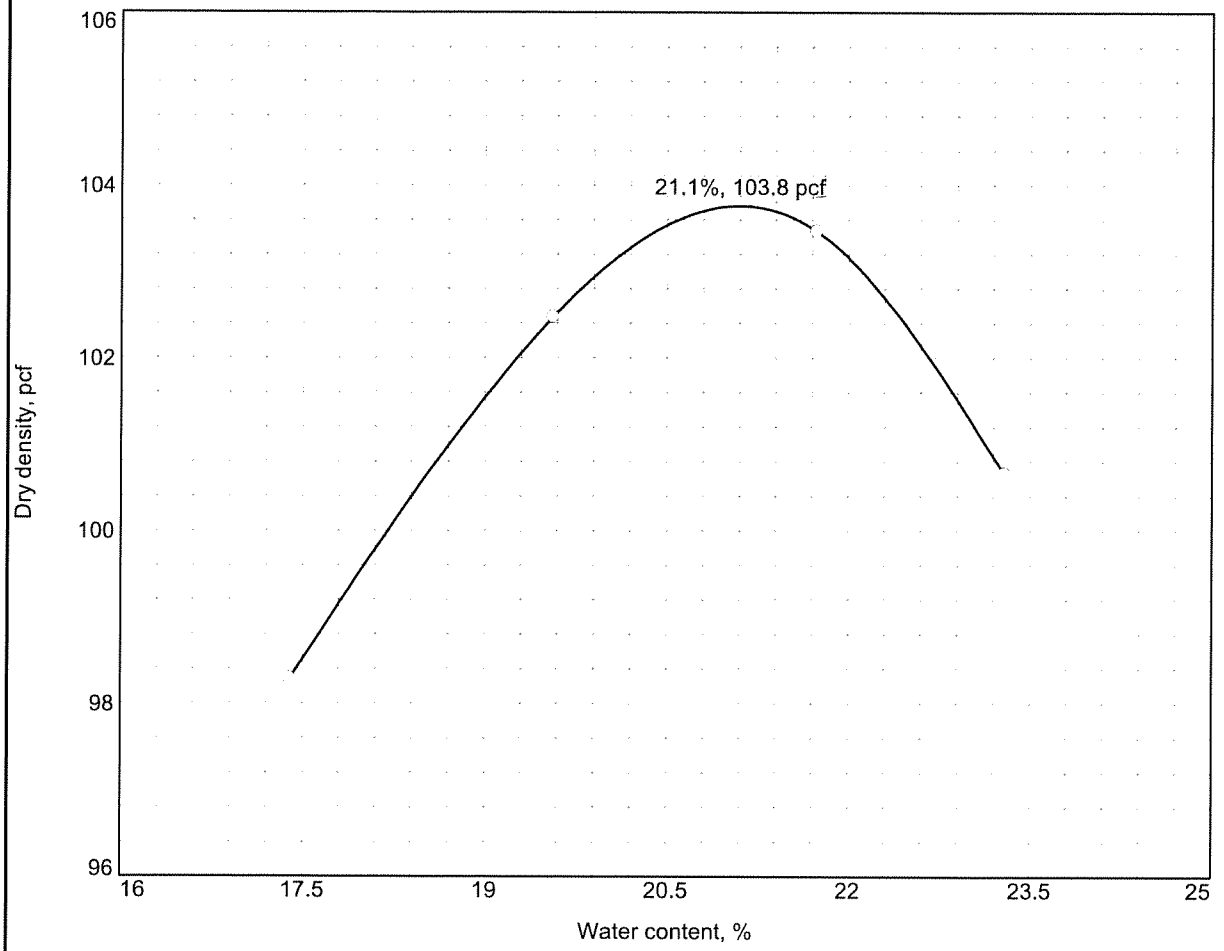
**Source of Sample:** Borings **Sample Number:** B-102 (Bulk)

**CSI of Kentucky**

**Lexington, KY**

**Figure**

# COMPACTION TEST REPORT




Test specification: ASTM D 698-00a Method A Standard

| Elev/ Depth | Classification | | Nat. Moist. | Sp.G. | LL | PI | % > #4 | % < No.200 |
|---|---|---|---|---|---|---|---|---|
| | USCS | AASHTO | | | | | | |
| 0.0-4.0 | CL | | 25.0 | | 42 | 22 | | 95.4 |

**TEST RESULTS**

Maximum dry density = 103.8 pcf

Optimum moisture = 21.1 %

**MATERIAL DESCRIPTION**

reddish brown LEAN CLAY

**Project No.** 2516 **Client:** MSE Engineering

**Project:** Proposed Facility For Salt River Electric - Nelson County, Kentucky

**Remarks:**

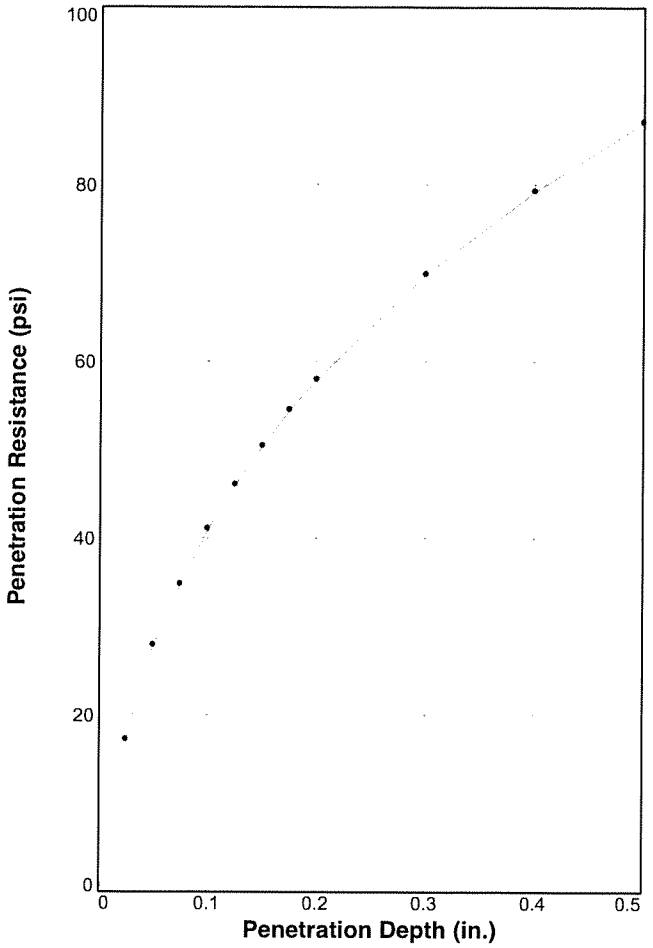
**Source of Sample:** Borings **Sample Number:** B-104 (Bulk)

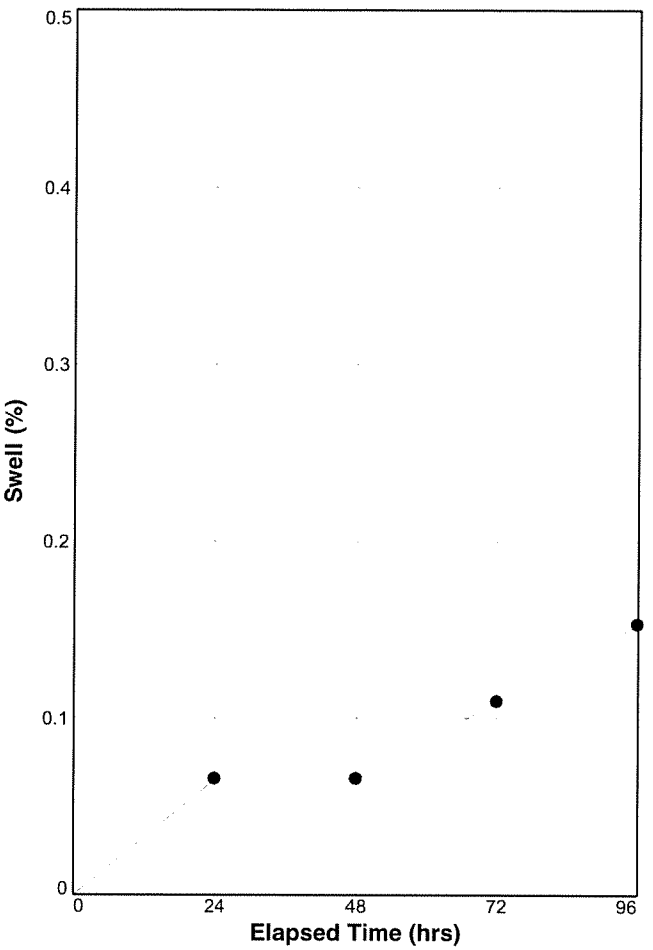
**CSI of Kentucky**

**Lexington, KY**

**Figure**

# BEARING RATIO TEST REPORT
## ASTM D 1883-07




| | Molded | | | Soaked | | | CBR (%) | | Linearity Correction (in.) | Surcharge (lbs.) | Max. Swell (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Density (pcf) | Percent of Max. Dens. | Moisture (%) | Density (pcf) | Percent of Max. Dens. | Moisture (%) | 0.10 in. | 0.20 in. | | | |
| 1 | 101.3 | 97.6 | 23.1 | 101.2 | 97.5 | 23.2 | 4.1 | 3.9 | 0.000 | | 0.2 |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |

| Material Description | USCS | Max. Dens. (pcf) | Optimum Moisture (%) | LL | PI |
|---|---|---|---|---|---|
| reddish brown LEAN CLAY | CL | 103.8 | 20.2 | 42 | 22 |

**Project No:** 2516

**Project:** Proposed Facility For Salt River Electric - Nelson County, Kentucky

**Source of Sample:** Borings **Depth:** 0.0-4.0

**Sample Number:** B-102 (Bulk)

**Date:**

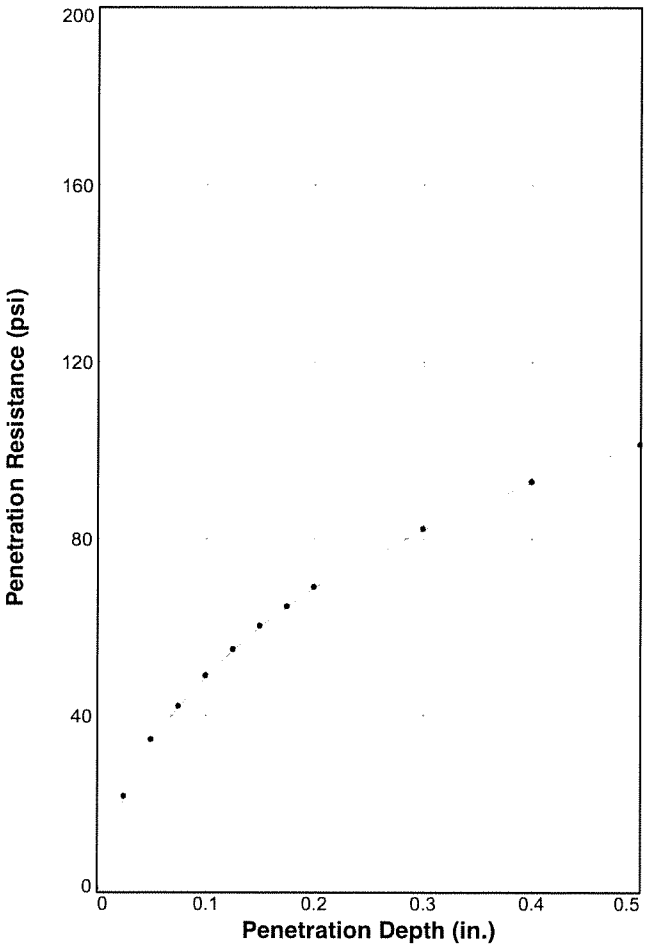
**Test Description/Remarks:**

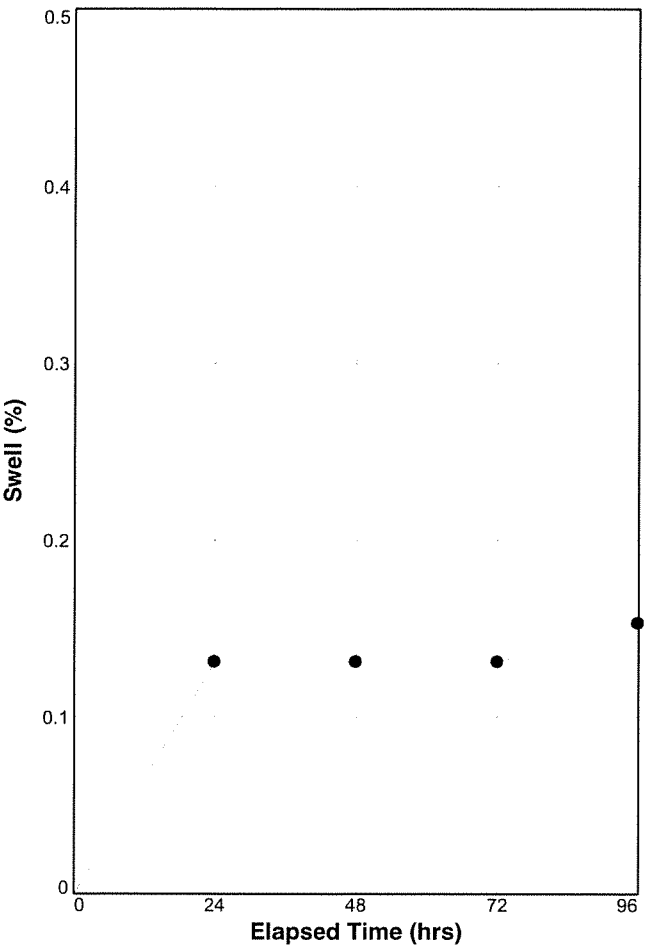
BEARING RATIO TEST REPORT

CSI of Kentucky

**Figure** _____

# BEARING RATIO TEST REPORT
## ASTM D 1883-07




| | Molded | | | Soaked | | | CBR (%) | | Linearity Correction (in.) | Surcharge (lbs.) | Max. Swell (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Density (pcf) | Percent of Max. Dens. | Moisture (%) | Density (pcf) | Percent of Max. Dens. | Moisture (%) | 0.10 in. | 0.20 in. | | | |
| 1 | 98.8 | 95.2 | 23.4 | 98.6 | 95 | 23.8 | 4.9 | 4.6 | 0.000 | | 0.2 |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |

| Material Description | USCS | Max. Dens. (pcf) | Optimum Moisture (%) | LL | PI |
|---|---|---|---|---|---|
| reddish brown LEAN CLAY | CL | 103.8 | 21.1 | 42 | 22 |

**Project No:** 2516

**Project:** Proposed Facility For Salt River Electric - Nelson County, Kentucky

**Source of Sample:** Borings **Depth:** 0.0-4.0

**Sample Number:** B-104 (Bulk)

**Date:**

**Test Description/Remarks:**

BEARING RATIO TEST REPORT

CSI of Kentucky

**Figure** _____

## LABORATORY TESTING PROCEDURES

Soil Classification: Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our "Test Boring Records."

The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary: grain size tests and plasticity tests. Using these test results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D 2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties obtained are presented in this report.

Rock Classification: Rock classifications provide a general guide to the engineering properties of various rock types and enable the engineer to apply past experience to current situations. In our explorations, rock core samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The rock cores are classified according to relative hardness and RQD (see Guide to Rock Classification Terminology), color, and texture. These classification descriptions are included on our Test Boring Records.

Atterberg Limits: Portions of the samples are taken for Atterberg Limits testing to determine the plasticity characteristics of the soil. The plasticity index (PI) is the range of moisture content over which the soil deforms as a plastic material. It is bracketed by the liquid limit (LL) and the plastic limit (PL). The liquid limit is the moisture content at which the soil becomes sufficiently "wet" to flow as a heavy viscous fluid. The plastic limit is the lowest moisture content at which the soil is sufficiently plastic to be manually rolled into tiny threads. The liquid limit and plastic limit are determined in accordance with ASTM D 4318.

Moisture Content: The Moisture Content is determined according to ASTM D 2216.

Percent Finer Than 200 Sieve: Selected samples of soils are washed through a number 200 sieve to determine the percentage of material less than 0.074 mm in diameter.

Rock Strength Tests: To obtain strength data for rock materials encountered, unconfined compression tests are performed on selected samples. In the unconfined compression test, a cylindrical portion of the rock core is subjected to increasing axial load until it fails. The pressure required to produce failure is recorded, corrected for the length to diameter ratio of the core and reported.

Compaction Tests: Compaction tests are run on representative soil samples to determine the dry density obtained by a uniform compactive effort at varying moisture contents. The results of the test are used to determine the moisture content and unit weight desired in the field for similar soils. Proper field compaction is necessary to decrease future settlements, increase the shear strength of the soil and decrease the permeability of the soil.

The two most commonly used compaction tests are the Standard Proctor test and the Modified Proctor test. They are performed in accordance with ASTM D 698 and D 1557, respectively. Generally, the Standard Proctor compaction test is run on samples from building or parking areas where small compaction equipment is anticipated. The Modified compaction test is generally performed for heavy structures, highways, and other areas where large compaction equipment is expected. In both tests a representative soil sample is placed in a mold and compacted with a compaction hammer. Both tests have three alternate methods.

| Test | Method | Hammer Wt./Fall | Mold Diam. | Run on Material Finer Than | No. of Layers | No. of Blows/ Layer |
|---|---|---|---|---|---|---|
| Standard | A | 5.5 lb./12" | 4" | No. 4 sieve | 3 | 25 |
| D 698 | B | 5.5 lb./12" | 4" | 3/8" sieve | 3 | 25 |
| | C | 5.5 lb./12" | 6" | 3/4" sieve | 3 | 56 |

| Test | Method | Hammer Wt./Fall | Mold Diam. | Run on Material Finer Than | No. of Layers | No. of Blows/ Layer |
|---|---|---|---|---|---|---|
| Modified | A | 10 lb./18" | 4" | No. 4 sieve | 5 | 25 |
| D 1557 | B | 10 lb./18" | 4" | 3/8" sieve | 5 | 25 |
| | C | 10 lb./18" | 6" | 3/4" sieve | 5 | 56 |

The moisture content and unit weight of each compacted sample is determined. Usually 4 to 5 such tests are run at different moisture contents. Test results are presented in the form of a dry unit weight versus moisture content curve. The compaction method used and any deviations from the recommended procedures are noted in this report.

Laboratory California Bearing Ratio Tests: The California Bearing Ratio, generally abbreviated to CBR, is a punching shear test and is a comparative measure of the shearing resistance of a soil. It provides data that is a semi-empirical index of the strength and deflection characteristics of a soil. The CBR is used with empirical curves to design pavement structures.

A laboratory CBR test is performed according to ASTM D 1883. The results of the compaction tests are utilized in compacting the test sample to the desired density and moisture content for the laboratory California Bearing Ratio test. A representative sample is compacted to a specified density at a specified moisture content. The test is performed on a 6-inch diameter, 4.58-inch-thick disc of compacted soil that is confined in a cylindrical steel mold. The sample is compacted in accordance with Method C of ASTM D 698 or D 1557.

CBR tests may be run on the compacted samples in either soaked or unsoaked conditions. During testing, a piston approximately 2 inches in diameter is forced into the soil sample at the rate of 0.05 inch per minute to a depth of 0.5 inch to determine the resistance to penetration. The CBR is the percentage of the load it takes to penetrate the soil to a 0.1 inch depth compared to the load it takes to penetrate a standard crushed stone to the same depth. Test results are typically shown graphically.

## SECTION 15050 - GENERAL PROVISIONS AND REQUIREMENTS



### PART 1 - PERMITS, CODES, INSPECTIONS AND APPROVALS

1.1 Permits

A. All permits necessary for the completion ventilation system shall be obtained by the Contractor from the authorities governing such work. The cost of all permits shall be borne by the Contractor.

1.2 Mechanical Work

A. Ventilation work shall be performed in accordance with the rules and regulations of the Kentucky Building Code, National Fire Protection Association, the latest standards recognized by the American Society of Heating and Air Conditioning Engineers and International Mechanical Code as adopted by the Commonwealth of Ky. All HVAC work shall be performed by a Licensed Kentucky Master HVAC Contractor.

B. Where the scope of mechanical work includes electrical work, all provisions included in the electrical sections of the work shall apply.

1.3 Inspection Requirements

A. The inspection work shall be scheduled for rough as well as the finished work. The rough inspection shall be divided into as many inspections as may become necessary to cover all roughing-in. A punch list inspection shall be scheduled with the Architect or his representative present.

### PART 2 - MECHANICAL DRAWINGS AND SPECIFICATIONS

2.1 The drawings and specifications are intended to cover all work enumerated under the respective headings. The drawings are diagrammatic only as far as final location of pipes, relative size, is concerned. Any item of work not clearly included, specified and/or shown, any errors or conflict between plans (Mechanical, Architectural, Structural or Electrical), specifications, codes and field conditions, shall be clarified by a written request to the Architect by the Bidder before bidding; otherwise the bidder shall, at his own expense, supply the proper labor and materials to make good any damages or defects in his work caused by such error, omission or conflict.

2.2 This Contractor shall be responsible for all revisions, modifications or changes necessary in the structural or architectural or electrical systems to accommodate the equipment to be furnished under this Section of the Specifications. This shall be made at no additional cost to the Owner.

2.3 Scale of Drawings and/or details shall be verified by the contractor in all areas where his work and/or expense is involved. This may involve all contract drawings: Architectural, Structural, Mechanical, Electrical, etc. due to the advent of computers, copiers, and faxes, which change

drawing scales so easily, this is very important. If drawings are scaled to determine quantities of materials, labor, etc., no allowances will be due the contractor due to inaccurate scales shown on any of the contract drawings or reproductions thereof.

## PART 3 - SHOP DRAWINGS

3.1 Submit shop drawings on all equipment to be furnished under this Division of the Specifications, in accordance with the General and Special Conditions.

3.2 Shop Drawings shall be submitted only after the Contractor has checked and verified all field measurements, quantities, equipment dimensions, specified performance criteria, installation requirements, electrical requirements, materials, catalog numbers, and similar data with respect thereto and reviewed or coordinated each shop drawing with the requirements of the work and the Contract Documents.

3.3 The shop drawings shall have a stamp or specific written indication that the Contractor has satisfied the requirements stated hereinbefore. Shop drawings submitted without the Contractor's review and stamp shall be immediately returned to the Contractor without the Architect's review.

## PART 4 - CUTTING AND PATCHING

4.1 The Contractor shall be responsible for locating all openings and chases he may require in floors, walls or ceilings of any type construction (whether under construction or existing).

4.2 Sleeves or openings shall be left in all new construction for passage of pipes and ducts. Where openings or sleeves have been omitted, they shall be drilled or sawed as required by the Architect. In existing construction, holes in poured concrete shall be core drilled.

4.3 All cutting and patching shall be done by the trades whose work is affected. All expenses incurred shall be the Contractor's responsibility.

## PART 5 - WELDING

5.1 Each manufacturer or Contractor shall be responsible for the quality of welding done by his organization and shall repair or replace any work not in accordance with these specifications.

5.2 If there is any doubt whatsoever regarding the quality of welds performed by any workmen, segments shall be cut from piping, selected by the Architect, and tested accordingly, all at the Contractor's expense. If weld fails to meet Owner's requirements, subject workmen shall be barred from any further welding.

## PART 6 - TESTING AND ADJUSTING OF EQUIPMENT, ETC.

6.1 When the work included is complete, the Contractor shall start up and adjust all parts of his system. All equipment items of the various systems shall be adjusted for proper operation within the framework of design intent, and the operation characteristics as published by the equipment manufacturer.

6.2 No equipment shall be operated for any purpose until properly lubricated and brought into service condition.

6.3 The Contractor shall provide all equipment, materials and labor required to make the necessary adjustments and all the necessary test equipment.

6.4 For starting up and adjusting which is not within the normal function or capacity of the Contractor's personnel, arrange and pay for the services of employees of the manufacturers of the various major items of equipment to supervise such adjustment and initial operation. If the Contractor elects to provide such service for any equipment with his personnel and this proves unsatisfactory in the opinion of the Architect, the Contractor must, upon notification of such dissatisfaction, arrange immediately for services of manufacturer's employees as specified above.

6.5 If it becomes necessary for temporary use of the system before all parts are complete, the Contractor shall test and adjust all parts as far as possible in order to make temporary use as effective as possible.

6.6 Upon completion of the installation, the Contractor shall, at his own expense, conduct complete performance tests in the presence of the Architect to fully demonstrate the capacity and all other characteristics of the systems. The test shall be run for a length of time sufficient (in the opinion of the Architect) to demonstrate fully the ability of each system to perform as required by design Drawings and Specifications. In the event the tests demonstrate any system performance is deficient, with all system components properly adjusted and balanced, the Architect may require additional tests of system components as may be required for final acceptance.

6.7 When a test is to be made, notify the Architect or his representative not less than 48 hours before the test is scheduled to start, who may witness the test, or any part of it. The Architect or his representative will have the right to defer the start of any test by not more than two (2) work days if the proposed date conflicts with other commitments of the personnel assigned to witness the tests.

6.8 Disconnect devices, equipment and attached piping which are not designed for the test pressure, and all existing piping systems, and install plugs and blind flanges to close openings.

6.9 Replace work found defective, or repair as directed. After replacement or repair, test work again as specified. Repeat until satisfactory.

## PART 7 - EQUIPMENT SUPPORTS AND ROOF FRAMING

7.1 All equipment shall be adequately supported from the building structure as applicable and shall be subject to the approval of the Architect or his representative.

7.2 The Contractor shall provide all loose angles, structural steel, hanger rods, vibration isolators, support bases, etc. as required in order to support all equipment furnished under this contract.

7.3 All equipment shall be installed level and, where cooling coil drain pans are involved, high enough to install an insulated trapped drain line.

7.4 In all cases the manufacturers installation instructions shall be adhered to as minimum requirements.

## PART 8 - OPERATING AND MAINTENANCE INSTRUCTIONS

8.1 Deliver to the Architect, three (3) copies of the complete Operating and Maintenance Instructions for the equipment furnished and installed under this Contract, two (2) of which copies shall be for delivery to the Owner. Provide the aforementioned parties with parts lists for all new major equipment items. Each set shall be provided in a plastic or hard back binder with notations of contents.

8.2 Furnish the services of a fully competent operational instructor as directed by the Architect, to instruct operating personnel in the operations and care of all equipment and systems (including control systems) and their various components.

## PART 9 - GUARANTEE

9.1 Guarantee

A. The Contractor shall be responsible for guaranteeing all work, including equipment, materials and workmanship furnished under this Division of the Specifications. This guarantee shall be against all defects of any of the above and shall run a minimum period of one (1) year from the date of acceptance of the work as evidenced by final payment. Any defective work, equipment, materials and/or workmanship that develops within the guarantee period, which is not caused by ordinary wear, damage or abuse by others, shall be replaced and/or corrected without additional cost to the Owner.

END OF SECTION

# SECTION 15100 - PIPING & VALVES

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. Pipe; pipe fittings, valves, and connections for piping systems.

1. Sanitary sewer.
2. Domestic water.
3. Condensate Removal

### 1.2 RELATED SECTIONS

A. Division 15 - Mechanical Insulation.

B. Division 16 - Equipment Wiring Systems: Electrical characteristics and wiring connections.

### 1.3 REFERENCES

A. ASME B31.9 - Building Service Piping.

B. Kentucky Building Code.

C. Kentucky Plumbing Code.

D. IMC, International Mechanical Code.

### 1.4 SUBMITTALS FOR REVIEW

A. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

### 1.5 SUBMITTALS AT PROJECT CLOSEOUT

A. Project Record Documents: Record actual locations of valves and piping. Provide maintenance data for all valves, which can be rebuilt.

### 1.6 QUALITY ASSURANCE

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Welding Materials and Procedures: Conform to ASME SEC IX and applicable state labor regulations.

C. Welder's Certification: In accordance with Kentucky standards for trade involved.

D. Identify pipe with marking including size, ASTM material classification, ASTM specification, water pressure rating.

E. Pipe is to be stored covered, off the ground, with end caps in place. Pipe installed that is dirty or rusted shall be cleaned and painted.

1.7 REGULATORY REQUIREMENTS

A. Perform Work in accordance with Codes listed in Paragraph 1.3 references.

1.8 DELIVERY, STORAGE, AND PROTECTION

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not install underground piping when bedding is wet or frozen.

**PART 2 - PRODUCTS**

2.1 PIPING SCHEDULE

A. Furnish and install piping of sizes and locations shown on the drawings. Piping and fitting material shall be as shown in the accompanying table.

B. Table of Piping Fittings (Interior)

| **Service** | **Sizes** | **Pipe** | **Fittings** |
|---|---|---|---|
| Domestic Water | All Sizes | Type L Hard Copper | Wrought Copper or Cast Brass Solder Joint |
| Condensate Drain Above Slab | All Sizes | Type L Hard Copper | Wrought Copper Solder Joint |
| Condensate Drain Below Slab | All Sizes | DWV PVC | Glue Joints |

* The Contractor shall have the option of using Type "L" Hard Copper with wrought copper or cast brass solder joint fittings.

1. All pipe nipples shall be of the same material as the lines in which they are installed.

2. All piping not covered in the above table shall be Schedule 40 Black Steel with 125 lb. cast iron fittings.

3. Screwed fittings shall be Midwest, Grinnell, Crane or equal. Welding fittings shall be long radius type, Tube Turns, Midwest, Crane or equal.

4. Solder joint fittings shall be "Nibco", Ohio Brass, Chase or equal. Solder shall be lead-free 95-5 for all applications except DWV, where 50-50 may be used. Acid will not be allowed. Silver solder shall be used for brazing DX lines.

C. Pipe And Fittings - Exterior (Does Not Include Soil, Waste And Vent Piping).

1. Be responsible for contacting the local utility companies and include in the base bid all costs incurred with tap-on fees, service taps, piping to property line, meters, meter pits and pressure reducing equipment as required by the local utility companies.

2. Furnish and install sewer piping from the building to points shown on the Drawings. Piping shall be polyvinyl chloride SDR of 35. Piping shall be suitable for forced main service.

3. Furnish and install a new water service from the building to the point shown on the Drawings. Piping shall be Type K copper with wrought copper solder joint fittings or Class 200 PVC pressure piping with an S.D.R. of 21.

4. Furnish and install all water main piping from the building to the points shown on the Drawings. Piping shall be cement lined, Class 250 cast iron pipe with Tyton joints or Johns-Manville "Blue-Brute", PVC water main with ring-tite joints, Class 150 made to cast iron pipe outside diameter and meeting the requirements of SDR 17 with fitting the same as cast iron pipe.

5. Furnish and install other piping as indicated on the drawings.

D. Soil, Waste And Vent Piping

1. Pipe and Fittings (Above Slab)

a. All soil, waste and vent piping 3" and larger shall be standard weight cast iron and shall conform to the latest ASTM Standard Specifications for standard weight fittings. All joints shall be neoprene joints. All plumbing "trees" and piping made with neoprene joints shall be supported in a "plumb" and properly graded manner.

b. Waste and vent piping 2½" and smaller shall be DWV hard copper, hubless cast iron or galvanized piping. Fittings for copper vent piping shall be wrought copper and for copper waste piping shall be cast brass drainage type. If cast iron piping is installed, all joints may be leaded or neoprene.

c. Where allowed by building and plumbing code polyvinyl chloride piping or ABS may be used.

d. Space above ceilings is a return air plenum, contractor shall protect non flammable piping as required for use in a plenum space.

2. Pipe and Fittings (Below Slab or Grade)

a. All sanitary waste and vent piping below slab shall be standard weight cast iron pipe with neoprene joints, polyvinyl chloride or ABS.
b. Trap & first 10 feet of pipe at dishwasher shall be cast iron.

2.2 FLANGES, UNIONS, AND COUPLINGS

A. Pipe Size 3 inches and Under:
1. Ferrous pipe: Class 150 malleable iron threaded unions.
2. Copper tube and pipe: Class 150 bronze unions with soldered joints.

B. Pipe Size Over 1 inch:
1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
2. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

C. Grooved and Shouldered Pipe End Couplings:
1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
2. Sealing gasket: "C" shape composition-sealing gasket.

D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.3 GATE VALVES

A. Sizes 2" and smaller shall be Nibco Bronze No. T-134, Crane Brass, No. 431UB, Milwaukee 1151 or approved equal, screwed, solid wedge disc, tapered seat, rising brass stem, union bonnet working pressure 150 PSI steam.

B. Sizes 2½" and larger shall be Nibco No. F-617-0, Crane IBBM, No. 465 1/2, Milwaukee F2885 or approved equal, iron body bronze mounted, flanged with flanged bonnet and yoke, rising bronze stem, brass seat and disc, working pressure 125 PSI steam.

2.4 GLOBE VALVES

A. Sizes 2" and smaller shall be Nibco Bronze No. T-235-Y, Crane Brass, No. 7, Milwaukee 590 or approved equal, screwed renewable composition disc, rising brass stem, working pressure 150 PSI steam.

B. Sizes 2½" and larger shall be Nibco Bronze, No. F-918-B, Crane IBBM, No. 351, Milwaukee F2981 or approved equal flanged with flanged bonnet and yoke, rising bronze stem, brass seat and disc, working pressure 125 PSI steam.

2.5 CHECK VALVES (HORIZONTAL)

A. Sizes 2" and smaller shall be Nibco Bronze, No. T-433-B, Crane Brass No. 137, Milwaukee 510 or approved equal, screwed with screwed cap, swing check, renewable bronze disc, working pressure 150 PSI steam.

B. Sizes 2½" and larger shall be Nibco, No. F-918-B, Crane IBBM, No. 373, Milwaukee F2974 or approved equal, swing check, flanged with flanged cap, bronze seat and disc, working pressure 125 PSI steam.

2.6 BALANCING VALVES

A. Sizes 2" and smaller shall be Powell, Figure 2200 or approved equal, 175 PSI WOG, screwed, lubricated plug cock.

B. Size 2½" and larger shall be Powell, Figure 2201 or approved equal, 175 PSIG WOG flanged, lubricated plug cock.

C. Valves, as manufactured by Crane, Keystone, Homestead or equal will be acceptable.

2.7 RELIEF VALVES

A. Refer to individual articles on heaters or boilers.

2.8 BUTTERFLY VALVES

A. Dezurik, Figure No. 632-LD, Crane, Milwaukee, Keystone, Nibco or approved equal, lug style, semi-steel body, bronzed discs with stainless steel shafts, bronze bushings and infinite position adjustment lever on valves 4" and smaller and enclosed handwheel actuators on all valves 6" and larger.

2.9 BALL VALVES (WATER)

A. Milwaukee Model BA-100 Apollo, Nibco or equal bronze body and bonnet, chrome plated brass ball, glass-reinforced teflon seat, blowout proof stem, 600 PSI WOG, 150 PSI WSP, screwed, lever operated with extended neck to match insulation thickness, CV of 24 for ¾" size, 34 for 1" size.

2.10 EXTERIOR VALVES AND ACCESSORIES

A. Valve - Mueller, Cat. No. A-2480-20, mechanical joint of sizes as required on Drawings.

B. Valve Boxes - Mueller, Cat. No. H-10365, flange base. Provide extension piece as required.

C. Furnish a valve-operating wrench with socket to fit valves above. Length of wrench to be as required and shall be equal to Mueller, No. A-24610.
D. Valves, as manufactured by Milwaukee, Kennedy, Traverse City or equal will be accepted.

2.11 BACKFLOW PREVENTER

A. See schedule on drawings.

2.12 CHECK VALVES (VERTICAL)

A. Mueller, Fig. No. 107M-A-P, Williams-Hager, Nibco or approved equal, 250 PSI ANSI B16.1 globe type, silent check valve, flanged ends, cast iron body with bronze trim.

2.13 UNIONS

A. Unions shall be installed at all locations shown on the Drawings and as required for the isolation of all screwed valves and connections to screwed equipment.

B. Unions in steel piping 2" and smaller shall be ground joint, malleable iron, screwed; 250 PSI working pressure for high pressure steam and return lines and chilled water lines, and 125 PSI working pressure for all other applications.

C. Unions in piping 2½" and larger shall be flanged type with gaskets designed for the working pressure of the unions.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.
C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain maximum headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

H. Provide access doors where valves and fittings are not exposed.

I. Establish elevations of buried piping outside the building to ensure not less than 3 feet of cover.

J. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.

K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

L. Provide support for utility meters in accordance with requirements of utility companies.

M. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.

N. Install bell and spigot pipe with bell end upstream.

O. Install valves with stems upright or horizontal, not inverted.

P. Pipe vents from gas pressure reducing valves to outdoors and terminate in weatherproof hood.

Q. Sleeve pipes passing through partitions, walls and floors.

R. Trap and first 10 feet of pipe at dishwasher shall be cast iron.

## 3.4 INSTALLATION PROCEDURES

A. All piping furnished and installed under this Contract and shown on the Drawings shall be new and conform to the applicable specifications of ASA, as applied to the class, weight and type of piping installed.

B. All underground piping shall be installed at the elevations given on the Drawings or on details pertaining to the installation in question. All piping shall be installed with an even grade between elevations given and in accordance with articles in these Specifications, which apply to this work.

C. All piping located in pipe chases, furred walls, and ceilings shall be tested for leaks before being concealed or covered in any manner.

D. All waste and vent piping and roof leaders, condensate drain piping, shall pitch minimum of 1/8" per foot.

E. Where construction does not permit pitching, all piping other than waste, vent and roof leader piping may be installed dead level. Provide drain valves at low point.

F. No pressure piping shall be installed in or under concrete floor slab. No "Bull Head" Tees will be allowed.

G. High point in all recirculated water systems shall be provided with manual air vent valves and/or automatic air vents. Automatic air vents shall be piped to the outside of the building or to an approved drain.

H. Use dielectric insulating unions wherever adjoining materials being connected are of dissimilar material such as connections between copper and steel piping.

3.5 PIPE LAYING AND BEDDING

A. Provide firm bed for each pipe so that pipe is supported uniformly along barrel and does not rest on bell or joint when brought to grade. Set each length to grade and line before making joint.

B. Thoroughly inspect and fit pipes before lowering into trenches. Clean interior of joints before joint material is placed.

C. Lay to uniform grade between elevations shown or to pitch indicated. Use Engineer's level and transit along with adequately spaced and supported batter boards to establish horizontal and vertical control. Lay bell and spigot pipe with bells upstream.

D. For each pipe which passes under a footing or grade beam, provide steel pipe sleeve, with at least two (2) inches clearance around pipe and extending eighteen (18) inches beyond each side of footing or grade beam. Before backfilling, pack space between pipe and sleeve for a depth of two (2) inches at each end of sleeve with oakum or yarn to prevent the entrance of dirt. If pipe is installed before footing or grade is constructed, place compacted backfill around sleeve. If pipe is installed after building work is constructed, backfill with concrete to a thickness of at least six (6) inches around sleeve and up to the footing or grade beam.

E. Close open ends of piping during construction to prevent earth entering lines. Close ends of lines and unused openings in fittings.

F. Provide concrete thrust blocks for water piping as indicated or required to resist any thrust that may be encountered.

3.6 APPLICATION

A. Use grooved mechanical couplings and fasteners only in accessible locations.

B. Install unions downstream of valves and at equipment or apparatus connections.

C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

D. Install gate, ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.

E. Install globe ball or butterfly valves for throttling, bypass, or manual flow control services.

F. Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.

G. Provide spring loaded check valves on discharge of water pumps.

H. Provide plug valves in natural gas systems for shut-off service.

I. Provide flow controls in water recirculating systems where indicated.

3.7 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, verify system is complete, flushed and clean.

B. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residuals.

D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

E. Maintain disinfectant in system for 24 hours.

F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.8 SERVICE CONNECTIONS

A. Connect to existing sanitary connection. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

B. Provide new water service complete with approved reduced pressure water meter with by-pass valves and sand strainer.

1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Caulk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.

END OF SECTION

# SECTION 15260 – MECHANICAL INSULATION

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Insulation Materials:

a. Flexible elastomeric.
b. Mineral fiber.

### 1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

### 1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

### 1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

## PART 2 - PRODUCTS

### 2.1 INSULATION MATERIALS

A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

D. Flexible Elastomeric (aka "armaflex"): Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Aeroflex USA Inc.; Aerocel.
   b. Armacell LLC; AP Armaflex.
   c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.
   d. or Equal

E. Mineral-Fiber Blanket Insulation (aka "duct-wrap"): Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. CertainTeed Corp.; Duct Wrap.
   b. Johns Manville; Microlite.
   c. Knauf Insulation; Duct Wrap.
   d. Manson Insulation Inc.; Alley Wrap.
   e. Owens Corning; All-Service Duct Wrap.
   f. or Equal

F. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Fibrex Insulations Inc.; Coreplus 1200.
   b. Johns Manville; Micro-Lok.
   c. Knauf Insulation; 1000 Pipe Insulation.
   d. Manson Insulation Inc.; Alley-K.
   e. Owens Corning; Fiberglas Pipe Insulation.

2. Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

## 2.2 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
2. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

## 2.3 TAPES

A. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

B. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

1. Verify that systems have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

## 3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

K. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

## 3.4 PENETRATIONS

A. Refer to drawings for details showing insulation requirements at penetrations.

## 3.5 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

1. **Attachment of insulation using tape only is not acceptable.**

B. Omit insulation on valves, filter-dryers, or any other piping specialty that needs to remain accessible for service or maintenance. Also omit insulation where necessary for connected system to operate correctly.

## 3.6 MINERAL-FIBER INSULATION BLANKET INSTALLATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 50 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts (except top side) and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

a. On duct sides with dimensions larger than 18 inches, place pins 16 o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
b. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
c. Do not over-compress insulation during installation.
d. Impale insulation over pins and attach speed washers.
e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
5. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

## 3.7 PRE-FORMED MINERAL-FIBER PIPE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch , and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

## 3.8 INSULATION SCHEDULE

| Application | Material | Thickness |
|---|---|---|
| Domestic Cold Water (All Sizes) | Mineral-Fiber Pipe Insulation<br>Or Flexible Elastomeric | 1 inch<br>3/4" |
| Domestic Hot Water (All Sizes) | Mineral-Fiber Pipe Insulation<br>Or Flexible Elastomeric | 1 inch<br>3/4" |
| Supply Ductwork (All Sizes) | Mineral-Fiber Blanket | 2 inches |
| Return Ductwork (All Sizes) | Mineral-Fiber Blanket | 2 inches |
| Refrigerant Piping (All Sizes) | Flexible Elastomeric | 1 inch |
| | | |

**END OF SECTION 15260**

# SECTION 15310 - FIRE PROTECTION PIPING

## PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pipe, fittings, valves, and connections for sprinkler systems.

1.2 RELATED SECTIONS

A. Section 15325 - Sprinkler Systems: Sprinkler systems design.

B. Division 16 – Wiring methods.

1.3 REFERENCES

A. ASME Boiler and Pressure Vessel Code Section IX - Welding and Brazing Qualifications.

B. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.

C. ASME B16.3 - Malleable Iron Threaded Fittings, Class 150 and 300.

D. ASME B16.4 - Cast Iron Threaded Fittings, Class 125 and 250.

E. ASME B16.5 - Pipe Flanges and Flanged Fittings.

F. ASME B16.9 - Factory-made Wrought Steel Buttwelding Fittings.

G. ASME B16.11 - Forged Steel Fittings, Socket-welding and Threaded.

H. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

I. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

J. ASME B16.25 - Buttwelding Ends.

K. ASME B36.10 - Welded and Seamless Wrought Steel Pipe.

L. ASTM A135 - Electric-Resistance-Welded Steel Pipe.

M. ASTM A47 - Malleable Iron Castings.

N. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless.

O. ASTM A234 - Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.

P. ASTM A795 - Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.

Q. ASTM B32 - Solder Metal.

R. ASTM B75 - Seamless Copper Tube.

S. ASTM B88 - Seamless Copper Water Tube.

T. ASTM B251 - General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.

U. ASTM D3309 - Polybutylene (PB) Plastic Hot- and Cold-Water Distribution Systems.

V. AWS A5.8 - Brazing Filler Metal.

W. AWS D10.9 - Specifications for Qualification of Welding Procedures and Welders for Piping and Tubing.

X. NFPA 13 - Installation of Sprinkler Systems.

Y. UL - Fire Resistance Directory.

Z. UL 262 - Gate Valves for Fire-Protection Service.

AA. UL 312 - Check Valves for Fire-Protection Service.

BB. UL 405 - Fire Department Connections.

1.4 SUBMITTALS FOR REVIEW

A. Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.

B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

A. Project Record Documents: Record actual locations of components and tag numbering.

B. Operation and Maintenance Data: Include installation instructions and spare parts lists.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years experience

1.7 REGULATORY REQUIREMENTS

A. Conform to UL, FM, and/or Warnock Hersey as applicable.
B. Sprinkler Systems: Conform work to NFPA 13.

C. Welding Materials and Procedures: Conform to ASME Code.

D. Valves: Bear UL, FM, or Warnock Hersey as applicable label or marking. Provide manufacturer's name and pressure rating marked on valve body.

E. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND PROTECTION

A. Deliver and store valves in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.9 Sprinkler Contractor shall be responsible for seismic design and system installation.

**PART 2 - PRODUCTS**

2.1 BURIED PIPING

A. Steel Pipe: ASTM A53, ASTM A135, ASTM A795, or ASME B36.10, Schedule 40 black, with ASME C105 polyethylene jacket, or double layer, half-lapped 10 mil polyethylene tape.
   1. Steel Fittings: ASME B16.9, wrought steel, buttwelded; ASME B16.25, buttweld ends; ASTM A234, wrought carbon steel and alloy steel; ASME B16.5, steel flanges and fittings; ASME B16.11, forged steel socket welded and threaded; with double layer, half-lapped 10 mil polyethylene tape.
   2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings.
   3. Joints: AWS D1.1, welded.
   4. Casing: Closed glass cell insulation. Polyurethane insulation with high density polyethylene jacket and heat shrink sleeves.

B. Copper Tubing: ASTM B75, ASTM B88, or ASTM B251, Type L annealed.
   1. Fittings: ASME B16.18, cast copper alloy, or ASME B16.22, wrought copper and bronze, solder joint, pressure type.
   2. Joints: AWS A5.8 Classification BCuP-3 or BCuP-4 silver braze.
   3. Casing: Closed glass cell insulation. Polyurethane insulation with high density polyethylene jacket and heat shrink sleeves.

C. Cast Iron Pipe: AWWA C151.

1. Fittings: AWWA C110, standard thickness.
2. Joints: AWWA C111, rubber gasket.
3. Mechanical Couplings: Shaped composition sealing gasket, steel bolts, nuts, and washers.

2.2 ABOVE GROUND PIPING

A. Steel Pipe: ASTM A53; ASTM A135; ASTM A135 UL listed, threadable, light wall; ASTM A795; or ASME B36.10; Schedule 10, 40 black or galvanized.
   1. Steel Fittings: ASME B16.9, wrought steel, buttwelded; ASME B16.25, buttweld ends; ASTM A234, wrought carbon steel and alloy steel; ASME B16.5, steel flanges and fittings; ASME B16.11, forged steel socket welded and threaded.
   2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings; ASME B16.4, threaded fittings.
   3. Malleable Iron Fittings: ASME B16.3, threaded fittings or ASTM A47.
   4. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
   5. Mechanical Formed Fittings: Carbon steel housing with integral pipe stop and O-ring pocked and O-ring, uniformly compressed into permanent mechanical engagement onto pipe.

B. Copper Tubing: ASTM B75; ASTM B88; or ASTM B251; Type K, hard drawn.
   1. Fittings: ASME B16.18, cast copper alloy, or ASME B16.22, wrought copper and bronze, solder joint, pressure type.
   2. Joints: AWS A5.8 Classification BCuP-3 or BCuP-4 silver braze or ASTM B32, solder, Grade 95TA.

C. Copper Tubing: ASTM B88, Type L, hard drawn.
   1. Fittings: ASME B16.18, cast copper alloy, or ASME B16.22, wrought copper and bronze, grooved.
   2. Mechanical Grooved Couplings: Ductile iron housing with alkyd enamel paint coating clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers.

D. Cast Iron Pipe: AWWA C151.
   1. Fittings: AWWA C110, standard thickness.
   2. Joints: AWWA C111, rubber gasket.
   3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped composition sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.

2.3 PIPE HANGERS AND SUPPORTS

A. Conform to NFPA 13.

B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron or Carbon steel, adjustable swivel, split ring.

C. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.

D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

E. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.

F. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.
G. Vertical Support: Steel riser clamp or Angle ring.

H. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

I. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.4 GATE VALVES

A. Up to and including 2 inches:
1. Bronze body, bronze trim, rising stem, handwheel, solid wedge or disc, threaded ends.

B. Over 2 inches:
1. Iron body, bronze trim, rising stem pre-grooved for mounting tamper switch, handwheel, OS&Y, solid rubber covered bronze or cast iron wedge, flanged or grooved ends.

C. Over 4 inches:
1. Iron body, bronze trim, non-rising stem with bolted bonnet, solid bronze wedge, flanged ends, iron body indicator post assembly.

2.5 BUTTERFLY VALVES

A. Bronze Body:
1. Stainless steel disc, resilient replaceable seat, threaded or grooved ends, extended neck, handwheel and gear drive and integral indicating device , and built-in tamper proof switch rated 10 amp at 115 volt AC.

B. Cast or Ductile Iron Body
1. Cast or ductile iron, chrome or nickel plated ductile iron or aluminum bronze disc, resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck, handwheel and gear drive and integral indicating device, and external tamper switch rated 10 amp at 115 volt AC.

2.6 CHECK VALVES

A. Up to and including 2 inches:
1. Bronze body and swing disc, rubber seat, threaded ends.

B. Over 2 inches:
1. Iron body, bronze trim, swing check with rubber disc, renewable disc and seat, flanged ends with automatic ball check.

C. 4 inches and Over:

1. Iron body, bronze disc, stainless steel spring, resilient seal, threaded, wafer, or flanged ends.

2.7 DRAIN VALVES

A. Compression Stop:
   1. Bronze with hose thread nipple and cap.

B. Ball Valve:
   1. Brass with cap and chain, 3/4 inch hose thread.

2.8 BELOW GROUND PIPING

A. Per NFPA 13 and 14.

**PART 3 - EXECUTION**

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

A. Install piping in accordance with NFPA 13 for sprinkler systems.

B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

C. Install piping to conserve building space, to not interfere with use of space and other work.

D. Group piping whenever practical at common elevations.

E. Sleeve pipes passing through partitions, walls, and floors.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

H. Pipe Hangers and Supports:
   1. Install in accordance with NFPA 13 and NFPA 14.
   2. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   3. Place hangers within 12 inches of each horizontal elbow.
   4. Use hangers with 1-1/2" minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   5. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
   6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   7. Provide copper plated hangers and supports for copper piping.
   8. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

I. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

J. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

K. Do not penetrate building structural members unless indicated.

L. Provide sleeves when penetrating footings, floors and walls. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.

M. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

N. Die cut threaded joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

O. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.

P. Provide drain valves at main shut-off valves, low points of piping and apparatus.

END OF SECTION

# SECTION 15325 - SPRINKLER SYSTEMS

## PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Wet-pipe sprinkler system.

B. System design, installation, and certification.

1.2 RELATED SECTIONS

A. Section 15310 – Fire Protection Piping.

B. Division 16 - Equipment Wiring Systems: Electrical characteristics and wiring connections.

1.3 REFERENCES

A. NFPA 13 - Installation of Sprinkler Systems.

B. FM - Factory Mutual Approval Guide.

C. NFPA 70 - National Electrical Code.

D. UL - Fire Resistance Directory.

E. Warnock Hersey - Certification Listings.

1.4 SYSTEM DESCRIPTION

A. System to provide coverage for entire building.

B. Provide system to NFPA 13 light hazard occupancy requirements.

C. Use water flow data provided.

D. Interface system with building fire and smoke alarm system.

E. Provide method of sprinkler system supervision through an approved proprietary supervision supplier.

1.5 SUBMITTALS FOR REVIEW

A. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

B. Shop Drawings:

1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
3. Submit shop drawings and review to engineer of record for review. Engineer of record will forward plans to plan reviewer.

C. Submit shop drawings, product data, hydraulic calculations to engineer of record for review prior to submittal for code compliance.

1.6 SUBMITTALS AT PROJECT CLOSEOUT

A. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

B. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and code requirements.

C. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 13

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience approved by manufacturer.

D. Design and install system under direct supervision of a licensed sprinkler contractor and installer.

1.8 DELIVERY, STORAGE, AND PROTECTION

A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation. Store piping off the ground or floor. Piping installed with dirt and/or rust will be cleaned and painted!

1.9 EXTRA MATERIALS

A. Provide extra sprinklers under provisions of NFPA 13.

B. Provide suitable wrenches for each sprinkler type.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Gem.
B. Star
C. Viking.
D. Reliable.

### 2.2 SPRINKLERS

A. Suspended Ceiling:
   1. Type: Semi-recessed pendant type with matching clamp on escutcheon plate.
   2. Finish: Chrome plated or white enamel.
   3. Escutcheon Plate Finish: To match head
   4. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

B. Exposed Area Type:
   1. Type: Standard upright type with guard in mechanical rooms and gymnasiums.
   2. Finish: Brass.
   3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

C. Sidewall Type:
   1. Type: Semi-recessed horizontal sidewall type with matching clamp on escutcheon plate.
   2. Finish: Chrome plated.
   3. Escutcheon Plate Finish: Chrome plated.
   4. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

### 2.3 PIPING SPECIALTIES

A. Wet Pipe Sprinkler Alarm Valve, electric valve as shown on plans.

B. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Install in accordance with NFPA 13.

B. Install equipment in accordance with manufacturers' instructions.

C. Place pipe runs within joist space to minimize obstruction to other work.

D. Place piping in concealed spaces above finished ceilings.

E. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.

F. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.

G. Flush entire piping system of foreign matter.

H. Hydrostatically test entire system.

3.2 INTERFACE WITH OTHER PRODUCTS

A. Ensure required devices are installed and connected as required to fire alarm system.

END OF SECTION

# SECTION 15430 - PLUMBING SPECIALTIES

## PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Floor drains.

B. Cleanouts.

C. Hose bibs.

D. Hydrants.

E. Water hammer arrestors.

1.2 RELATED SECTIONS

A. Division 15 - Piping & Valves.

B. Division 15 - Plumbing Fixtures.

C. Division 15 - Plumbing Equipment.

D. Division 16 - Equipment Wiring Systems: Electrical characteristics and wiring connections.

1.3 REFERENCES

A. ASME A112.21.1 - Floor Drains.

B. ASME A112.26.1 - Water Hammer Arrestors.

C. ASSE 1013 - Backflow Preventers, Reduced Pressure Principle.

D. ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.

E. DI G-101 - Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.

F. DI WH-201 - Water Hammer Arrestors.

1.4 SUBMITTALS FOR REVIEW

A. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

B. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

1.5 SUBMITTALS FOR INFORMATION

A. Certificates: Certify that grease and oil interceptors meet or exceed specified requirements.

B. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.

1.6 SUBMITTALS AT PROJECT CLOSEOUT

A. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, and water hammer arrestors.

B. Operation Data: Indicate frequency of treatment required for interceptors.

C. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Accept specialties on site in original factory packaging. Inspect for damage.

1.8 EXTRA MATERIALS

A. Supply two loose keys for outside hose bibs.

**PART 2 - PRODUCTS**

2.1 WATER HAMMER ARRESTORS

A. ANSI A112.26.1; stainless steel or copper construction, bellows type sized in accordance with PDI WH-201, precharged suitable for operation in temperature range 34 to 250 degrees F and maximum 250 psi working pressure.

**PART 3 - EXECUTION**

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

C. Encase exterior cleanouts in concrete flush with grade.

D. Install floor cleanouts at elevation to accommodate finished floor.

E. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibs.

F. Pipe relief from backflow preventer to nearest drain.

G. Install water hammer arrestors complete with accessible isolation valve on hot and cold water as indicated.

END OF SECTION

# SECTION 15440 - PLUMBING FIXTURES

## PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Water closets.

B. Urinals.

C. Lavatories.

D. Sinks.

E. Service sinks.

F. Electric water coolers.

1.2 RELATED SECTIONS

A. Division 15 - Supports and Anchors.

B. Division 15 - Piping & Valves.

C. Division 15 - Plumbing Specialties.

D. Division 15 - Plumbing Equipment.

E. Division 16 - Equipment Wiring Systems: Electrical characteristics and wiring connections

1.3 REFERENCES

A. ARI 1010 - Drinking Fountains and Self-Contained Mechanically Refrigerated Drinking Water Coolers.

B. ASME A112.6.1 - Supports for Off-the-Floor Plumbing Fixtures for Public Use.

C. ASME A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.

D. ASME A112.19.2 - Vitreous China Plumbing Fixtures.

E. ASME A112.19.3 - Stainless Steel Plumbing Fixtures (Designed for Residential Use).

F. ASME A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals.

G. NFPA 70 - National Electrical Code.

1.4 SUBMITTALS FOR REVIEW

A. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

A. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

B. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.7 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., or a testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND PROTECTION

A. Accept fixtures on site in factory packaging. Inspect for damage.

B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.9 WARRANTY

A. Provide five year manufacturer warranty for electric water cooler.

1.10 EXTRA MATERIALS

A. Supply two sets of faucet washers, flush valve service kits, and toilet seats minimum, and two additional for each five fixtures.

**PART 2 - PRODUCTS**

2.1 See Schedule on Drawings.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify that electric power is available and of the correct characteristics.
C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.2 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Install and secure fixtures in place with wall supports and wall carriers as indicated.

E. Seal fixtures to wall and floor surfaces with sealant, color to match fixture.

F. Solidly attach water closets to floor with lag screws. Lead flashing is not intended to hold fixture in place.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.5 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 CLEANING

A. Clean plumbing fixtures and equipment.

3.7 PROTECTION OF FINISHED WORK

A. Do not permit use of fixtures until acceptance of project.

3.8 SCHEDULES

A. Fixture Rough-In

| | Hot | Cold | Waste | Vent |
|---|---|---|---|---|
| Water Closet (Flush Valve) | | 1 inch | 4 inch | 2 inch |
| Urinal: (Flush Valve) | | 3/4 inch | 2 inch | 1-1/2 in |
| Lavatory: | 1/2 inch | 1/2 inch | 1-1/2 in | 1-1/4 in |
| Sink: | 1/2 inch | 1/2 inch | 1-1/2 in | 1-1/4 in |
| Service Sink: | 1/2 inch | 1/2 inch | 3 inch | 1-1/2 in |
| Drinking Fountain | | 1/2 inch | 1-1/4 in | 1-1/4 in |

END OF SECTION

# SECTION 15462 - ELECTRIC WATER HEATERS

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Divisions 0 and 1 Specification Sections, apply to this Section.

### 1.02 SUMMARY

A. This Section includes electric water heaters and accessories.

B. Related Section: Division 15 Section "Plumbing Specialties" contains requirements that relate to this Section.

### 1.03 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data including rated capacities of selected models, weights (shipping, installed, and operating), furnished specialties, and accessories. Indicate dimensions, finishes and coatings, required clearances, methods of assembly of components, and piping and wiring connections.

C. Shop Drawings showing layout of each unit, including tanks, pumps, controls, related accessories, and piping.

D. Setting Drawings with templates and directions for installing foundation bolts, anchor bolts, and other anchorages.

E. Wiring diagrams from manufacturers detailing electrical requirements for electrical power supply wiring to water heaters. Include ladder-type wiring diagrams for interlock and control wiring required for final installation of water heaters and controls. Differentiate between factory-installed and field-installed wiring.

F. Product certificates signed by manufacturers of water heaters certifying that their products comply with specified requirements.

G. Field quality-control installation reports.

H. Maintenance data for water heaters to include in operation and maintenance manuals specified in Division 1. Include startup instructions.

### 1.04 OPERATING AND MAINTENANCE MANUALS

A. Three sets of O&M instructions and manuals shall be submitted in loose-leaf 3-ring cardboard reinforced vinyl binders to the Engineer in accordance with the General Conditions.

B. Contained in each binder shall also be vendors, warranty information, vendor phone numbers, list of materials, and materials parts list.

C. O & M Manuals shall be available to the Owner prior to equipment training commences.

D. General and Supplemental General Conditions shall supercede this paragraph where conflicts occur.

E. O & M manuals shall be submitted on CD disk in PDF format along with the required paper copies. Contractor shall send same PDF format information to Facility Management System Contractor to incorporate into the operating system software.

## 1.05 QUALITY ASSURANCE

A. ASHRAE Standard: Comply with performance efficiencies prescribed in ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

B. ASHRAE Standard: Comply with performance efficiencies prescribed in ASHRAE 90.2, "Energy Efficient Design of New Low-Rise Residential Buildings."

C. NFPA Standard: Comply with NFPA 70, "National Electrical Code," for electrical components.

D. Listing and Labeling: Provide electrically operated water heaters, controls, and components specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in National Electrical Code, Article 100.

2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

E. Product Options: Drawings indicate size, profiles, connections, dimensional requirements, and characteristics of water heaters and accessories and are based on specific types and models indicated. Other manufacturers' water heaters and accessories with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

## 1.06 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.

B. Special Warranty: Submit a written warranty executed by manufacturer agreeing to repair or replace water heaters and accessories that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, tanks and elements. This warranty is in addition to, and not a limitation of, other rights Owner may have against Contractor under Contract Documents.

C. Warranty Period: 5 years after date of Substantial Completion.

## 1.07 EQUIPMENT STARTUP AND STARTUP REPORTS

A. Field Testing and Adjustment: It is required that the equipment specified in this section of the specifications be started up by a certified representative of the equipment manufacturer. Startup shall consist of testing and adjusting the equipment to ensure it is properly operating per Drawings, Specifications, and Accepted Shop Drawing parameters. Minimum startup time the representative shall be on site is one day, not including travel time. The Architect/Engineer shall be notified one week prior any scheduled startup date. Any costs involved with starting up the equipment shall be included in the bid price regardless of problems encountered.

B. Startup Report: A written report shall be created that documents all procedures used in starting up and running the piece of equipment. The report shall certify that the equipment is running in accordance with the accepted shop drawing parameters for capacity, performance, and energy usage. Report shall include the name of the manufacturer's representative starting up the equipment, date equipment was started, problems encountered and actions taken to correct problems. Report shall include acceptance of all external connections to the piece of equipment and that the equipment was installed in accordance with manufacturer's documented installation instructions.

C. Startup date shall not be confused with warranty start date, or substantial completion dates. Warranty equipment begins on the substantial completion date per Division 1 of these Specifications.

# PART 2 - PRODUCTS

## 2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Domestic Electric Hot Water Heaters:

   a. See Schedule in Plumbing Drawings.

2. Thermal Expansion Absorbers

   a. Furnish and install as shown on Drawings Amtrol, Bell & Gossett, Armstrong or Taco thermal expansion absorbers with polypropylene liner, heavy-duty butyl diaphragm and outer steel shell constructed per ASME Code Section VIII.

   b. See Schedule in Plumbing Drawings

# PART 3 - EXECUTION

## 3.01 CONCRETE BASES

A. Install concrete bases of dimensions indicated for water heaters and accessories. Refer to Division 3 Section "Cast-in-Place Concrete" and Division 15 Section "Basic Mechanical Materials and Methods."

## 3.02 WATER HEATER INSTALLATION

A. General: Install water heaters on concrete bases. Set and connect units according to manufacturer's written instructions. Install units plumb, level, and firmly anchored in locations indicated. Maintain manufacturer's recommended clearances. Install so controls and devices are accessible for service.

B. Anchor water heaters and storage tanks to substrate.

C. Install seismic restraints as indicated.

E. Install temperature and pressure relief valves in top portion of storage water heater tanks and hot-water storage tanks. Use relief valves with sensing elements that extend into tanks. Extend relief valve outlet with water piping in continuous downward pitch and discharge to closest floor drain.

F. Install pressure relief valves in hot-water-outlet piping for water heaters without storage. Extend relief valve outlet with water piping in continuous downward pitch and discharge to closest floor drain.

G. Install vacuum relief valves in cold-water-inlet piping.

H. Install vacuum relief valves in water heaters and hot-water storage tanks that have copper lining.

I. Install water heater drain piping as indirect waste to spill into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 15 Section "Plumbing Specialties" for drain valves.

J. Install thermometers on water heater inlet and outlet piping. Thermometers are specified in Division 15 Section "Meters and Gages."

M. Install piping adjacent to water heaters to allow service and maintenance.

N. Arrange for field-applied insulation on equipment and piping not furnished with factory-applied insulation.

## 3.03 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Connect hot- and cold-water piping to units with shutoff valves and unions. Connect hot-water circulating piping to unit with shutoff valve, check valve, and union.

2. Make connections with dielectric fittings where piping is made of dissimilar metals. Dielectric fittings are specified in Division 15 Section "Basic Mechanical Materials and Methods."

B. Electrical Connections: Power wiring and disconnect switches are specified in Division 16 Sections. Arrange wiring to allow unit servicing.

C. Grounding: Ground equipment. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

END OF SECTION

# SECTION 15623 - SPLIT-SYSTEM HEAT PUMPS (15 SEER)

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes split-system air-conditioning and heat pump units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for exposed or concealed mounting, and may be connected to ducts.

### 1.3 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

C. Warranty: Special warranty specified in this Section.

### 1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2007, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. ASHRAE/IESNA 90.1-2007 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6 - "Heating, Ventilating, and Air-Conditioning."

### 1.5 COORDINATION

A. Where condensing units are located on grade, coordinate size and location of concrete bases for units. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Division 03 Section "Cast-in-Place Concrete."

B. Where condensing units are located on roof, coordinate size, location, and connection details with roof curbs, equipment supports, and roof penetrations specified in Division 07 Section "Roof Accessories."

## 1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period: **Five** years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carrier Air Conditioning; Div. of Carrier Corporation.
2. Lennox Industries Inc.
3. Trane Company (The); Unitary Products Group.
4. York International Corp.
5. Other Similar Units.

### 2.2 AIR-COOLED, 15 SEER HEAT PUMPS (OUTDOOR UNIT)

A. Casing: Steel, finished with baked enamel in standard color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

B. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

1. Compressor Type: Scroll
2. Refrigerant: R-410A

C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.

D. Heat Pump Components: Reversing valve and low-temperature air cut-off thermostat.

E. Fan: Propeller type, directly connected to motor.

F. Motor: Permanently lubricated, with integral thermal-overload protection.

G. Low Ambient Kit: Permits operation down to 45 deg F (7 deg C).

H. Mounting Base: Concrete with cast-in place anchors.

I. Minimum Energy Efficiency: **15 SEER**

2.3 INDOOR AIR HANDLER & COOLING COIL

A. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.

1. Insulation: Faced, glass-fiber duct liner.
2. Drain Pans: Galvanized steel, with connection for drain; insulated.
3. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.

1. Coil shall be sized to match outdoor heat pump and indoor fan characteristics.

C. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow proving device; and one-time fuses in terminal box for overcurrent protection.

D. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.

E. Fan Motors: Permanent split-capacitor (PSC).

1. Special Motor Features: Multi-tapped, multispeed with internal thermal protection and permanent lubrication.

F. Wiring Terminations: Connect motor to chassis wiring with plug connection.

2.4 ACCESSORIES

A. Thermostat: Low voltage 7-day programmable thermostat.

B. Automatic-reset timer to prevent rapid cycling of compressor.

C. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

1. Minimum Insulation Thickness: 1/2 inch thick.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Where units are noted on the drawings to be installed on concrete pad, install heat pump on 4-inch-thick, reinforced concrete base; 4 inches larger on each side than unit.

D. Where units are noted to be installed on manufactured mounting base, install heat pumps on polyethylene mounting base.

E. Install roof-mounting compressor-condenser components on equipment supports specified in Division 07 Section "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.

F. Install and connect pre-charged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

### 3.2 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to unit to allow service and maintenance.

C. Duct Connections: Duct installation requirements are specified in Division 23 Section "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply and/or return ducts to air handler with flexible duct connectors. Flexible duct connectors are specified in Division 23 Section "Air Duct Accessories."

D. Electrical Connections: Comply with requirements in Division 26 Sections for power wiring, switches, and motor controls.

### 3.3 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 15623

# SECTION 15870 – EXHAUST FANS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes the following:

1. Wall Hung Exhaust Fans.

### 1.3 PERFORMANCE REQUIREMENTS

A. Operating Limits: Classify according to AMCA 99.

### 1.4 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material thickness and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.
6. Fan speed controllers.
7. Wiring Diagrams: Power, signal, and control wiring.

B. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

### 1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.

C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

D. UL Standard: Power ventilators shall comply with UL 705.

## PART 2 - PRODUCTS

### 2.1 Wall Hung Exhaust Fans

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Broan Mfg. Co., Inc.
2. Carnes Company HVAC.
3. Dayton Electric Manufacturing Co.; a division of W. W. Grainger, Inc.
4. Greenheck.
5. JencoFan; Div. of Breidert Air Products.
6. Loren Cook Company.
7. Penn Ventilation.

B. Description: Propeller fans designed for installing in wall.

C. Housing: Steel.

D. Fan Wheel: Propeller fans, belt drive.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Accessories: As noted on the Drawings

## PART 3 - EXECUTION

### 3.1 CONNECTIONS

A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories.

B. Install ducts adjacent to power ventilators to allow service and maintenance.

C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

### 3.2 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. Verify that shipping, blocking, and bracing are removed.

2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete.
3. Verify that cleaning and adjusting are complete.
4. Adjust damper linkages for proper damper operation.
5. Remove and replace malfunctioning units and retest as specified above.

B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

## 3.3 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Refer to Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.

**END OF SECTION 15625**

# SECTION 15890 - METAL DUCTS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Sheet metal materials.
4. Sealants.
5. Hangers and supports.

B. Related Sections:

1. Division 15 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

### 1.3 SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.
3. Fittings
4. Reinforcement and spacing
5. Seam and joint construction.
6. Penetrations through fire-rated and other partitions.
7. Hangers and supports, including methods for duct and building attachment and vibration isolation.

## PART 2 - PRODUCTS

### 2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

### 2.2 SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Transverse Joints - Round Duct," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Seams - Round Duct and Fittings," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

## 2.3 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

D. Tie Rods: Galvanized steel, 1/4-inchminimum diameter for lengths 36 inchesor less; 3/8-inch minimum diameter for lengths longer than 36 inches.

## 2.4 SEALANTS

A. General Sealant Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

C. Solvent-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.
4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
8. VOC content of 250 g/L or less.
9. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
10. Service: Indoor or outdoor.
11. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

## 2.5 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

F. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

# PART 3 - EXECUTION

## 3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install round ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

J. Protect duct interiors from moisture, construction debris and dust, and other foreign materials.

## 3.2 DUCT SEALING

A. Seal **all** longitudinal and transverse joints.

## 3.3 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."

B. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

C. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

D. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

## 3.4 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Division 15 Section "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

## 3.5 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Division 09 painting Sections.

**END OF SECTION 15890**

# SECTION 15910 - DUCTWORK ACCESSORIES

## PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Air turning devices/extractors.

B. Backdraft dampers.

C. Smoke dampers.

D. Duct access doors.

E. Duct test holes.

F. Fire dampers.

G. Flexible duct connections.

H. Volume control dampers.

1.2 RELATED SECTIONS

A. Division 15 - Ductwork.

B. Division 15 - Air Terminal Units: Pressure regulating damper assemblies.

C. Division 16 - Equipment Wiring Systems.

1.3 REFERENCES

A. IMC - International Mechanical Code

B. NFPA 70 - National Electrical Code.

C. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

D. UL 33 - Heat Responsive Links for Fire-Protection Service.

E. UL 555 - Fire Dampers and Ceiling Dampers.

F. UL 555S - Leakage Rated Dampers for Use in Smoke Control Systems.

1.4 SUBMITTALS

A. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers and duct access doors.

B. Manufacturer's Installation Instructions: Indicate for fire dampers and combination fire and smoke dampers.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.6 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories Inc., or a testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

1.8 EXTRA MATERIALS

A. Provide two of each size and type of fusible link.

**PART 2 - PRODUCTS**

2.1 AIR TURNING DEVICES/EXTRACTORS

A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.2 BACKDRAFT DAMPERS.

A. Gravity Backdraft Dampers, size 18X18 or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturers standard construction.

B. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: 16 gage thick galvanized steel, with blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked 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.

2.3 DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

2.4 FIRE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

B. Ceiling Dampers: Galvanized steel, 22 gage frame and 16 gage flap, two layers .125 inch ceramic fiber on top side, and one layer on bottom side for round flaps, with locking clip.

C. Horizontal Dampers: Galvanized steel, 22 gage frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.

D. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations and closure under air flow conditions. Configure with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height.

E. Multiple Blade Dampers: 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x ½ inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

F. Fusible Links: UL 33, separate at 160 0r 212 degrees F with adjustable link straps for combination fire/balancing dampers.

## 2.5 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

B. Connector: Fabric crimped into metal edging strip.
   1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz.
   2. Net Fabric Width: Approximately 6 inches wide.
   3. Metal: 3 inches wide, 24 gage thick galvanized steel.

## 2.6 SMOKE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 5555, and as indicated.

B. Dampers: UL Class 1 curtain or multiple blade type fire damper, normally open automatically operated by electric actuator.

C. Electro Thermal Link: Fusible link melting at 165 degrees F; 120 volts, single phase, 60 Hz; UL listed and labeled.

## 2.7 VOLUME CONTROL DAMPERS.

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

B. Splitter Dampers:

1. Material: Same gage as duct to 24 inches size in either direction, and two gages heavier for sizes over 24 inches.
2. Blade: Fabricate of double thickness sheet metal to streamline shape, secured with continuous hinge or rod.
3. Operator: Minimum ¼ inch diameter rod in self aligning, universal joint action, flanged bushing with set screw.
4. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.

C. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

D. End Bearings: Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.

E. Quadrants:
1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
3. Where rod lengths exceed 30 inches provide regulator at both ends.

## PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.2 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, BOCA-NMC, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 15890 for duct construction and pressure class.

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated. Review locations prior to fabrication.

D. Provide duct test holes where indicated and required for testing and balancing purposes.

E. Provide fire dampers , combination fire and smoke dampers and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components , and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

F. Install smoke dampers and combination smoke and fire dampers in accordance with IMC - International Medical Code and the Kentucky Building Code.

G. Demonstrate re-setting of fire dampers to Owner's representative.

H. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment, and supported by vibration isolators.

I. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

J. Use splitter dampers only where indicated.

K. Provide balancing dampers on high velocity systems where indicated.

L. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

## SECTION 15940 - AIR OUTLETS AND INLETS

## PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Diffusers.

B. Registers/grilles.

1.2 REFERENCES

A. ADC 1062 - Certification, Rating and Test Manual.

B. AMCA 500 - Test Method for Louvers, Dampers and Shutters.

C. ARI 650 - Air Outlets and Inlets.

D. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.

E. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

F. NFPA 70 - National Electrical Code.

G. IMC - International Mechanical Code.

1.3 SUBMITTALS

A. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.4 PROJECT RECORD DOCUMENTS

A. Record actual locations of air outlets and inlets.

1.5 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.

B. Test and rate louver performance in accordance with AMCA 500.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

## PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Titus.
B. Tuttle and Bailey.
C. Anemostat.
D. Naylor.
E. Price.
F. York.

## PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

C. Install diffusers to ductwork with air tight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

E. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09900.

END OF SECTION

# SECTION 15990 - TESTING, ADJUSTING, AND BALANCING

## PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Measurement of final operating condition of HVAC systems.

1.2 REFERENCES

A. AABC - National Standards for Total System Balance.

B. ADC - Test Code for Grilles, Registers, and Diffusers.

C. ASHRAE 111 - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems.

D. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

E. SMACNA - HVAC Systems Testing, Adjusting, and Balancing.

1.3 SUBMITTALS

A. Submit name of adjusting and balancing agency for approval within 30 days after award of Contract.

B. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.

C. Prior to commencing work, submit report forms or outlines indicating adjusting, balancing, and equipment data required.

D. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.

E. Provide reports in 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

F. Include detailed procedures, agenda, sample report prior to commencing system balance.

G. Test Reports: Indicate data on AABC National Standards for Total System Balance forms, or forms prepared following ASHRAE 111, NEBB forms, forms containing information indicated in Schedules.

1.4 QUALITY ASSURANCE

A. Perform total system balance in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance or NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

1.5 QUALIFICATIONS

A. Agency: Company specializing in the testing, adjusting, and balancing of systems specified in this Section with minimum three years documented experience.

B. Perform Work under supervision of AABC Certified Test and Balance Engineer or NEBB Certified Testing, Balancing and Adjusting Supervisor.

1.6 PRE-BALANCING CONFERENCE

A. Convene one week prior to commencing work of this section.

1.7 SEQUENCING

A. Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.

1.8 SCHEDULING

A. Schedule and provide assistance in final adjustment and test of system with Fire Authority.

**PART 2 - PRODUCTS**

2.1 Not used

**PART 3 - EXECUTION**

3.1 AGENCIES

A. Thermal Balance.
B. Ebco.
C. Prefered Air Balance.

3.2 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
   1. Systems are started and operating in a safe and normal condition.
   2. Temperature control systems are installed complete and operable.
   3. Proper thermal overload protection is in place for electrical equipment.
   4. Final filters are clean and in place. If required, install temporary media in addition to final filters.

5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Air coil fins are cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage is minimized.

B. Submit field reports. Report defects and deficiencies noted during performance of services which prevent system balance.

C. Beginning of work means acceptance of existing conditions.

3.3 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

B. Provide additional balancing devices as required.

3.4 INSTALLATION TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.5 ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

F. Check and adjust systems approximately six months after final acceptance and submit report.

3.6 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities .

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions.

L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately .050 positive static pressure near the building entries.

M. Check multi-zone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.

N. On fan powered VAV boxes, adjust air flow switches for proper operation.

3.7 SCHEDULES

A. Equipment Requiring Testing, Adjusting, and Balancing

1. Roof Top Units
2. Exhaust FanS
3. Air Inlets and Outlets

B. Report Forms
   1. Title Page:
      a. Name of Testing, Adjusting, and Balancing Agency
      b. Address of Testing, Adjusting, and Balancing Agency
      c. Telephone number of Testing, Adjusting, and Balancing Agency
      d. Project name
      e. Project location
      f. Project Architect
      g. Project Engineer
      h. Project Contractor
      i. Project altitude
      j. Report date
   2. Summary Comments:
      a. Design versus final performance
      b. Notable characteristics of system
      c. Description of systems operation sequence
      d. Summary of outdoor and exhaust flows to indicate amount of building pressurization
      e. Nomenclature used throughout report
      f. Test conditions
   3. Instrument List:
      a. Instrument
      b. Manufacturer
      c. Model number
      d. Serial number
      e. Range
      f. Calibration date
   4. Electric Motors:
      a. Manufacturer
      b. Model/Frame
      c. HP/BHP
      d. Phase, voltage, amperage; nameplate, actual, no load RPM
      e. Service factor
      f. Starter size, rating, heater elements
      g. Sheave Make/Size/Bore
   5. V-Belt Drive:
      a. Identification/location
      b. Required driven RPM
      c. Driven sheave, diameter and RPM
      d. Belt, size and quantity
      e. Motor sheave diameter and RPM
      f. Center to center distance, maximum, minimum, and actual
   6. Roof Top Units:
      a. Identification/number
      b. Location
      c. Service
      d. Manufacturer

e. Air flow, design and actual
f. Entering air DB temperature, design and actual
g. Entering air WB temperature, design and actual
h. Leaving air DB temperature, design and actual
i. Leaving air WB temperature, design and actual
j. Air pressure drop, design and actual

7. Exhaust Fan Data:
   a. Location
   b. Manufacturer
   c. Model number
   d. Serial number
   e. Air flow, specified and actual
   f. Total static pressure (total external), specified and actual
   g. Inlet pressure
   h. Discharge pressure
   i. Sheave Make/Size/Bore
   j. Number of Belts/Make/Size
   k. Fan RPM

8. Duct Traverse:
   a. System zone/branch
   b. Duct size
   c. Area
   d. Design velocity
   e. Design air flow
   f. Test velocity
   g. Test air flow
   h. Duct static pressure
   i. Air temperature
   j. Air correction factor

9. Air Distribution Test Sheet:
   a. Air terminal number
   b. Room number/location
   c. Terminal type
   d. Terminal size
   e. Area factor
   f. Design velocity
   g. Design air flow
   h. Test (final) velocity
   i. Test (final) air flow
   j. Percent of design air flow

END OF SECTION

## SECTION 16000 - GENERAL PROVISIONS AND REQUIREMENTS

### PART 1 – PERMITS, CODES, INSPECTIONS, APPROVALS, ETC.

a) The Contractor shall obtain all permits necessary and shall bear all costs involved. The contractor shall bear all costs associated with electrical utility work.

b) All electrical work shall be performed in accordance with the requirements of the latest revision of the National Electrical Code (NFPA 70), National Electrical Safety Code, and Ky. Building Code. Similarly, all electrical equipment, where applicable, shall conform to all other NFPA Pamphlets, NEMA, ANSI, IPCBA and U.L. requirements. Whenever and wherever the design or State and local regulations require higher standards than the current National Electrical Code, then these shall be followed. Division 1 of the Architectural specifications shall apply to all electrical work.

c) The Architect/Engineer shall be notified twenty-four (24) hours in advance when any tests are to be made and before any work is concealed. The Contractor shall notify the Architect/Engineer when he is ready for final inspection.

d) The fronts of all electrical panels shall be removed for final punch list inspection.

e) All electrical items on this project shall bear the Underwriters Laboratories (UL) label and/or FM (Factory Mutual).

f) Provide electrical inspection by a licensed and recognized Electrical Inspector. Notify Electrical Inspector in writing, immediately upon start of work with a copy of notice to Architect. Schedule inspections for rough work as well as finished work. Approval from Electrical Inspector will not be allowed as reason for deviation from Contract Documents. All costs incidental to Electrical Inspection shall be borne by Contractor. Prior to final acceptance of work and release of final payment, deliver to Architect the certificate of final inspection.

g) The contractor shall install the fire alarm system, if applicable for this project, per the state approved drawings. The contractor is responsible for submission to the state.

### PART 2 - CLEANING AND PAINTING

a) The Contractor shall remove all temporary stickers, tags, etc. from all items installed under this Contract and shall thoroughly clean all equipment or materials installed under this Contract. Scratched and damaged paint and/or other finishes shall be touched up and/or repainted as required. All equipment shall be cleaned and made ready for painting by others.

b) Upon completion of the work, the Contractor shall thoroughly clean and lubricate all equipment.

c) Surplus material, rubbish and equipment resulting from the electrical work shall be removed from the building and premises by the Contractor upon completion of the work in accordance with the Architectural specifications.

d) All permanent nameplates on equipment shall be kept clean and exposed for easy reading. If field conditions warrant (in the opinion of the Architect) the Contractor shall vacuum clean all equipment and installed materials.

## PART 3 – IDENTIFICATION OF ELECTRICAL EQUIPMENT

a) The equipment services, feeder and branch circuits shall be marked in accordance with the National Electrical Code. Mark with moisture and fungus resistant wire markers and nameplates. All conductors that are not color-coded shall be marked with colored tapes to denote phases.

b) Identification of main entrance switchboard and branch circuit panelboards shall be labeled with a machine cut lamacoid plate with ¼" high letters, indicating the panel designation, voltage and phase (i.e.: Panelboard "A" - 120/208V., 3-Phase, 4W). Branch panelboards in finished areas shall have plate installed inside of door.

c) All switches or breakers in main switchboard shall be labeled to indicate equipment served with ½" wide machine cut lamacoid plate with 1/8" high letters.

d) All remote disconnects, safety switches, motor starters, etc. shall have the name of the motor/equipment which it is controlling engraved on lamacoid plate, ½" wide with 1/8" high letters. Exact name of system or motor shall be coordinated with Architect/Engineer prior to manufacture.

e) Identify circuits contained in each box on exterior cover w/permanent marker.

f) Mark all conduit housing currents with greater than 300 volts phase to phase every 20'. ½" high letters to be used.

g) All lighting and power panels shall have each breaker (including spares and spaces) identified with typed directory cards covered in plastic. Indicate type and location of load based on actual room numbers (verify final room number designation with Owner and Architect).

## PART 4 – SLEEVES, ESCUTCHEONS AND INSERTS

a) Sleeves shall be installed through masonry and concrete walls and floors for the passage of electrical raceways, cables, etc. Sleeves shall be placed and sized to permit installation and removal of the assembly. All electrical raceways larger than 1" shall be sleeved. Sleeves are not required where raceway bends into wall.

b) Cast iron sleeves shall be installed through all walls where conduit enters the building below grade. All other sleeves shall be standard weight steel. Sleeves shall be

flush with each face of the wall. Sleeves for conduit through outside walls shall be packed with oakum for weatherproofing.

c) All sleeves through floors shall extend ¾" above finished floors. All sleeves shall be ½" larger than the outside diameter of the duct or conduit. All sleeves shall be equal to Schedule 20 pipe or heavier.

d) Escutcheon shall be installed around all openings in exposed finished area. This includes all raceways whether they are sleeved or not. Escutcheon shall be equal to Benton & Caldwell, No. 40 or equal.

e) Inserts shall be installed as required, with location coordinated with other Contractors.

**PART 5 - CIRCUIT NUMBERS AND CIRCUITRY**

a) Circuit numbers, and breaker numbers shall be coordinated on panel identification card as shown on the Drawings.

b) The exact routing of circuits as shown on the drawings from receptacle to receptacle, light to light, etc. is schematic only. If the Contractor desires to change the routing of any circuits, he may do so within the scope of good engineering practice, and with the permission of the Architect/Engineer. All outlets shall be on the same circuit number as shown on the Drawings. Any change in routing shall be shown on the "Record" Drawings.

c) Circuits shall NOT share the same neutral. All circuits shall be provided with a separate dedicated neutral. Circuits on the construction drawings are shown individually. If the contractor chooses to combine circuits in the same raceway the circuits shall be sized and derated per NEC.

**PART 6 - SPARE CIRCUITS/CONDUIT**

a) All spare breakers or switches shown in the Panelboard Schedule shall have conduits stubbed above ceiling and/or down below slab as described hereinafter.

1) Recessed Panels - All spare conduit shall be stubbed above ceiling. If area has no ceiling, spare conduit shall ell out 2" below slab above.

2) Surface Panels - Spare circuits shall have knockouts only in top of tub available for spare circuits.

b) Contractor shall provide three-3/4" conduit to accessible ceiling space. Cap all spare conduits for all recessed panelboards.

**PART 7 - PROTECTION**

a) All work, equipment and material shall be protected at all times. All conduit openings shall be closed with caps or plugs during construction. All equipment and

accessories shall be tightly covered and protected against dirt, water or other injury during period of construction.

b) The Contractor shall cover all installed receptacles, switches, etc. with a plastic or equal cover prior to the painting of the areas. No device plate shall be installed prior to the finish painting. Any receptacle, switch, device plate, etc. with paint on it shall be removed and replaced by this Contractor. It shall be the Contractor's responsibility to coordinate with the Painting Contractor with regard to the scheduling of the installation of switches, outlets, device plates, etc.

## PART 8 – TESTING AND ADJUSTING

a) When the work included is complete, the Contractor shall start up and adjust all parts of his system. All equipment items of the various systems shall be adjusted for proper operation within the framework of design intent, and the operating characteristics as published by the equipment manufacturer.

b) No equipment shall be operated for any purpose until properly lubricated and brought into service condition.

c) The Contractor shall provide all equipment, materials and labor required to make the necessary tests.

d) The Architect/Engineer reserves the right to require the services of an authorized representative of the manufacturer in the event the Contractor is unable to so adjust any piece of equipment. The Contractor shall arrange for such services and bear all incurred costs thereof. After completion of adjustments, the Contractor shall advise the Architect/Engineer that the work is ready for the final acceptance test.

e) Upon completion of the installation, the Contractor, at his expense, shall conduct complete performance tests in the presence of the Architect/Engineer and Owner to fully demonstrate the capacity and all other characteristics of the systems. The test shall be run for a length of time sufficient to demonstrate the ability of each system to perform as required by design drawings and specifications.

f) The Electrical Contractor shall perform the following tests:

1) All branch circuits of No. 8 wire and larger and main feeders shall be megged for ground and insulation resistance before connecting to equipment. (Megger to be 500 volts).

2) All motors larger than ½ HP shall be megged before conductors are connected thereto and again after they have gained running temperature.

3) A record of all megging shall be delivered to the Engineer before final acceptance. Architect/Engineer shall be notified in advance so that he may witness the test.

g) Refer to respective equipment sections for special tests such as Sound Systems, Fire Alarm, Television, etc.

## PART 9 - CONNECTIONS TO EQUIPMENT FURNISHED BY OTHERS

a) The Architectural, Structural, Electrical, Plumbing, Heating, Ventilating and Air Conditioning Drawings and Specifications are complementary to one another.

The Contractor shall rough-in for and furnish all labor and materials necessary to make final connections to all equipment furnished by the Owner or any other Contractor or Sub-Contractor which requires electrical connections, including heating controls and all control and interlock wiring.

b) The Contractor making the required connections shall be responsible for any damages caused by erroneously connected equipment.

## PART 10 – MOTORS AND APPARATUS BY OTHER TRADES

a) The Contractor shall obtain from the other trades all necessary information regarding motors, and wiring connections of apparatus furnished by these trades.

b) Furnish and install all necessary wiring and raceways required for satisfactory testing and operation of all controllers, starters, motors, control boards, alarm boards and related equipment, etc. The other trades supplying apparatus on which there are motors will supply and deliver to the Contractor at the sidewalk or building receiving quarters all control equipment specified under their section of the specifications for erection and connection of all such equipment in their designated places under this section of the specifications. (The equipment furnished by others is shown on the Motor Schedule).

c) The Contractor shall carefully examine the Architectural, Structural, Plumbing, Heating, Ventilating and Air Conditioning Drawings and Specifications to determine the extent, type and locations of all wiring required and shall obtain from the respective Contractors the wiring diagrams and other necessary information to properly install his part of the work.

d) Motor sizes shown on the Drawings are nominal sizes with some variation anticipated in the final installations. Under this section of the specifications, the Contractor is to coordinate the work with all other trades by obtaining all final data from each supplier and install wiring, circuit and motor protection and equipment in accordance with the actual equipment nameplate data regardless of sizes, etc. shown on the drawings. Undersized wiring, conduit, disconnects, etc. connected to equipment shall be the responsibility of the Contractor. Coordinate with the Engineer on any differences found between drawings and actual load data.

## PART 11 – ELIMINATION OF NOISE AND VIBRATION

During the construction of this project, if any system or piece of equipment produces noise or vibration, which, in the opinion of the Architect is objectionable to the Owner, the Contractor shall, at his own expense, make changes in equipment and do all work necessary to eliminate the objectionable noise or vibration.

## PART 12 – GROUNDING OF SYSTEM

a) All metallic conduit, supports, cabinets and equipment shall be grounded in accordance with the latest issue of the National Electrical Code and as shown on the Drawings.

b) The size of the grounding conductor for service equipment shall not be less than that given in Article 250-94 and 250-95 of the National Electrical Code or as shown on the Drawings.

c) Ground bus and non-current carrying metallic parts of all equipment and conduit shall be securely grounded by connection to common ground bus insofar as possible or as shown. Jumper all noise or vibration isolators to insure ground potential.

d) The above ground bus shall not be less than #350 MCM copper or as per code with all connections made with pressure connectors.

e) No ground wires smaller than No. 12 solid copper shall be used; all wires larger than No. 8 shall be bare copper, stranded cable. All flexible conduit shall have a green insulated jumper bonded at each end.

f) The main ground electrode shall be a bare #350 MCM (or as shown on the drawings) copper conductor laid in bottom of footer trench. This electrode shall be as shown, but no less than 100' long and shall be thermal welded to building steel at each column it passes with both ends tied back to ground terminal in main gear. Ground resistance shall not exceed 5 ohm. (If ground electrode cannot be installed in bottom of footer trench, then the Contractor shall provide ground rods necessary, (minimum of six (6)), no less than 15' (center to center) to meet the ohmic value mentioned above).

g) The main water pipe shall be bonded to the service equipment enclosure, the grounded conductor at the service and the grounding electrode conductor in footer trench.

h) All connections to main ground conductors shall be thermal welded.

i) All raceways with ground lug bushings shall be grounded to their respective boxes with an approved jumper wire.

j) All EMT runs to receptacles, light fixtures, power outlets or any equipment shall have a code size insulated green ground wire connected to respective receptacle, light fixture outlet or equipment. All PVC (if allowed) shall have code sized ground wire.

**PART 13 - SAMPLES**

Provide samples as required by the Architect under this section of the specifications if a substitution is questioned. Any samples, if approved, submitted may be subsequently installed on the project providing it is approved.

**PART 14 – SHOP DRAWINGS**

Submit Shop Drawings in bound sets on all items furnished under this Contract in sufficient number to satisfy the Architect's requirements. Shop Drawings should be submitted within 30 days after the work order to proceed. All shop drawings submitted for review shall bear an "approved stamp" and signed by the Contractor. All shop drawings not bearing the Contractor's "approved" stamp will be returned without comment.

**PART 15 – CUTTING AND PATCHING**

a) Any cutting and patching in the building required to install the equipment, etc. shown on Drawings shall be accomplished by the Contractor. He shall meet all requirements of the Architectural Section and at his expense.

b) The Contractor shall be responsible for all openings and chases he may require in floors, walls or ceilings of any type construction (whether under construction or existing). All work necessary as a result of failure on the part of the Contractor to provide the required openings and chases and to set sleeves and inserts shall be performed at his own expense. When shown, these openings and/or chases will be formed or provided for in the work of the General Contractor. However, the Contractor shall be responsible for cooperation with the General Contractor in locating and sizing such openings. Openings required and not shown on Drawings shall be brought to the attention of the General Contractor promptly and the Architect/Engineer for approval.

**PART 16 – ACCESS DOOR**

a) The Contractor shall refer to the Architectural Drawings to ascertain which rooms have removable ceilings. Where removable ceilings are specified, access to equipment may be obtained by removing the ceiling pieces. Where non-removable ceilings are specified, the Contractor shall furnish all required access doors for servicing disconnect switches, etc.

b) Access doors shall be equal to L.M. Walsh Company "Way-Loctor". No. 3 shall be used for concrete block or tile walls having no plaster finish and No. 2 shall be used for plastered walls and ceilings for acoustical tile ceilings. All doors shall be prime coated and key operated and keys.

c) Installation of doors will be shall be the same for plumbing and heating work. Doors by Miami or Milcor or equal quality will be acceptable done by the General Contractor. However, the Contractor shall be responsible for the correct location of them for servicing equipment. These access doors shall be sized large enough to service the equipment with a minimum size of 20"x20".

## PART 17 – COORDINATION OF WALL OUTLETS

The Contractor shall plan his work in such a manner that wall outlets that are adjacent to each other or within a given area shall be installed at the same height, and with a symmetrical appearance.

## PART 18 – EXCAVATION AND BACKFILLING

a) General

1) Refer to Special Conditions in the Architectural Specifications and bid the rock and earth excavation in accordance with the requirements listed.

b) Excavation

1) Rock excavation shall be made to a depth of 4" below conduit or ducts or as shown on the drawings. All conduit and/or ducts shall have 4" of dense graded aggregate installed above and below. The Contractor shall be responsible for locating in the field the lines shown on the drawings. The Contractor shall use reference points as shown on the drawings for locating control points on the lines. Trench bottom shall follow uniform grades insofar as possible and shall be relatively flat from side to side.

2) Minimum depth of bury for all lines outside the building shall be 24" to top of pipe or as shown on the Drawings. The width of the trench above that level shall be as wide as necessary for sheathing and bracketing. All conduit under slab shall be deep enough to allow vertical code bends.

c) Dewatering And Shoring

Trenching and other excavation shall be maintained adequately free of water and shall be adequately shored, where necessary to protect workmen, materials, equipment, and adjacent structures. Discharge from pumps, drains or bailing shall be placed in ditches, storm drains or natural drainage ways. No extra will be paid for this work.

d) Backfilling

1) Under all backfill conditions with exceptions as listed below, earth shall be hand-placed to a height of at least 6" above the top of the dense graded aggregate. After backfilling and tamping with earth to a depth of 6" above the top of the dense grade aggregate, the backfilling operation may be continued by a machine in 12" layers, compacted with approved mechanical tampers. Any trenches improperly backfilled, or where settlement occurs, shall be re-opened to the depth required and compacted with the surface restored to the required grade and compacted and smoothed off. All trenches which run under sidewalks, roadway, etc. shall be filled to sub-grade with dense graded aggregate.

2) Dense graded aggregate shall be crushed limestone blended into a homogeneous mixture and graded in conformance with Article 208.2.0 of the latest edition of the Standard Specifications of the Kentucky Department of Highways.

e) Surplus Materials

All surplus material, particularly rock, resulting from this operation shall be removed from the grounds. Disposal from the site of such materials is the responsibility of this Contractor. Earth shall be disposed of only after rock has been removed from the site.

f) Blasting

All blasting on this project shall be done as set forth in the Architectural Specifications.

## PART 19 – FOUNDATIONS AND ANCHOR BOLTS

a) The Contractor shall be responsible for the location of all concrete pads required for all equipment installed under this Contract. All pads required will be poured at the expense of the Contractor.

b) The Contractor shall furnish anchor bolts for all equipment installed on concrete slabs and/or bases. Bolts shall be placed in exact positions prior to pouring concrete. Sizes of bolts shall be determined by the manufacturer's recommendations for the equipment served.

c) Contact utility for exact requirements of transformer concrete pad.

## PART 20 - OPERATING AND MAINTENANCE INSTRUCTIONS

Deliver to the Architect three (3) copies of shop drawings and all Operating and Maintenance Instructions for all equipment furnished and installed under this Contract, including parts lists for all new major equipment items. Each set shall be provided in a hardback binder with table of contents and divider for each section.

## PART 21 - FIRESTOPPING

All openings required for conduit in walls, floors, ceilings, partitions, etc., where such construction is required for fire protection, shall be firestopped to preserve the fire rating of the construction. Firestopping shall be mineral wool or other non-combustible insulating material tightly placed and filling the space around such conduit. All materials used shall be approved for use as fire stop equal to 3M Fire Barrier. (Caulk CP-25, putty 303 and 7904 Barriers), or equal by Hilti (Caulk CS240, putty CB 120 Foam, CS2420 barrier material. Firestopping shall be installed after the installation of all wiring and cabling, etc.

## PART 22 – SUSPENDED CEILINGS

a) The Contractor shall insure that framing numbers of suspended ceiling systems used to support fixtures shall be securely fastened to each other and shall be securely attached to the building structure at necessary intervals (NEC).

b) If the above items are not covered, the Contractor shall immediately alert the Architect. Fixtures shall not be installed until all questions concerning the above are answered.

c) All recessed light fixtures shall be clipped to ceiling structure. All 2x4 light fixtures shall be independently suspended from the ceiling grid at a minimum of opposite corners.

## PART 23 – ELECTRICAL DRAWINGS AND SPECIFICATIONS

a) The drawings and specifications are intended to cover all work enumerated under the respective headings. The drawings are diagrammatic only as far as final location of raceways, equipment, etc. is concerned. Any item of work not clearly included, specified and/or shown, any errors or conflict between plans (Mechanical, Electrical, Architectural or Structural) specifications, codes and field conditions, shall be clarified by a written request to the Architect by the Bidder before bidding; otherwise, the bidder shall, at his own expense, supply the proper labor and materials to make good any damages or defects in his work caused by such error, omission or conflict.

b) Schematics, risers and details shown on the drawings are for the equipment specified. All revisions, modifications or changes in circuitry, accessories, etc. due to using equipment of a different manufacturer than specified hereinafter, shall be the responsibility of the Bidder and shall be made at no additional cost to the Owner. All modifications or changes shall be submitted to the Architect in writing and meet his approval before the equipment is released for shipment.

c) The Contractor shall be responsible for all revisions, modifications or changes necessary in the Structural, Architectural or Mechanical/Electrical systems to accommodate the equipment to be furnished under this section of the specifications. This shall be made at no additional cost to the Owner.

d) Contractor shall provide arc flash study and breaker coordination study/arc fault study.

## PART 24 – APPLICATION FOR PAYMENT

a) Line items and description of electrical work shall be as follows:

| Item No. | Description of Work |
|---|---|
| 1 | Bond & Permits |
| 2 | Mobilization |
| 3 | Electrical Service and Phone Site work |
| 4 | Distribution Equipment Material |

5 Distribution Equipment Labor
6 Lighting Material
7 Lighting Labor
8 Outdoor Lighting Material
9 Outdoor Lighting Labor
10 Gas Island Equipment Hookup and Labor
11 Conduit & Boxes
12 Wiring (material and labor)
13 Excavation & B.F.
14 Electrical Inspection
15 Utility company coordination and fees

## PART 25 – PERFORMANCE AND PAYMENT BOND

a) The Electrical Sub-Contractor for this project shall furnish and include cost of same in his bid, a surety bond in the amount equal to one hundred percent (100%) of his contract amount to the benefit of the Prime Contractor.

b) This bond shall assure performance and payment of labor, materials, and unemployment contributions.

c) This bond requirement does not void the full performance and payment bond required by the Contractor.

d) A copy of the bond shall be furnished to the Architect before first payment request. No payment will be approved or made to the Electrical Sub-Contractor until a copy of the bond is furnished.

END OF SECTION

## SECTION 16025 – SCOPE OF WORK

### PART 1 - GENERAL

Except as otherwise hereinafter specified, the work under this Contract consists of furnishing all labor, materials, tools, elevating apparatus, transportation permits, certificates and equipment and performing all operations relevant to the installation of the Electrical Systems complete and working (unless otherwise noted) in strict accordance with this Specification and the applicable drawings, and all applicable codes, and subject to the terms and conditions of the Contracts. All systems shall be turned over to the Owner in a workable and usable condition.

### PART 2 – WORK INCLUDED

Without restricting the generality of the foregoing, the work to be performed under this Contract shall consist of furnishing, installing and connecting the following items:

a) Power and Lighting Distribution.
b) Conduit, Fittings, Pull Boxes, Junction Boxes, Terminal Boxes.
c) Safety Switches as required by Code.
d) Wire and Cable installations and terminations.
e) Installation of Wiring of Starters, Switches, other electrical equipment and kitchen equipment furnished under other sections of these Specifications or Owner.
f) Receptacles and Lighting Outlets.
g) Lighting Fixtures and Lamps.
h) Motor Controls.
i) Grounding/Bonding.
j) Megger testing of all wiring.
k) Connection to equipment furnished by others.
l) Voice/Data System – Rough-in only. .
m) Arc flash study and breaker coordination study/arc fault study.
n) Parking Lot Lighting.
m) Installation of generator and transfer switch provided by owner.

END OF SECTION

## SECTION 16050 - BASIC MATERIALS AND METHODS

## PART 1 – RACEWAYS (CONDUIT, ETC.)

a) Rigid

Rigid, threaded steel conduit shall be used in concrete, underground in hazardous locations or where called for on the Drawings. All wiring above 600V. shall be rigid, unless otherwise noted.

b) Electric Metallic Tubing (EMT)

Metallic tubing may be used where permitted by code, except for underground panel feeders or unless otherwise noted as rigid. No raceway smaller than ¾" will be permitted except for vertical drops to switch legs, or receptacles which may be ½".

c) PVC Conduit

Nonmetallic schedule 40 PVC rigid conduit conforming to ANSI, NEMA specifications with each length U.L. labeled may be installed as noted below when the following conditions are adhered to:

1) Install rigid steel conduit where under-floor conduits enter the building and penetrate the slab and above floor.

2) Install equipment-grounding conductors as required by N.E.C. and size conduits for number of conductors installed.

3) P.V.C. conduit may be used for telephone and television service entrance. (Encased in 3" concrete under roadways). Use long radius steel ells.

4) P.V.C. conduit may be used for primary service (from service pole to transformer) (Encased in 3" concrete under roadways). Use long radius steel ells.

5) P.V.C. conduit shall not otherwise be allowed unless shown or noted on drawings.

d) All metallic conduit shall be electro-galvanized, sheradized, hot-dipped galvanized or metallized galvanized. Conduit shall be concealed for all new work whether on existing walls or new structure. All (exposed and concealed) runs of conduit shall have supports spaced not more than 8' apart and shall be installed with runs parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings, with right angle turns consisting of cast metal fittings or symmetrical bends as shown on the Drawings. Expansion fittings or other approved devices shall be used to provide for expansion and contraction where conduit crosses expansion joints. Jumper for ground continuity in all cases. Conduit shall be installed so as to insure against trouble from collection of trapped condensation.

f) Flexible conduit for motors shall be liquid tight single strip; neoprene covered, and shall be used from motor terminal boxes to outlet or conduit for vibration purposes. Lengths of this flexible conduit shall not exceed 24" and shall be installed in such a manner so as to isolate vibration from the conduit. Connectors, as manufactured by Efcor, Thomas and Betts, Appleton or approved equal will be acceptable.

g) All conduit systems, except those otherwise specifically shown to the contrary, shall be concealed in the building construction or run above suspended ceiling. All steel conduit installed below grade or slab shall be coated with an asphaltum tar manufactured for this purpose and approved by the Architect (conduit under stone fill shall be considered below slab and shall be so painted). This includes all conduit for outside lighting. (Pre-coated conduit may be used).

h) Runs of conduit shall not have more than the equivalent of three (3) 90-degree bends. Junction boxes shall be installed in conduit runs exceeding 80', whether shown on Drawings or not. Length requirement does not apply to underground circuits to outside lights.

i) MC Cable will not be allowed on this project except for lighting circuits and as called out in the drawings.

## PART 2 – CABINETS, OUTLETS AND JUNCTION BOXES

a) Cabinets, Junction And Pull Boxes

1) Cabinets for lighting and power, telephone, clocks or any other purposes specified or shown on the Drawings shall be constructed of panelboard code gauge, galvanized steel with sides formed and corner seams riveted or welded before galvanizing. Boxes constructed with sheet metal screws or bolts will not be accepted.

2) Pull boxes shall include all boxes used to reduce the run of conduit to the required number of feet or bends for cables, supports, taps, troughs and other similar applications and shall also be constructed as specified above.

3) All cabinets and boxes shall be provided with knockouts as required by the manufacturer, or shall be cut in the field by approved cutting tools, which will provide a clean symmetrically cut opening. Such boxes shall be provided with code gauge fronts, which shall have hinged doors with ¼ turn fasteners.

b) Outlet Boxes

1) Lighting fixture outlet boxes shall be galvanized steel, 4" octagonal, not less than 2-1/8" deep, with lugs or ears to secure covers and those for use with ceiling lighting fixtures shall be fitted with 3/8" fixture studs fastened to the back of the boxes, where applicable.

2) Outlet boxes for switches, receptacles, telephone, etc., installed in walls of glazed tile, brick or other masonry which will not be covered by wood wainscot or paneling shall be 4"x4"x1½" with masonry extension and they shall be completely covered with plates or lighting fixtures. All exposed boxes shall be FS type. No box will be allowed with the ears on the outside. The Contractor shall cooperate with the brick layers and carpenters to insure that the outlet boxes are installed straight and flush in the walls. Jumbo plates will not be allowed.

3) Boxes for more than two devices shall be for number of devices required and shall be one piece. No ganging of single switch boxes will be allowed.

4) Outlets for use on this project shall have only the holes necessary to accommodate the conduits at the point of installation and shall be rigidly secured in position.

5) The location of fixtures, outlets and/or equipment, as shown on the drawings, shall be considered as approximate only. It shall be incumbent upon the Contractor to study the general building drawings, with relation to spaces surrounding each outlet, in order to coordinate this work with the work of others and in order that when the fixtures, outlets and/or equipment are installed, they will be symmetrically located and will not interfere with any other work or equipment. Any change in fixture layout shall be coordinated with the Architect before the change is made.

6) Refer to separate articles for any special outlet boxes, etc. required for individual equipment.

**PART 3 - CONDUCTORS**

a) All conductors on this project shall be copper. All circuits shall be sized as the load requires or as shown on the drawings. No conductor shall be less than #12 AWG. All conductors shall have THHN/THWN insulation. All conductors within fixture or equipment housing shall have temperature rating not less than recommended by fixture or equipment manufacturer.

b) Conductors No. 10 and smaller sizes of wire shall be solid. Conductors No. 8 and larger sizes of wire shall be stranded. The pulling of all wires and cable on this project shall be performed in strict compliance with Section 300 of the National Electrical Code. No conductor entering or leaving a cabinet or box shall be deflected in such a manner as to cause excess pressure on the conductor insulation. (See NEC).

c) All wire on this project shall be new, in good condition, and shall be delivered in standard coils. The color of the wire shall be selected to conform with the latest edition of the National Electrical Code with conductors phase color-coded at each termination (red, blue and black). Neutral to be white and ground wire to be green. #12 and #10 wiring shall be supplied with colored insulation.

d) Refer to separate sections of this specification for any special conductors required.

## PART 4 – SUPPORTS AND HANGERS FOR CONDUIT AND FIXTURES

a) The Contractor shall be responsible for the support of all fixtures specified hereinafter. He shall not relocate them from the locations shown on the Drawings for the purpose of supporting them from existing angles, tee bars, bulb tees, etc.

b) Recessed fixtures supported from suspended ceiling framing members shall be securely fastened to the ceiling-framing member as per N.E.C.

c) Raceways shall be run at least 6" from steam pipes, or hot water and refrigeration pipes. Raceways shall be supported each 8' unless special conditions require closer spacing. Individual horizontal runs of raceways shall be supported by Kindorf's C-144, C-147, C-149, C-247, C-248, C-249, HS-100, HS-400, HS-900, or equivalent as approved. Exposed runs shall be installed with runs parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceilings, and have all right angle turns consisting of constant radius bend or threaded fittings. Where two or more conduits run parallel or where specified, a rack shall support them, trapeze or framework constructed of B-900 series channel. Wherever hanger rods are used in conjunction with channel to form a trapeze, B-900 series channel with holes such as B-903, B-905-2A, B-905, B-907 and B-995 shall be used and, in all cases, rigid conduit shall be fastened to the channel with C-105 straps, E.M.T. and C-106 straps, and O.D. tubing with C-107 straps.

d) Copper or steel wire hangers will not be acceptable to support any item under this Contract.

e) Strap iron, properly installed, may be used for 1¼" conduit and smaller.

f) Where pipe supports and inserts have been specified by a particular manufacturer, pipe supports and inserts of equal quality and size, as manufactured by Elcen Metal Products or the Auto-Grip Division of Automatic Sprinkler Corporation will be acceptable.

## PART 5 - SPECIALTIES

a) All EMT terminations at junction boxes, panels, etc. shall be made with locknuts, case hardened, and appropriate fittings as manufactured by Thomas and Betts, Efcor, or ETP. All rigid conduit shall have double locknuts.

b) All conduit, except main and branch feeders, shall have insulated metallic bushings equal to OZ Type B. All branch and main feeders #6 and larger and all raceways entering a box thru concentric knockouts shall have insulated bushings with grounding lugs equal to Type BL as manufactured by OZ. Jumper ground lugs to box. All rigid conduit fittings shall be threaded metal type, not set screw type.

c) All EMT terminations shall have insulated throat fittings equal to Thomas and Betts "Insulined" fittings.

d) All conduit stubbed through floor during construction shall have openings protected with plastic caps approved for this purpose. Connections on both ends of all flexible conduit shall be equal to Efcor.

e) All EMT fittings shall be compression type, malleable or equal. Pressure cast or die cast fittings will not be acceptable.

f) Dead spring type pressure connectors will not be acceptable on this project. All connections shall be made with insulated pressure type connectors (live spring) as manufactured by Thomas and Betts, or approved equal, (connectors with rigid body will not be acceptable). All connections on conductors No. 8 and larger shall be made with Burndy Type KS.

g) Items as manufactured by OZ, Gedney, Thomas and Betts, Midwest, Efcor, or ETP will be considered equal.

**PART 6 – BASIC METHODS**

a) Unless indicated otherwise, install all wiring in rigid metallic conduit, electric metallic tubing or flexible metallic conduit specified herein or as indicated on Drawings.

b) Install recessed fluorescent fixtures with flexible metallic conduit at approximately 6 feet in length to permit relocation flexibility.

c) Empty conduit systems shall have conduit bushings and pure wire installed.

END OF SECTION

## SECTION 16140 – WIRING DEVICES

### PART 1 - GENERAL

a) The work under this section consists of furnishing and installing all materials, equipment and services necessary for the installation of all wiring devices shown on the drawings and herein specified.

b) All receptacles and switches, insofar as possible, shall be of one (1) manufacturer.

c) Colors of receptacles and switches shall be per the Architect.

d) All receptacles shall be grounded type.

e) All device plates shall be thermoplastic except in the garage area which shall be stainless steel.

f) All outlets behind water coolers shall be concealed by water cooler when viewed from the front of the cooler. Refer to Shop Drawings furnished by Mechanical Contractor.

### PART 2 – DUPLEX RECEPTACLES

a) Duplex receptacles shall be 20 amp, 120 volts, 2-pole, 3-wire, NEMA 5-20R configuration, unless otherwise shown. Receptacles shall have the following characteristics:

1) "T" Type contacts for phase and neutral female connection.

2) Female ground connection shall be riveted to the bridge.

3) The bridge shall be of hot dipped steel.

4) The receptacle body shall be of heat resistant thermoset material.

5) Rivet connecting the face plate to bridge shall be spun brass.

b) Duplex receptacles shall be 5352 Series equal to Hubbell, Arrow Hart, Bryant, P&S, or Leviton. Surge suppressed receptacles shall be equal to Hubbell HBL420

c) Weatherproof receptacles shall be the same as "B" above with Hubbell, #5206-WO lift cover plate.

### PART 3 – GROUND FAULT INTERRUPTER RECEPTACLES

a) Ground fault interrupter receptacle shall be duplex type suitable for mounting in a standard outlet box, rated 20 amps., 125 volts, 2-pole, 3-wire grounding type.

b) Device shall have a nominal sensitivity to ground leakage current of five milli-amperes and shall function to interrupt the current supply for any value of ground leakage current above five milli-amperes on the load side of the device. Device shall have a minimum nominal tripping time of 1/30th. of a second. All receptacles within 6 foot of a sink shall be GFI type, as well as other locations shown on the drawings. All kitchen general use receptacles shall be GFI type.

c) Device shall be equal to Hubbell, #GF-5352 or P&S 2091-S.

**PART 4 – SAFETY/TAMPERPROOF RECEPTACLES**

a) Device shall be designed to accept either two or three wire plugs. Receptacle shall have six-inch pigtail leads for wiring, no exposed metal parts for wiring terminations. Shutter type devices will not be accepted.

b) Receptacles shall be 5-20R, 20A, 125V Hubbell SG62H series.

**PART 5 – FLOOR RECEPTACLES**

a) Flush Floor Receptacles

1) Floor boxes on or below grade shall be P.V.C. type.

a) Concrete pours greater than 3" shall be Hubbell B2536 fully adjustable.

b) Concrete pours 2-3" shall be Hubbell B2537.

2) Floor boxes above grade shall be P.V.C. type.

a) Concrete pours greater than 3" shall be Hubbell B2527 fully adjustable box.

b) Concrete pours 2-3" shall be Hubbell B2529 box.

c) Floor depth to be determined by Contractor from Architectural drawings.

3) Covers

a) Where indicated for flush mounting - use S3925 cover and Hubbell 5352 receptacle with proper box for tile floor.

b) For carpet - use S3925 cover + 5352 Hubbell receptacle with proper box and carpet flange S3182.

b) Pedestal Type Floor Receptacles

1) Use Hubbell cover S2525 with housing SC3098, cover plates SS309-D for duplex with Hubbell 5352, with appropriate box.

2) If communication pedestal use SC3098 with SS309-T with appropriate box.

**PART 6 - SWITCHES**

a) All switches shall be rated 20 amps. for 120 and 277 volt lighting circuits and shall be specification grade, back and side wired, with automatic ground clip and one piece contact arm. Switches shall be single pole, three or four way, or furnished with pilot where shown on the drawings.

b) Switches shall be equal to Hubbell 1221 Series, Arrow Hart, 1990 Series, Bryant 4900 Series, P&S Series 20AC or Leviton Series 1220, or GE # 5951 Series.

c) Mullion Switch - shall be a P&S 20A., 120-277V. single pole (#2241-S) or three-way (#2243-S) with vertical opening plate (301 stainless steel) #SWK-4-IN and #347 bracket.

**PART 7 - DEVICE PLATES**

a) All outlet boxes shall have a cover plate.

b) All device plates shall be thermoplastic except where called out to be stainless steel in the specifications.

c) All unused telephone outlets shall have a one-hole cover plate.

d) Mechanical rooms, kitchen and janitor closets wall plates shall be metal corrosion resistant 302 stainless steel.

**PART 8 – TECHNOLOGY OUTLET COVER PLATES & INSERTS – Not used.**

**PART 9 – REQUIRED SUBMITTALS**

Submit manufacturer's data on all wiring devices and cover plates.

END OF SECTION

## SECTION 16400 - DISTRIBUTION EQUIPMENT

### PART 1 - INCOMING SERVICE

1.1 Service to this building shall originate from pad mounted transformer as shown on utility site plan, and riser diagram. All conduit, duct system, secondary cable, cable connectors, opening and closing of primary and secondary trenches, and concrete transformer pad to be provided by this contractor. Contractor shall also provide primary conduit with pull string. Utility company will supply and install the primary conductors and transformer. Service to this building shall be 277/480V., 3 Phase, 4W. 60 Hz. Electrical utility company is Jackson RECC. .

### PART 2 - DISTRIBUTION PANELBOARDS

2.1 CIRCUIT BREAKER

A. Furnish and install circuit breaker panelboards as indicated in the panelboard schedule and where shown on the drawings. Each panelboard, as a complete unit, shall have a short circuit rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or drawing. Panelboards shall be listed by UL. When required, panelboards shall be suitable for use as service equipment.

### PART 3 - BRANCH PANELS (120/208V )

3.1 Furnish and install circuit breaker panelboards as indicated in the panelboard schedule and where shown on the plans. Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or drawings. The panelboard is to be 20"W x 5-3/4"D and shall be listed by UL. Panelboards shall be Square D type NQOD or equal. Cutler/Hammer, G.E., Siemens are acceptable manufacturers. All outdoor panels shall be type NEMA 3R

### PART 4 - BREAKERS

4.1 Breakers for branch panels shall be molded case bolt-in type. Single pole breakers in branch panels shall have an interrupting capacity of not less than 10,000 Amp. symmetrical at 208/120V. unless otherwise noted on plans. Tandem breakers will not be allowed.

4.2 Breakers used for switching of lights shall be rated for switch duty and so noted.

### PART 5 - DISCONNECT SWITCHES (NOT IN MAIN SWITCHGEAR)

5.1 Provide disconnect switches where indicated on drawings or where required by Code although not indicated on Drawings.

5.2 Disconnect switches shall be fused or unfused as required by Code as indicated on the Drawings or as specified. They shall be housed in an enclosure suitable for the location in which they are installed. For instance, all outdoor units shall be NEMA 3R.

5.3 All fusible switches shall be heavy duty. All unfused switches shall be general duty.

**PART 6 - REQUIRED SUBMITTALS**

6.1 Submit manufacturer's data on all panelboards and disconnect switches.

END OF SECTION

## SECTION 16500 - LIGHTING

## PART 1 – GENERAL REQUIREMENTS

a) Lighting fixtures shall be of the types, sizes, etc. as specified in light fixture schedule. The lighting fixtures specified are intended to indicate the general fixture type required. All fixtures shall be U.L. listed. All general requirements shall be required unless otherwise noted in detail specifications for each fixture.

b) The necessary precautions shall be exercised during the course of construction to protect the fixtures from dirt, dust, and debris. All fixtures shall be cleaned before the project is accepted.

c) The Contractor shall install lamps in all lighting fixtures and they shall be of one manufacturer such as Osram/Sylvania, General Electric, or Westinghouse.

d) Fixture housing, chassis and/or channel shall not be less than 20 gauge steel of rigid construction and shall be finished with a baked-on white enamel over a zinc phosphate undercoating. Wiring shall be secured by clips or similar means. All doors shall be extruded aluminum with a positive type latch.

e) Reflectors separate from housings for fluorescent fixtures shall not be less than 22 gauge steel furnished with baked-on white enamel with not less than 0.85 initial reflection factor unless otherwise specified.

f) Each ballast shall be designed to start and satisfactorily operate the type of lamp required in the particular fixtures. Ballasts shall be securely fastened in place with mounting surface of ballast making as complete contact with surface of ballast mounting area of fixture as practical. Ballast shall be high power factor, rapid start or 800 ma. ETL, CBM, "P" rated. Refer to individual fixture if special ballasts are required.

g) Refer to Section on "Fuses" for fixture fuses.

h) Fluorescent Lampholders

1) Fluorescent lampholders shall be of such design that lamps will be held firmly in place, electrically and mechanically secure and shall permit easy insertion or removal of lamps.

2) Lampholders shall be rigidly (19 gauge) and securely fastened by bolts or screws to the mounting surface with necessary provisions to prevent lampholders from turning.

Snap-in type holders will not be allowed. The dimensions of lampholders shall be such as to position lamp tube not less than 1/8" from mounting surface of reflector. All lampholders in the industrial, open fixtures shall be spring loaded, turret type, heavy duty.

i) Metal Halide Sockets

All mercury and metal halide (250 watts and above) shall be split type to insure that lamps will not freeze in socket. The center contact shall be spring loaded.

j) Lamps

1) Fluorescent

a) Rapid Start – T8, 4100K.
b) 32W TRT

2) H.I.D.

a) All mercury to be deluxe white, color corrected.

b) All metal halide to be phospor coated.

3) Incandescent

All incandescent lamps shall be inside frosted rated for 2500 hours life.

k) Lens

1) Refer to each fixture for type of lens used.

l) All recessed fixtures shall be securely fastened to ceiling framing member by mechanical means such as bolts, screws, nuts or clips manufactured for this purpose. (Wire lashing of each fixture to roof or floor structure above will be acceptable).

m) Substitutions

1) Fixture substitutions must be made through the equipment supplier's representative ten (10) days prior to the bid date. The equipment supplier's representative is to furnish the Engineer with original fixture brochures, photometrics and point by point computer printouts for consideration of written prior approval.

n) Light Fixture Schedule (See Electrical Plans)

Catalog numbers are for style and quality only. The Contractor shall be responsible to determine the type of ceiling that fixtures are to be installed and to so order fixtures even though catalog numbers may indicate other type of ceiling.
Refer to the drawings for the light fixture schedule. Any substitutions for the light fixtures specified shall be submitted to the Engineer 10 days prior to bid date. All submissions shall include light fixture cutsheets and point by point illumination level printouts of each area of the building.

## PART 2 – EMERGENCY LIGHTING SYSTEM

a) Exit and emergency light luminaires shall be connected to unswitched circuits with emergency power from emergency battery packs.

b) Provide self-contained battery powered emergency lighting units in areas indicated on Drawings with a permanent conduit connection to housing. Battery chargers shall be solid state.

**PART 3 – GENERAL INSTALLATION REQUIREMENTS**

a) Delivery lighting fixtures individually wrapped in factory-fiberboard type containers.

b) Install lighting fixtures of types indicated, where indicated, and at indicated heights; in accordance with lighting fixture manufacturer's written instructions and recognized industry practices to ensure that fixtures comply with requirements and serve intended purposes. Comply with NEMA standards, and requirements of NEC pertaining to installation of lighting fixtures.

c) Set lighting fixtures and equipment plumb, square, and level and secure to structure support members of building. Provide all steel supports necessary for lighting fixtures in addition to those specified under general building construction. Recessed and semi-recessed fixtures shall be supported independent of suspended ceiling system. Secure fixtures in suspended ceilings to framing members in accordance with NEC by using standard clips made for the purpose. Sheet metal screws are not acceptable.

d) Mounting heights specified as indicated shall be to bottom of fixture. Coordinate exact mounting of lighting fixture with type, style and pattern of ceiling being installed.

e) Clean interior lighting fixtures of dirt and debris upon completion of installation. Protect installed fixtures from damage during remainder of construction period.

f) At date of substantial completion, replace lamps in lighting fixture which are observed to be inoperable or noticeably dimmed after Contractors use and testing, as judged by Architect/Engineer.

g) Set time switches for operation as directed by the Owner and/or Architect/Engineer.

**PART 4 – REQUIRED SUBMITTALS**

Submit light fixture shop drawings and manufacturer's data booklet form with a separate sheet for each fixture, assembled in luminaire type alphabetical order as shown in the light fixture schedule, with proposed fixture and accessories clearly indicated on each sheet.

END OF SECTION

## SECTION 16900 - CONTROLS

### PART 1 – MAGNETIC STARTERS

All motor starters shall be steel mounted, front wired with all terminals accessible for wiring directly from the front. No slate or ebony asbestos will be permitted on any size starter. All contacts shall be double break, solid silver cadmium oxide alloy, or approved equal, which will not require any filing, dressing or cleaning throughout the life of the control equipment. Bare copper or silver flashed copper contacts which require periodic filing or cleaning maintenance will not be permitted. Operating coils shall be pressure molded and so designed that if accidentally connected to excessive voltage, they will not expand, bubble or melt. When a coil fails under this condition, the starter shall definitely drop out by gravity and not freeze the starter in the "On" position. All motor starter coils shall be rated 120 volts unless shown otherwise on the Drawings. All magnetic motor starters shall have control transformers (one side fuse, the other grounded to box). Each magnetic starter shall be provided with one (1) spare N.O. and one (1) N.C. auxiliary contact. Transformer shall be sized to handle the loads shown in the Schedule and Schematics. No starter smaller than Size "0" shall be utilized. NOTE: ADDITIONAL CONTACT SHALL BE PROVIDED TO OPEN THE STARTER AND DE-ENERGIZE THE EQUIPMENT UPON SIGNAL FROM DDC(HVAC) CONTROL SYSTEM. THE SAME DDC CONTROL SYSTEM SIGNAL SHALL ALSO ENERGIZE THE EQUIPMENT VIA THE STARTER.

### PART 2 – OVERLOAD RELAYS

a) Overload relays shall be of the melting alloy, hand-reset, trip-free variety. All overload relays shall be equipped with a trip indicator, visible from the front, which will indicate which motor has tripped. Overloads shall be installed in all ungrounded legs.

b) Taking into account the temperature rating of the motors, overloads shall be sized for one of three conditions:

1) Temperature at starter is the same as motors.
2) Temperature at starter is lower than at motor.
3) Temperature at starter is higher than at motor.

All overloads shall be sized from data on motor nameplate taking into consideration the above three (3) items. The sizing of overloads is the responsibility of the Contractor. Submit written list of overload vs. motors FLC to Engineer on all motors.

c) It shall be possible to field add two (2) extra N.O. or N.C. contacts in all motor starters without removing existing wiring or removing the starter from the enclosure.

### PART 3 – PUSHBUTTONS, SWITCHES, PILOT LIGHTS, ETC.

a) Pushbuttons and switches shall be heavy duty, double-break silver contacts. Buttons shall have means of installing metal plate to designate function.

b) Pilot lights shall be press-to-test, 120 volts incandescent. Refer to Drawings for typical control diagram.

c) Unless otherwise shown, all pushbuttons, switches, pilot lights, etc. shall be mounted in the face of the respective starters. Remote buttons, etc. shall be flush mounted where shown.

## PART 4 – MANUAL STARTERS

Furnish and install, where shown on Drawings, 1 or 2 pole toggle operated manual starters. Starters shall be surface unless otherwise shown and shall have neon pilot lights. Starters shall be in a NEMA 1 enclosure. Heaters shall be sized from motor nameplate data.

## PART 5 – AC COMBINATION STARTER

a) General

Combination starters shall be manufactured in accordance with the latest published NEMA standards, sizes and horsepower ratings. Disconnect switch combination starters shall consist of a visible blade disconnect switch and a motor starter. Combination starters shall be mounted in general purpose enclosures unless otherwise indicated on the plans.

b) Starters

All starters used in combination starters shall be manufactured in accordance with the latest published NEMA standards, sizes, and horsepower ratings. These starters shall be furnished with three melting alloy type thermal overload relays.

c) Thermal Units

Thermal units shall be of one-piece construction and interchangeable. The starter shall be inoperative if a thermal unit is removed.

d) Disconnect Handle

The disconnect handle used on combination starters shall always be in control of the disconnect device with the door opened or closed. The disconnect handle shall be clearly marked as to whether the disconnect device is "ON" or "OFF", and shall include a two-color handle grip, the black side visible in the "OFF" position indicating a safe condition, and the red side visible in the "ON" position indicating an unsafe or danger condition.

## PART 6 – REQUIRED SUBMITTALS

Submit manufacturer's data on all starters, relays and other control devices.

END OF SECTION

Project Manual and Specifications

# Warehouse/Operations Center
# for
# Salt River Electric
# Bardstown, Kentucky

**MSE Project #9551-03**

**July 2013**

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# DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS

## SECTION 00020 - ADVERTISEMENT FOR BIDS
## Salt River Electric
## Warehouse/Operations Center
## Bardstown, Kentucky

Sealed bids for the construction of a Warehouse/Operations Center Building located in Bardstown, KY, will be received by Salt River Electric in their Business Office at 111 W. Brashear Street, Bardstown, KY 40004 until 4:00 p.m., local time, Tuesday, September 3, 2013. Bids will be opened privately.

The CONTRACT DOCUMENTS may be reviewed at the following location:

MSE Web Site: mselex.com under Bid Opportunities. A password is needed to access them; call MSE at 859.223.5694 to receive the password.

Copies of the Contract Documents may be obtained at the office of Lynn Imaging, 328 E. Vine St. Lexington, KY 40507, (859) 226-5850 upon receipt of a check made payable to Lynn Imaging in the amount of $150.00 (non-refundable) and a check made payable to MSE of Kentucky, Inc. of $150.00 (refunded when specs and plans are returned to Lynn Imaging within 30 days). All orders must be prepaid. There will be a 24 hour turn-around on all orders. This project is listed under Private Jobs and a password is needed to access it; call MSE at 859.223.5694 to receive the password.

A certified check or bank draft, payable to Salt River Electric, government bonds, or a satisfactory bid bond executed by the bidder and acceptable sureties in an amount equal to five percent of the bid shall be submitted with bid. The successful bidder will be required to furnish and pay for the following: 1) 5% Bid Bond; and 2) A performance and payment bond for 100% of the contract price.

Each bidder must deposit with his bid, security in the amount, form, and subject to the conditions provided in the Information for Bidders.

The Owner may consider informal any bid not prepared and submitted in accordance with the provisions of this advertisement and/or the specifications and may waive any informalities or reject any and all Bids. Any proposal received after the time and date specified shall not be considered and will be returned unopened to the proposer.

Sealed bid should be labeled "Salt River Electric Warehouse/Operations Center". If mailed/shipped, bid should be enclosed in another envelop and addressed to: Salt River Electric, 111 W. Brashear Street, Bardstown, KY 40004.

State and Federal Wage Rates do not apply to this project.

No Bidder may withdraw his Bid for a period of ninety (90) days after the actual date of the opening thereof.

Award will be made to the lowest, responsive, responsible bidder. Bidding is for the sole benefit of Salt River Electric.

Salt River Electric is an Equal Employment Opportunity Employer.

End of Section

## SECTION 00100 - INSTRUCTIONS TO BIDDERS
## ADDITIONAL INFORMATION

### PART 1 - GENERAL

1.01 DEFINITIONS

A. AIA Document A701/1987, Instructions to Bidders, Articles 1 through 8, inclusive, is a part of this Contract.

B. General Conditions of the Contract for Construction, AIA Document A201/1997, Articles 1 through 14 inclusive, are a part of this Contract.

1.02 BIDDING DOCUMENTS

A. The Bidding Documents are the Bidding and Contract Requirements, the Specifications, the Drawings and any addenda issued prior to receipt of bids.

B. Documents are on file and may be examined or obtained for bidding purposes as stated in Section 00020 - Advertisement for Bids.

1.03 SUBSTITUTIONS AND APPROVALS DURING BIDDING

A. Whenever products or materials are specified as "Standards" or they are otherwise named, approval of other equal quality products shall be obtained by requesting in writing and presenting for evaluation, such product or material, to the Architect, no later than seven (7) days prior to date set for receipt of bids. Submittals circumventing the above time frame will not be processed.

1. If approval is granted, product or material will be added by Addendum.

2. No direct reply will be made to any requests for changes, but any requested changes approved by the Architect will be stated in an Addendum issued to all prime-bidders.

3. Issuance of Bidding Documents does not constitute approval of products, materials, or subcontractors.

1.04 ADDENDA

Article 3: Bidding Documents. 3.4 Addenda, 3.4.3. Change the four days to read as follows: Addenda will be issued by the Architect when in the opinion of the Architect the issuance of an addenda is in the interest of the bid process and the Owner.

1.05 BIDDER'S REPRESENTATION

A. Each Bidder, by making his bid, represents that he has read and understands the bidding documents.

B. Each Bidder, by making his bid, represents that he has familiarized himself with the local conditions under which the Work is to be performed.

1. No additional costs of any type will be allowed by the failure of the Bidder to avail himself of the privilege of a complete and thorough, on-site inspection.

C. Each bidder must visit and inspect the site.

1.06 BID SECURITY

A. Provide bid security in the form of Bid Bond, AIA Documents A310, for five percent (5%) of bid made payable to Salt River Electric. This security shall be forfeited if the bidder is awarded the contract and subsequently fails to enter into a contract with and furnish the required contract bond to the OWNER within ten (10) days after notice of acceptance of his proposal is made.

B. The bid security of all unsuccessful bidders will be returned promptly after an award has been made, or in the event that all bids are rejected. The bid security of the successful bidder will be returned when a satisfactory performance and labor and material payment bond has been furnished and the contract executed.

1.07 PREPARATION OF BIDS

A. Bids shall be submitted in duplicate only on proposal bid form as included herein.

B. Any interlineation, alteration, or erasure will be grounds for rejection of the Bid. Bids shall contain no recapitulation of the work to be done.

C. Bids shall be based on the materials, construction, equipment and methods named or described in the specifications and on the drawings, and any addenda issued prior to receipt of bids.

D. Proposals shall be sealed in an opaque envelope marked with the bidder's name and business address, and bearing the following caption:

1. Proposal for:
   Salt River Electric Warehouse/Operations Center

2. Proposals shall be addressed and delivered to:
   Salt River Electric
   111 W. Brashear Street
   Bardstown, KY 40004

1.08 BID SUPPLEMENTS

A. Bids shall be accompanied by the following supplemental documents, all properly signed and notarized:
   1. Bid Security, Bid Bond, AIA Document A310
   2. Document SC-1 - Subcontractors List (may use your own form)
   3. Document PC-1 - Project Cost Breakdown (may use your own form)
   4. Non-Collusion Affidavit

1.09 SELECTION OF BIDS

A. The Owner reserves the right to reject any and/or all bids and to waive any informality in bidding.

1.10 AWARD OF CONTRACTS

A. Contracts shall be deemed to have been awarded when Notice of Award shall have been duly served upon the Bidder by any officer or agent of the Owner duly authorized to give such notice. Before the contract becomes valid, the Bidder must provide all necessary bonds, insurance and other information herein called for.

1.11 THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FURNISH THE FOLLOWING:

A. A One Hundred Percent (100%) Performance/Payment Bond, in an amount equal to the total contract price. This bond shall guarantee all labor and materials to be as required, the faithful performance of the contract and the prompt and faithful payment of any claim or liens form any cause for which the Contractor is liable, including those for labor, materials, utility services, transportation costs and for supplies, equipment and machinery (or rental thereof).

B. Such guarantee bonds shall remain in effect and full force for one (1) year after final acceptance of the work. Such bond shall not be executed as of a date prior to the executing of the contract.

1.12 DETAILED COST BREAKDOWN

A. Upon award of contract, Contractor will have seven (7) working days to generate a finalized detailed cost breakdown and a detailed project schedule of the project. All construction draws made on the project will require updating the Contractor's cost breakdown. Architect and Owner approval will be required on all pay requests.

1.13 CONTRACTOR'S RESPONSIBILITY REGARDING SUB-CONTRACTORS

A. It shall be prime contractor's responsibility to check all sub-bids carefully to determine whether or not any exceptions, omissions, or alterations to the drawings and specifications have been noted therein, as he is solely responsible for a complete job in strict accordance with drawings and specifications.

1.14 COMMENCING WORK

A. Contractor shall commence work within ten (10) days after written Notice to Proceed is issued by the Owner, unless otherwise arranged by the Owner.

1.15 OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

A. These construction documents are to be governed, at all times, by applicable provisions of the federal laws, including but not limited to the latest amendments of the following:

1. William - Steiger Occupational Safety and Health Act of 1970, Public Law 91-596.

2. Part 1910 - Occupational Safety and Health Standards, Chapter XVII of Title 29, Code of Federal Regulations.

B. All prime contractors, sub-contractors and their employees shall be solely responsible to conduct their work in conformance with the regulations contained in this act and as amended. All material suppliers and manufacturers shall be fully aware of their responsibilities and the requirements of the finished project under the regulations of this Act, and as amended. Such materials and fabricated products incorporated in this project shall, at the time of installation or application, be in conformance with the regulations of this act, and as amended.

END OF SECTION

## SECTION 00310 - BID SCHEDULE

Proposal of _____ (hereinafter called "BIDDER"), organized and existing under the laws of the State of _____ doing business as _____ * to Salt River Electric (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the construction of the Salt River Electric Warehouse/Operations Center in strict accordance with the CONTRACT DOCUMENTS, within the time set forth and the prices stated below.

By submission of this BID, each BIDDER certifies, and in the case of a joint BID, each party thereto certifies as to its own organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence Work under this contract on or before a date to be specified in the Notice to Proceed and to complete the Project within one hundred ninety (190) consecutive calendar days following the Notice to Proceed. BIDDER further agrees to pay as liquidated damages, the sum of $1,000.00 for each consecutive calendar day thereafter as provided in the General Conditions and the Special Conditions.

BIDDER agrees to perform all the WORK described in the CONTRACT DOCUMENTS for the lump sum contained in the following Bid Schedule.

State Wage Rates do not apply to this project.

*Insert "a corporation", "a partnership", or "an individual" as applicable.

| Item | Description | Unit | Cost of Item |
|---|---|---|---|
| 1. | Main Building with Office | LS | $ |
| 2. | Mechanical | LS | $ |
| 3. | Electrical | LS | $ |
| 4. | Site Grading | LS | $ |
| 5. | Testing Allowance | LS | $ 25,000 |
| 6. | All Other Miscellaneous Costs | LS | $ |
| | **TOTAL COST OF ITEMS 1 - 6** | | **$** |

ALTERNATE PROPOSALS:

**Deduct Alternate No. 1:** On Buildings #2 & #3 delete the exterior wall split-faced buff colored CMU and instead, exterior wall shall be 26 gauge metal wall panel from grade beam to eave. Additionally, change the Deflection Conditions to:
Frames are vertically supporting: Metal Roof Purlins and Panels (L/180)
Frames are laterally supporting: Metal Wall Girts and Panels
Deflection Limit Override H/100
Purlins are supporting: Metal Roof Panels (L/180)
Girts are supporting: Metal Wall Panels (L/90)

Deduct the sum of _____ ($ )

**Deduct Alternate No. 2:** Deduct all exterior pole-mounted lighting; underground conductors will remain in project.

Deduct the sum of _____ ($ )

The bid prices shall include all labor, materials, overhead, profit, insurance, and other costs necessary to install the finished work of the several items called for. Changes shall be processed in accordance with the General Conditions.

This is an invitation for offer to bid, not an offer to enter into a contract. If a bid is accepted, the contract will be awarded to either the lowest total cost of Items 1 - 6 or the total cost of Items 1 - 6 minus Deduct Alternate #1 or Deduct Alternate #2 or Deduct Alternates #1 and #2.

Accompanying this Proposal is a certified check or standard Bid Bond in the sum of_____ _____Dollars ($_____ ), in accordance with the Information for Bidders. The BIDDER, by submittal of this Bid, agrees with the OWNER that the amount of the bid security deposited with this Bid fairly and reasonably represents the amount of damages the OWNER will suffer due to the failure of the BIDDER to fulfill his agreements as provided in this Proposal.

Addenda to the Drawings and Specifications issued heretofore are hereby acknowledged by the undersigned as being:

No. _____ Date: _____ No. _____ Date: _____

No. _____ Date: _____ No. _____ Date: _____

BIDDER understands that the OWNER reserves the right to reject any or all Bids and to waive any informalities in the Bidding.

BIDDER agrees that this Bid shall be good and may not be withdrawn for a period of sixty (60) calendar days after the actual date of bid opening.

Within ten (10) calendar days after receiving written notice of the acceptance of this Bid by the OWNER, the Bidder will execute and deliver to the OWNER four (4) copies of the Agreement and such other required Contract Documents.

BIDDER: _____

(Name of Company or Partnership)

By: _____ _____

(Signature) (Date)

_____ _____

(Print Name) (Title)

_____ _____

(Street Address/P.O. Box) (Phone Number)

_____

(City, State, Zip)

Attested By:

_____ _____

(Signature) (Date)

Seal (If bid is by a corporation)

END OF SECTION

## SECTION 00410 - BID SECURITY FORM

### PART 1 - GENERAL

1.01 DESCRIPTION

A. Bid security for this project shall be in the form of a Bid Bond executed on AIA Document A310 form in the amount of five percent (5%) of the bid, made payable to the Owner.

1. The bid security of all unsuccessful bidders will be returned promptly after an award has been made or in the event that all bids are rejected. The bid security of the successful bidder will be returned when satisfactory performance and labor and material payment bonds (AIA Document A312) have been furnished and contract executed, including 1 year warranty period.

END OF SECTION

## SECTION 00480 - NON-COLLUSION AFFIDAVIT

### PART 1 - GENERAL

1.01 DESCRIPTION

A. The Non-Collusion Affidavit for the project shall be submitted with the bid proposal, and a copy of this document is bound herewith.

1. When properly executed, this Document shall become a part of the successful bidder's Contract Document.

END OF SECTION

## NON-COLLUSION AFFIDAVIT

The undersigned bidder, on behalf of its officers and agents or representatives being duly sworn, states that it has not in any way, directly or indirectly, entered into any arrangement or agreement with any other bidder, or with any other person or public officer whereby bidder has paid or is to pay to such other bidder or other person or public officer any sum or money, or has given of is to give to such other bidder or other person or public officer anything of value whatever, or such avant or affiants or either of them has not, directly or indirectly, entered into any arrangement or agreement with any other bidder or bidders, which tends to or does lessen or destroy free competition in the letting of the contract sought for by the attached bids; that no inducement of any form or character other than that which appears upon the face of the bid will be suggested, offered, paid or delivered to any person whomsoever to influence the acceptance of the said bid or awarding of the contract, nor has this bidder any agreement or understanding of any kind whatsoever, with any person whomsoever to pay, deliver to, or share with any other person in any way or manner, any of the proceeds of the contract sought by this bid.

_____

_____

_____

_____

Subscribed and sworn to before me by _____ this _____ day of _____, 20____.

My Commission expires:

_____ _____

Notary Public

END OF AFFIDAVIT

## SECTION 00490 - NOTICE OF AWARD

To: _____

_____

_____

Project Description: Salt River Electric Warehouse/Operations Center

The Owner has considered the Bid submitted by you for the above described Work in response to its Advertisement for Bids dated _____, and Information for Bidders.

You are hereby notified that your Bid has been accepted for items in the amount of $_____.

You are required by the Information for Bidders to execute the Agreement and furnish the Required Contractor's Performance Bond, Payment Bond and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said Bonds within ten (10) days from the date of this Notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your Bid as abandoned and as a forfeiture of your Bid Bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to the Owner.

Dated this _____ day of _____, 2013.

_____
Owner

By _____

Name/Title _____

## ACCEPTANCE OF NOTICE

Receipt of the above Notice of Award is hereby acknowledged by _____, this the _____ day of _____, 2013.

By _____

Name/Title _____

## SECTION 00500 - AGREEMENT

### PART 1 - GENERAL

1.01 DESCRIPTION

A. The contract Agreement for this project shall be AIA Document A101, Owner - Contractor Agreement Form - Stipulated Sum, June 1997 edition.

B. This form, when fully executed, shall become a part of the successful bidder's Contract Documents.

END OF SECTION

## SECTION 00610 - PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

### PART 1 - GENERAL

1.01 DESCRIPTION

A. A performance bond for 100% of the final contract amount shall be executed in favor of the Owner; the forms for this bond shall be AIA Document A 312, "Performance Bond", 1984 edition.

B. Payment Bond, AIA Document A312, "Payment Bond", 1984 edition.

C. Consent of Surety to Reduction in or Partial Release of Retainage: AIA Document G707A, 1994 Edition.

D. Consent of Surety to Final Payment: AIA Document G707, 1994 Edition.

E. Furnish the required bonds within seven (7) days of receipt of Notice of Award.

F. When fully executed, these bonds shall become part of the successful bidder's Contract Documents.

G. Application and Certificate for Payment: AIA Document G702 and G703, 1992 Edition.

H. Contractors Affidavit of Payment of Debts: AIA Document G706, 1994 Edition.

I. Contractors Affidavit of Release of Liens: AIA Document G706A, 1994 Edition.

J. Certificate of Substantial Completion: AIA Document G704, 1992 Edition.

END OF SECTION

## SECTION 00650 - CERTIFICATES OF INSURANCE

### PART 1 - GENERAL

1.01 GENERAL

A. Certificates of Insurance shall be filed with the Owner prior to the commencement of any work. Insurance shall be purchased by the General Contractor.

1. These certificates shall contain a provision that coverages afforded under the policies shall not be canceled or in any way terminated until at least thirty days prior written notice has been given to the Owner and Architect.

2. The Owner and the Architect shall be specifically named as additional insureds on all insurance coverage for this project.

B. Detailed insurance requirements are covered in Section 00800 - Supplementary General Conditions, and all certificates shall reflect these minimum requirements for the project.

END OF SECTION

## SECTION 00680 - NOTICE TO PROCEED

TO: _____ Date: _____

_____ Project: _____

_____ _____

You are hereby notified to commence WORK in accordance with the Agreement dated _____ _____, on or before _____, and you are to complete the WORK within ___ consecutive calendar days thereafter. The date of completion of all WORK is therefore _____.

_____
Owner

_____
Signature

_____
Name/Title

## ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by _____ this the _____ day of _____ , 2013.

_____
Contractor

_____
Signature

_____
Name/Title

End of Section

# SECTION 00800 - SUPPLEMENTAL CONDITIONS

## PART 1 - GENERAL

1.01 DESCRIPTION

A. The "General Conditions of the Contract for Construction," AIA Document A201, fifteenth edition, 1997, Articles 1 through 14, inclusive, is a part of this Contract.

1.02 SUPPLEMENTS

A. The following supplements modify, change, delete or add to the "General Conditions of the Contract for Construction." Where any Article, Paragraph, Sub-Paragraph or Clause thereof is modified or deleted by these supplements, the unaltered provisions of that Article, Paragraph, SubParagraph or Clause shall remain in effect.

## PART 2 - ARTICLE 2: OWNER

2.01 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.2.5 The Contractor can download pdf's from mselex.com.

## PART 3 - ARTICLE 3: CONTRACTOR

3.01 REVIEW OF CONTRACT SUB-PARAGRAPHS

A. Add the following sub-paragraphs:

3.2.2 The Contractor shall not perform any work at any time requested by persons other than the Architect. Any interpretations to the documents, or request for minor changes in the work will be by the Architect.

3.2.3 Where there is a conflict in or between the Drawings and Specifications, the Contractor shall be deemed to have estimated on the more expensive way of doing the work and/or the larger quantity required. Only changes in interpretations covered by Addenda or in writing from the Architect will be permitted during construction of the work.

3.02 WARRANTY

A. Add the following sub-paragraph:

3.5.2 General Contractor shall guarantee the work for a period of one year from the date of acceptance by the Owner, except where a longer guarantee is specified and will thus control and leave the work in perfect order at completion. Neither the final certificate of payment any provision in the Contract Documents shall relieve the Contractor of responsibility within the extent and period provided by said guarantee or by law whichever is longer. Upon written notice, he shall remedy any damage to other work resulting therefrom, including necessary labor for removing and replacing.

## PART 4 - ARTICLE 8: TIME OF COMPLETION AND LIQUIDATED DAMAGES

See the Bid Schedule, Section 00310, for the time allotted for this contract. The time allowed for completion shall begin at midnight, local time, on the date which the Owner shall instruct the Contractor, in writing, to start work, but not later than 7 days after Notice to Proceed.

The Contract completion time stipulated above includes an allowance for an average number of inclement weather days as follows:

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Precip. | 7 | 7 | 9 | 8 | 8 | 8 | 8 | 7 | 6 | 5 | 6 | 7 |
| Freeze | 10 | 6 | 1 | | | | | | | | 1 | 5 |

When number of days (including Saturdays, Sundays and Holidays) of precipitation in excess of 0.1" per day or maximum daily temperatures of 32°F exceed those shown above in any month, the Contractor shall be entitled to an equal number of additional days for Contract Completion.

This provision for inclement weather shall only apply to that time while foundations are being constructed and prior to the building being "under-roof".

It is understood that time is the essence of this contract and that the Owner will sustain damages, monetary and otherwise, in the event of delay in completion of the work hereby contracted.

Therefore, if the said Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the Owner, then the Contractor does hereby agree, as part consideration for the awarding of this contract, to pay the Owner the amount specified in the contract, not as a penalty, but as liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the contract for completing the work.

The said amount is fixed and agreed upon by and between the Contractor and the Owner because of the extreme difficulty in fixing and ascertaining the actual damages the Owner would in such event sustain, and said amount is agreed to be the amount of damages which the Owner would sustain and said amount shall be retained from time to time by the Owner from current periodical estimates.

## PART 5 - ARTICLE 9: PAYMENTS AND COMPLETION

5.01 APPLICATIONS FOR PAYMENT

A. Add the following sub-paragraph:

9.3.1.1 Monthly payments will be based on ninety (90%) percent of the value of the work done and materials delivered and suitably stored until work under this contract is fifty (50%) completed. If at that time, progress of the work has been satisfactory, there will be no additional retainage, provided the Contractor submits Consent of Surety for each application, authorizing any remaining partial payments to be paid in full. The form of Application for Payment shall be AIA Document G702, Application for Certificate for Payment, supported by AIA Document G702A Continuation Sheet.

## PART 6 - ARTICLE 11: INSURANCE AND BONDS

6.01 11.1 CONTRACTOR'S LIABILITY INSURANCE

A. Change as follows:

General Contractor shall take out and maintain insurance of such types and in such amounts as are necessary to cover his responsibilities and liabilities on all projects, and shall require all his subcontractors to carry similar insurance.

1. The Owner will accept in lieu of all subcontractors carrying similar insurance an "Owner's and Contractor's Protective Liability Policy" paid for by the Contractor and written in the name of the Owner for the amount specified hereinafter including all the special coverages. Said policy must protect the Owner for all claims for bodily injury and/or property damage arising out of operations for the named insured by said Contractor, or any subcontractor of said Contractor.

B. No Contractor shall commence work under this contract until he has obtained all insurance required under this section and such insurance has been approved by the Owner, nor shall any Contractor allow any subcontractor to commence work on his subcontract until the same insurance has been obtained by the subcontractor and approved by the Owner. Each and every contractor and subcontractor shall maintain all insurance required under paragraphs (1) and (2) of this section for not less than one year after completion of this contract.

C. Each Contractor shall file with the Owner and Architect, a Certificate of Insurance. Any certificate submitted and found to be altered or incomplete will be returned as unsatisfactory.

D. If requested by the Owner, Contractor shall furnish the Owner with true copies of each policy required of him or his subcontractors. Said policies will not be canceled or materially altered, except after fifteen (15) days advance written notice to the Owner and Architect, mailed to the addresses indicated herein.

E. Insurance under this section, as a minimum, shall include the following coverages:

1. Workman's Compensation and Employer's Liability Insurance: Workman's Compensation and Occupational Disease Insurance of statutory limits as provided by the state in which his contract is performed and Employers' Liability Insurance at a limit of not less than $100,000.00 for all damages arising from each accident or occupational disease.

2. Comprehensive General Liability Insurance covering:

a. Operations- Premises Liability:
Including, but not limited to, Bodily Injury, including death at any time resulting therefrom, to any person or Property Damage resulting from execution of the work provided for in this contract, or due to or arising in any manner from any act of omission or negligence of the Contractor and any Subcontractor, their respective employees or agents.

b. Contractor's Protective Liability:
Including, but not limited to, Bodily Injury, including death at any time, resulting therefrom to any person, or Property Damage arising from acts or omissions of any subcontractor, their employees or agents.

c. Products-- Completed Operation Liability:
Including, but not limited to, Bodily Injury, including death at any time, resulting therefrom to any person, or Property Damage because of goods, products, materials or equipment used or installed under this contract, or because of completed operation, which may become evident within one year after acceptance of the building, including damage to the building or its contents.

d. Contractual Liability:

Each and every policy for liability insurance, carried by each Contractor and Subcontractor, as required by this section shall specifically include Contractual Liability coverage with respect to Section F of this Division.

e. Special Requirements:

The insurance required under Paragraph (2) of this Section shall specifically include the following special hazards:

Property Damage caused by conditions otherwise subject to exclusions "x, c, u," Explosion, Collapse or Underground Damage.

Broad Form Property Damage endorsement, which has reference to property in the "care, custody, or control" of the insured.

"Occurrence" Bodily Injury coverage in lieu of "caused by accident."

"Occurrence" Property Damage coverage in lieu of "caused by accident."

f. Limits of Liability:

The insurance under Paragraph (2) of this Section shall be written in the following limits of liability, as a minimum:

| Bodily injury | Property Damage |
|---|---|
| $1,000,000 Each Person | $1,000,000 Each Occurrence |
| $3,000,000 Each Occurrence | $2,000,000 General Aggregate |
| $500,000 Aggregate Products | $1,000,000 Aggregate Protective |
| | $1,000,000 Aggregate Contractual |

3. Comprehensive Automobile Liability covering:
   a. All owned, hired, or non-owned vehicles including the loading or unloading thereof.

   b. Special Requirements: The insurance required under paragraph (3) of this section shall specifically include the following special hazards:

      "Occurrence" Bodily Injury in lieu of "caused by accident."

      "Occurrence" Property Damage in lieu of "caused by accident."

      The insurance under Paragraph (3) of this section shall be written in the following limits of liability as a minimum:

| Automobile Bodily Injury | Automobile Property Damage |
|---|---|
| $1,000,000 Each Person | $1,000,000 Each Occurrence |
| $3,000,000 Each Occurrence | |
| $3,000,000 Excess/Umbrella Liability | |

F. Hold Harmless Agreement:

1. The Contractor shall indemnify and hold harmless the Owner and the Architect and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the work, provided that any such claim, damage, loss or expense (a) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the work itself ) including the loss of use resulting therefrom and (b) is caused in whole or part by any negligent act or omission of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

2. In any and all claims against the Owner or the Architect or any of their agents or employees by any employee of the Contractor, Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Hold Harmless agreement shall not be limited in any way by any limitation on the amount payable by or for the Contractor or any Subcontractor under workman's compensation acts, disability benefit acts or other employee benefit acts.

3. The obligations of the Contractor under this Hold Harmless Agreement shall not extend to any claim, damage, loss or expense arising out or professional services performed by the Architect, his agents, or employees, including (a) the preparation of maps, plans, opinions, reports, surveys, designs or specifications, and (b) supervisory, inspection or engineering services.

**PART 7 - ARTICLE 11.3: PROPERTY INSURANCE (Purchased by the General Contractor)**

7.01 A. Change the first sentence of paragraph 11.3.1 to read: The contractor shall purchase....

B. Change the second sentence of Paragraph 11.3.1 to read:

11.3.1 "This insurance shall include the interests of the Owner, the Contractor, the Subcontractor and Sub-Subcontractors in the work and shall insure against the perils of fire, extended coverage, vandalism, malicious mischief and theft."

C. Add the following subparagraph:

"11.3.1.1 If by the terms of this insurance any mandatory deductibles are required, or if the Owner should elect to increase the mandatory deductible amounts or purchase this insurance with voluntary deductible amounts, the Owner shall be responsible for payment of the amount of the deductible in the event of a paid claim."

11.3.6 Revise a portion on the first sentence in Subparagraph to read as follows:

"...and (2) the Architect, his consultants, and separation contractors, if any..."

D. Add the following Article to the General Conditions of the Contract for Construction:

**PART 8 - ARTICLE 15: EQUAL OPPORTUNITY**

8.01 15.1 Employment Policies

15.1.1 The Contractor and all Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin or age. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, national origin or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates or pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of non-discrimination.

15.1.2 The Contractor and all Subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sect, national origin or age.

## PART 9 - ARTICLE 16: CHARACTER OF WORKERS, METHODS, AND EQUIPMENT

16.1 The Contractor shall, at all times, employ sufficient and equipment for prosecuting the work to full completion in the manner and time required by the contract, drawings, and specifications. Suitable number of foremen and supervisors shall be available on the job to insure proper prosecution and coordination of the work. All workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily.

16.2 Any person employed by the Contractor or by any subcontractor who, in the opinion of the Owner and Architect, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Architect, be removed forthwith by the Contractor or Subcontractor employing such person, and shall not be employed again in any portion of the work.

16.3 Should the Contractor fail to remove such person or persons or fail to furnish suitable and sufficient personnel for the proper prosecution of the work, the Architect may suspend the work by written notice until compliance with such orders.

16.4 After the beginning of work on the site, the Contractor may not remove his Superintendent from the project without the prior written approval of the Owner.

END OF SECTION

## Section 00815 - Supplemental General Conditions
## Part Two

1) General Contractors and Sub-contractors are hereby notified that they are encouraged, to the greatest extent practicable, to purchase American-made equipment and products with funding provided under this Award.

End of Section

# DIVISION I - GENERAL REQUIREMENTS

## SECTION 01010 - SUMMARY OF WORK

## PART 1 - GENERAL

1.01 SUMMARY OF WORK

A. Work covers construction of the new Salt River Electric Warehouse/Operations Center plus two storage buildings with site work.

B. Related requirements specified elsewhere:

1. Submittals- Section 01300

2. Temporary Facilities- Section 01500

3. Project Closeout - Section 01700

C. Contractor's Duties:

1. Except as specifically noted, provide and pay for:
   a. Labor, materials, tools, and equipment.
   b. Permits.
   c. Fees.
   d. Licenses.
   e. Taxes.

2. Give required notices.

3. Comply with codes, ordinances, rules, regulations, orders, and other legal requirements of public authorities which bear on performance of work.

4. Promptly submit written notice to Architect of observed variance of Contract Documents from legal requirements.

5. Contractor shall verify all grades, lines, levels, and dimensions indicated on the drawings and shall report any inconsistencies before commencing work.

6. Each Sub Contractor shall be responsible for the layout for their specific phase of work.

1.02 CONTRACT (OWNER AND GENERAL CONTRACTOR)

A. Construction work shall be under a single lump sum contract, which shall include all general construction, steel, concrete, mechanical, electrical, plumbing and site work, etc.

1.03 CONTRACTORS' USE OF PREMISES

A. Confine operations at site to areas permitted by:

1. Law.
2. Ordinances.
3. Permits.
4. Contract Documents.
5. Owner.

B. Do not unreasonably encumber site with materials or equipment.

C. Do not load structure with weight that will endanger structure.

D. Assume full responsibility for protection and safekeeping of products stored on site.

E. Move any stored products which interfere with operations of the Owner.

END OF SECTION

## SECTION 01027 - APPLICATIONS FOR PAYMENT REQUIREMENTS OF CONTRACTOR

### PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Procedures of Contractor for preparation and submittal of applications for payment.

1.02 RELATED SECTIONS

A. Document 00500 - Agreement: Contract Sum amounts of progress payments and retainages.

B. Section 00800 - Supplementary Conditions: Progress payments and final payment.

C. Section 01028 - Modification Requirements: Procedures for changes to the Work.

D. Section 01300 - Submittals: Submittal procedures.

E. Section 01700 - Contract Closeout - Final Payment

1.03 FORMAT

A. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of Work.
   3. Scheduled Values.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
   9. Balance to Finish.
   10. Retainage.

1.04 PREPARATION OF APPLICATIONS

A. Present required information in typewritten form on specified AIA Documents.

B. Execute certification by signature of authorized officer.

C. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.

D. List each authorized Change Order as an extension on AIA G703 Continuation Sheet, listing Change Order number and dollar amount as for an original item of Work.

E. Prepare Application for Final Payment as specified in Section 01700.

F. Submit partial release of liens waiver for all work completed to date with each payment application.

G. Submit up-to-date (revised) construction schedule.

1.05 SUBMITTAL PROCEDURES

A. Submit three copies of each Application for Payment.

B. Submit an updated construction schedule with each Application for Payment.

C. Payment Period: Submit at intervals stipulated in the Agreement.

D. Submit with transmittal letter as specified for Submittals in Section 01300.

1.06 DETAILED COST BREAKDOWN

A. Upon award of contract, Contractor will have seven working days to generate a finalized cost breakdown of the project.

1.07 SUBSTANTIATING DATA

A. When Architect/Engineer requires substantiating information, Contractor shall submit data justifying dollar amounts in question.

B. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

**PART 2 - PRODUCTS**

Not Applicable.

**PART 3 - EXECUTION**

Not Applicable.

END OF SECTION

## SECTION 01028 - MODIFICATION REQUIREMENTS
## REQUIREMENTS OF CONTRACTOR

### PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Submittals.
B. Documentation of change in Contract Sum and Contract Time.
C. Change procedures.
D. Construction Change Directive.
E. Stipulated Sum change order.
F. Execution of change orders.
G. Correlation of Contractor submittals.

1.02 SUBMITTALS

A. Submit name of the individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. Change Order Forms: AIA G701 Change Order.

1.03 DOCUMENTATION OF CHANGE IN CONTRACT SUM AND CONTRACT TIME

A. Maintain detailed records of work performed. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work.

B. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation.

C. Provide additional data to support computations:
1. Quantities of products, labor, and equipment.
2. Taxes, insurance, and bonds.
3. Overhead and profit.
4. Justification for any change in Contract Time.
5. Credit for deletions from Contract, similarly documented.

D. Support each claim for additional costs, and for work performed, with additional information:
1. Origin and date of claim.
2. Dates and times work was performed, and by whom.
3. Time records and wage rates paid.
4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

1.04 CHANGE PROCEDURES

A. The Architect/Engineer will advise of minor changes in the Work not involving an adjustment to Contract Sum/Price or Contract Time as authorized by AIA A201, 1987 Edition, Paragraph 7.4 by issuing supplemental instructions on AIA Form G710.

B. The Architect/Engineer may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change. Contractor will prepare and submit an estimate within seven (7) days.

1.05 CONSTRUCTION CHANGE DIRECTIVE

A. Architect/Engineer may issue a document, signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

B. The document will describe changes in the Work, and will designate method of determining any change in Contract Sum or Contract Time.

C. Contractor shall include in his costs any and all costs associated with contract documents modification required by the Architect/Engineer as a part of modifications.

D. Promptly execute the change in Work.

1.06 STIPULATED SUM CHANGE ORDER

A. Based on Proposal Request and Contractor's fixed price quotation.

1.07 CHANGE ORDER

A. Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

B. Architect/Engineer will determine the change allowable in Contract Sum and Contract Time as provided in the Contract Documents pending Owner approval.

C. Maintain detailed records of work performed.

D. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

1.08 EXECUTION OF CHANGE ORDERS

A. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1.09 CORRELATION OF CONTRACTOR SUBMITTALS

A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

B. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

C. Promptly enter changes in Project Record Documents.

**PART 2 - PRODUCTS**

Not Used.

**PART 3 - EXECUTION**

Not Used.

END OF SECTION

# SECTION 01041 - PROJECT COORDINATION

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Project coordination.

B. Construction mobilization.

C. Schedules.

D. Submittals.

E. Coordination drawings.

F. Closeout procedures.

### 1.02 RELATED SECTIONS

A. Section 00800 - Supplementary Conditions

B. Section 01011 - Summary of Project: Work sequence.

C. Section 01700 - Contract Closeout: Contract Closeout Procedures.

### 1.03 CONSTRUCTION MOBILIZATION

E. Comply with procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

F. Comply with instructions for use of temporary utilities and construction facilities.

G. Coordinate field engineering and layout work.

### 1.04 SCHEDULES

A. Submit preliminary progress schedule in accordance with Section 01310.

B. After review, revise and resubmit schedule to comply with revised Project schedule. Submit revised or up-to-date schedule with each application for payment.

C. During progress of work revise and resubmit as directed.

1.05 SUBMITTALS

A. Provide submittals for review and transmittal to Architect/Engineer.

B. Submit applications for payment on AIA G702 forms for review, and for transmittal to Architect/Engineer.

C. Submit requests for interpretation of Contract Documents, and obtain instructions through the Architect/Engineer.

D. Process requests for substitutions, and change orders.

E. Deliver closeout submittals for review and preliminary inspection reports, for transmittal to Architect/Engineer.

1.06 COORDINATION DRAWINGS

A. Provide information required by Architect/Engineer for preparation of coordination drawings.

B. Review drawings prior to submission to Architect/Engineer.

1.07 CLOSEOUT PROCEDURES

A. Notify Architect/Engineer when Work is considered ready for Substantial Completion.

B. Comply with Architect/Engineer's instructions to correct items of work listed in executed Certificates of Substantial Completion and for access to Owner occupied areas.

C. Notify Architect/Engineer when Work is considered finally complete.

D. Comply with instructions for completion of items of Work determined by Architect/Engineer's final inspection.

**PART 2 - PRODUCTS**

Not Used.

**PART 3 - EXECUTION**

Not Used.

END OF SECTION

## SECTION 01045 - CUTTING AND PATCHING REQUIREMENTS OF CONTRACTOR

### PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements and limitations for cutting and patching of Work, including:

6. Cutting, fitting, or patching that may be required to complete the work or make its several parts fit together properly.

7. Uncovering work to provide for installation of ill-timed work.

8. Removing and replacing defective work.

9. Removing and replacing work not conforming to requirements of the Contract Documents.

10. General Contractor shall be responsible for cutting and patching of construction as required to facilitate work, including work by his mechanical and electrical subcontractors. He shall assign proper trades normally associated with the materials being cut and patched to perform work.

1.02 RELATED SECTIONS

H. Section 01010 - Summary of Work.

I. Section 01300 - Submittals.

J. Section 01620 - Product Delivery, Storage and Handling.

K. Individual Product Specification Sections:

1. Cutting and patching incidental to work of the section.

2. Advance notification to other sections of openings required in work of those sections.

1.03 SUBMITTALS

A. Submit written request in advance of cutting or alteration which affects:

1. Structural integrity of any element of Project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate contractor.

B. Include in request:

1. Identification of Project.
2. Location and description of affected Work.
3. Necessity for cutting or alteration.
4. Description of proposed Work and Products to be us.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.
7. Written permission of affected separate contractor.
8. Date and time work will be executed.

## PART 2 - PRODUCTS

2.01 MATERIALS

A. Primary Products: Those required for original installation.

B. Product Substitution: For any proposed change in materials, submit request for substitution.

## PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

B. After uncovering existing Work, assess conditions affecting performance of work.

C. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

B. Provide protection from elements for areas which may be exposed by uncovering work.

C. Maintain excavations free of water.

3.03 CUTTING

A. Execute cutting and fitting including excavation and fill to complete the Work.

B. Uncover work to install improperly sequenced work.

C. Remove and replace defective or non-conforming work.

D. Provide openings in the Work for penetration of mechanical and electrical work.

E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

3.04 PATCHING

A. Execute patching to complement adjacent Work.

B. Fit Products together to integrate with other Work.

C. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

D. Employ original installer to perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.

E. Restore work with new products in accordance with requirements of Contract Documents.

F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire resistant material to full thickness of the penetrated element.

H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit. When possible, do not cut-and-patch work which is exposed in occupied spaces of building, in a manner resulting in reductions of visual qualities or resulting substantial evidence of cut-and-patch work, both as judged solely by Architect. Remove and replace work judged by Architect to be cut-and-patched in a visually unsatisfactory or otherwise objectionable manner.

END OF SECTION

## SECTION 01300 - SUBMITTALS

## PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Submittal procedures.
B. Shop Drawings.
C. Test reports.
D. Certificates.
E. Erection drawings.

1.02 REFERENCES

A. AGC (Associated General Contractors of America) publication "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

1.03 SUBMITTAL PROCEDURES FOR SHOP DRAWINGS

L. All shop drawings must be reviewed be the General Contractor before submitting them to the Architect.

M. Transmit each submittal with accepted form, containing the following:

1. Date
2. Project title
3. Contractor's name and address
4. Notification of any deviations from the contract documents.
5. Identify project as "Salt River Electric Warehouse/Operations Center"
6. Other pertinent data as required.

N. Identify Project, Contractor, Subcontractor, Manufacturer or supplier; pertinent drawing and detail number, and specification section number, as appropriate.

1. Provide identification of product or material size, type, finish and color as appropriate.
2. Field dimensions, clearly identified as such.
3. All working and erection dimensions, views, as required to indicate fully all construction and fabrication methods, profiles and materials.

O. On all shop drawings apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

1.04 CERTIFICATES

A. When specified in individual specifications sections, submit certification by the manufacturer, installation/application/subcontractor, or the Contractor to Architect/ Engineer, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect/Engineer.

**PART 2 - PRODUCTS**

Not used.

**PART 3 - EXECUTION**

Not used.

END OF SECTION

## SECTION 01310 - CONSTRUCTION PROGRESS SCHEDULES

## PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Format.
B. Content.
C. Revisions to schedules.
D. Submittals.

1.02 RELATED SECTIONS

A. Section 01011 - Summary of Work.
B. Section 01027 - Applications for Payment: Application for payment.
C. Section 01300 - Submittals: Shop drawings.

1.03 REFERENCES

A. AGC (Associated General Contractors of America) publication "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

1.04 FORMAT

A. Prepare schedules starting with Notice to Proceed date through substantial completion, as a horizontal bar chart or Gantt chart with separate bar for each major portion of Work or operation, identifying first work day of each week.

B. Sequence of Listings: The chronological order of the start of each item of Work.

C. Scale and Spacing: To provide space for notations and revisions.

D. Sheet Size: Maximum 30" x 42" OR multiples of 8½" x 11".

1.05 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Identify work of separate stages and other logically grouped activities.

D. Provide sub-schedules for each stage of Work.

E. Provide sub-schedules to define critical portions of the entire schedule.

F. Include conferences and progress meetings in schedule.

G. Show accumulated percentage of completion of each item, and total percentage of Work completed, to coincide with schedule of values in each application for payment.

H. Provide separate schedule of submittal dates for shop drawings, product data, and samples, including Owner furnished products and dates reviewed submittals will be required from Architect/Engineer. Indicate decision dates for selection of finishes.

I. Include scheduling for fabrication of structural steel.

J. Include scheduling of erection sequence of building structural steel, precast walls and delivery to site.

K. Include scheduling of erection sequence of building precast walls and delivery to site.

1.06 REVISIONS TO SCHEDULES

A. Indicate progress of each activity to date of submittal, and projected completion date of each activity.

B. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

C. Provide narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect including the effect of changes on schedules of separate contractors.

1.07 SUBMITTALS

A Submit initial schedules within 15 days after date of Owner-Contractor Agreement. After review, resubmit required revised data within seven days.

B. Submit revised Progress Schedules with each Application for Payment.

C. Submit the number of opaque reproductions which Contractor requires, plus two copies which will be retained by Architect/Engineer.

1.08 DISTRIBUTION

A. Distribute copies of reviewed schedules to Project site file, Subcontractors, suppliers, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

**PART 2 - PRODUCTS**

Not Used.

**PART 3 - EXECUTION**

Not Used.

END OF SECTION

# SECTION 01400 - QUALITY CONTROL

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Quality assurance - control of installation.
B. Tolerances
C. Mock-up.
D. Manufacturers' field services.

### 1.02 RELATED SECTIONS

A. Section 01300 - Submittals: Submission of manufacturers' instructions and certificates.
B. Section 01410 - Testing Services.
C. Section 01620 - Product Delivery, Storage and Handling.
D. Section 01650 - Starting of Systems

### 1.03 QUALITY ASSURANCE - CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

G. Perform Work by persons qualified to product required and specified quality.

### 1.04 TOLERANCES

A. Monitor fabrication and installation tolerance control of Products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

C. Adjust Products to appropriate dimensions; position before securing Products in place.

1.05 MOCK-UP

A. Tests will be performed under provisions identified in this section and identified in the respective Product specification sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be a comparison standard for the remaining Work.

D. Where mock-up has been accepted by Architect/Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so.

1.06 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment and additional products as specified, as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

**PART 2 - PRODUCTS**

Not Used.

**PART 3 - EXECUTION**

3.01 EXAMINATION

L. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

M. Examine and verify specific conditions described in individual specification sections.

N. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or condi-tioner prior to applying any new material or substance in contact or bond.

END OF SECTION

## SECTION 01410 - TESTING SERVICES

## PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Selection and payment.
B. Agency responsibilities.
C. Agency reports.
D. Limits on testing authority.
E. Contractor responsibilities.
F. Schedule of tests.

1.02 RELATED SECTIONS

A. Section 01300 - Submittals: Manufacturer's certificates.
B. Section 01400 - Quality Control.
C. Section 01650 - Starting of Systems: Testing, Adjusting, and Balancing of systems.

1.03 REFERENCES

A. ASTM C802 - Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods for Construction.

B. ASTM C1021 - Practice for Laboratories Engaged in the Testing of Building Sealants.

C. ASTM C1077 - Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

D. ASTM C1093 - Practice for Accreditation of Testing Agencies for Unit Masonry.

E. ASTM D290 - Recommended Practice for Bituminous Mixing Plant Inspection.

F. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

G. ASTM D4561 - Practice for Quality Control Systems for an Inspection and Testing Agency for Bituminous Paving Materials.

H. ASTM E329 - Practice for Use in the Evaluation of Inspection and Testing Agencies as Used in Construction.

I. ASTM E543 - Practice for Determining the Qualification of Nondestructive Testing Agencies.

J. ASTM E548 - Practice for Preparation of Criteria for Use in the Evaluation of Testing Laboratories and Inspection Bodies.

K. ASTM E699 - Practice for Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E6.

1.04 SELECTION AND PAYMENT

A. Architect will designate a firm or firms to provide construction testing/inspection services for the following listed types of work. Contractor will pay for services of testing/inspection agency or laboratory to perform specified testing from the allowance for testing.

1. Concrete footings, foundations, rebar placement
2. Soil Subgrades
3. Concrete slabs
4. Paving

B. Observe tests and adjustments for mechanical, electrical, plumbing, piping, welding, conducted by the various trades subcontractors and provide independent verification of results to Architect, Contractor and Owner. Payment for such services shall be made from the Contractor's bid, not the testing allowance.

C. Employment of testing\inspection agency or laboratory in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

1. Upon initial test results, if defects in the construction are found, further testing of these systems shall be the responsibility of the Contractor in order to ensure these items being tested are in compliance with the specifications.

2. Testing required by defective materials or defective work shall be paid for by the Contractor and is not paid from the allowance.

3. When initial tests requested by the Architect indicate non-compliance with the Contract Documents, costs of initial tests associated with that noncompliance will be deducted by the Owner from the Contract Sum, and subsequent retesting occasioned by the non-compliance shall be performed by the same testing laboratory and the costs thereof shall be paid by the Contractor.

4. The test cost for and adjustments conducted for mechanical, electrical, plumbing and piping systems, including welding and bolt-tightening shall be included in the bid for the associated work.

1.05 AGENCY RESPONSIBILITIES

A. Test samples of mixes submitted.

B. Provide qualified personnel at site with prior approval of Architect. Cooperate with Architect/Engineer and Contractor in performance of services.

C. Perform specified sampling and testing of Products in accordance with specified standards.

D. Ascertain compliance of materials and mixes with requirements of Contract Documents.

E. Promptly notify Architect/Engineer and Contractor of observed irregularities or non-conformance of Work or Products.

F. Perform additional tests as required by Architect/Engineer and approved by the Owner.

G. Attend progress meetings.

1.06 AGENCY REPORTS

A. After each test, promptly submit one copy of report to Architect/Engineer and Owner.

B. Include:
   1. Date issued.
   2. Project title and number.
   3. Name of inspector.
   4. Date and time of sampling or inspection.
   5. Identification of product and specifications section.
   6. Location in the Project.
   7. Type of inspection or test.
   8. Date of test.
   9. Results of tests.
   10. Conformance with Contract Documents.

C. When requested by Architect/Engineer, and approved by Owner, provide interpretation of test results.

1.07 LIMITS ON TESTING AUTHORITY

A. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
B. Agency or laboratory may not approve or accept any portion of the Work.
C. Agency or laboratory may not assume any duties of Contractor.
D. Agency or laboratory has no authority to stop the Work.

1.08 CONTRACTOR RESPONSIBILITIES

A. Cooperate with testing/inspection personnel, and provide access to the Work.

B. Notify Architect/Engineer and testing agency 48 hours prior to expected time for operations requiring testing and inspection services.

1.09 SCHEDULE OF TESTS

A. Individual Specification Sections: Tests required and standards for testing.

**PART 2 - PRODUCTS**

Not Used.

**PART 3 - EXECUTION**

Not Used.

END OF SECTION

# SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS REQUIREMENTS OF CONTRACTOR

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and water control.
B. Construction Facilities: Access roads, parking and progress cleaning.

### 1.02 RELATED SECTIONS

A. Section 01510 - Temporary Utilities.
B. Section 01540 - Security.
C. Section 01550 - Access Roads and Parking Areas.
D. Section 01580 - Project Identification and Signs.
E. Section 01590 - Field Offices and Sheds.
F. Section 01700 - Project Closeout: Final cleaning.

### 1.03 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide protection for plants designated to remain. Replace damaged plants.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

### 1.04 WATER CONTROL

A. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

### 1.05 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

F. Prohibit traffic from landscaped areas.

1.06 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.

E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

**PART 2 - PRODUCTS**

Not Used.

**PART 3 - EXECUTION**

Not Used.

END OF SECTION

## SECTION 01510 - TEMPORARY UTILITIES
## REQUIREMENTS OF CONTRACTOR

### PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities: Electricity, lighting, heat, ventilation, telephone service, water, and sanitary facilities.

1.02 RELATED SECTIONS

A. Section 01580 - Project Identification and Signs.

B. Section 01590 - Field Offices and Sheds.

C. Section 01700 - Contract Closeout: Final cleaning.

1.03 TEMPORARY ELECTRICITY

A. Cost: By Contractor; provide and pay for power service required from utility source or on-site generators.

B. Provide temporary electric feeder from electrical service at approved point of available service. Do not disrupt Owner's need for continuous service.

C. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.

D. Provide main service disconnect and over-current protection at convenient location.

E. Permanent convenience receptacles may be utilized during construction.

1.04 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain incandescent lighting for construction operations.

B. Permanent building lighting may be utilized during construction upon written approval from Owner.

1.05 TEMPORARY HEATING AND AIR CONDITIONING

A. Provide and pay for heating and air conditioning devices and heat and air condition as needed to maintain specified conditions for construction operations.

B. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications and provided by manufacturer instructions.

1.06 TEMPORARY COOLING

A. Provide and pay for cooling devices and cooling as needed to maintain specified conditions for construction operations.

1.07 TEMPORARY VENTILATION

A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

B. Utilize existing ventilation equipment. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations.

1.08 TELEPHONE SERVICE

A. Provide, maintain, and pay for telephone service to field office at time of project mobilization.

1.09 FACSIMILE SERVICE

A. Provide, maintain and pay for facsimile service to field office at time of project mobilization.

1.10 TEMPORARY WATER SERVICE

A. Provide, maintain and pay for suitable quality water service required for construction operations at time of project mobilization.
B. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

1.11 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

1.12 WARRANTY PERIOD

A. The warranty period for all permanent equipment used for temporary purposes by the Contractor including lighting, heating and cooling equipment shall commence from date of final completion of the entire project.

**PART 2 - PRODUCTS**

Not Used.

**PART 3 - EXECUTION**

Not Used.

END OF SECTION

## SECTION 01580 - PROJECT IDENTIFICATION AND SIGNS REQUIREMENTS OF CONTRACTOR

### PART 1 - GENERAL

There will be one (1) sign for this project.

1.01 SECTION INCLUDES

A. Project identification sign.

1.02 RELATED SECTIONS

A. Section 01010 - Summary of Work.

1.03 QUALITY ASSURANCE

A. Design sign and structure to withstand 60 miles/hr wind velocity.

B. Sign Painter: Experienced as a professional sign painter for minimum three years.

C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

1.04 SUBMITTALS

A. Section 01300 - Submittals: Shop drawings.

B. Show content, layout, lettering, color, foundation, structure, sizes, and grades of members.

### PART 2 - PRODUCTS

2.01 SIGN MATERIALS

A. Structure and Framing: New wood, structurally adequate.

B. Sign surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inch thick, standard large sizes to minimize joints.

C. Rough Hardware: Galvanized.

D. Paint and Primers: Exterior quality, two coats; sign background of color as selected.

E. Lettering: Exterior quality paint, contrasting colors as selected.

2.02 PROJECT IDENTIFICATION SIGN

A. One painted sign of construction, design, and content shown on Drawings, location designated.

B. Content:
1. Project title, logo and name of Owner as indicated on Contract Documents.
2. Names and titles of authorities.
3. Names and titles of Architect/Engineer and Consultants.

4. Name of Prime Contractor and major Subcontractors.

C. Graphic Design, Colors, Style of Lettering: Designated by Architect/Engineer and approved by Owner.

2.03 PROJECT INFORMATIONAL SIGNS

A. Painted informational signs of same colors and lettering as Project Identification sign, or standard products; size lettering to provide legibility at 100-foot distance.

B. Provide at each field office, and directional signs to direct traffic into and within site. Relocate as Work progress requires.

**PART 3 - EXECUTION**

3.01 INSTALLATION

A. Install project identification sign within 30 days after date fixed by Owner-Contractor Agreement.

B. Erect at designated location.

C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

D. Install sign surface plumb and level, with butt joints. Anchor securely.

E. Paint exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE

A. Maintain signs and supports clean, repair deterioration and damage.

3.03 REMOVAL

A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION

# SECTION 01590 - FIELD OFFICES AND SHEDS
# REQUIREMENTS OF CONTRACTOR

## PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Temporary field offices and sheds.

B. Maintenance and cleaning.

C. Removal.

1.02 RELATED SECTIONS

A. Section 01010 - Summary of Work.

B. Section 01550 - Access Roads and Parking Areas.

C. Section 01580 - Project Identification and Signs.

D. Section 01620- Product Delivery, Storage and Protection.

1.03 USE OF PERMANENT FACILITIES

A. Permanent facilities shall not be used for field offices or for storage.

## PART 2 - PRODUCTS

2.01 MATERIALS, EQUIPMENT, FURNISHINGS

A. Materials, Equipment, Furnishings: Serviceable, new or used, adequate for required purpose.

2.02 CONSTRUCTION

A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.

B. Construction: Structurally sound, secure, weather tight enclosures for office and storage spaces. Maintain during progress of Work; remove at completion of Work.

C. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy and storage requirements.

D. Exterior Materials: Weather resistant, finished.
E. Interior Materials in Offices: Sheet type materials for walls and ceilings, pre-finished or painted; resilient floors and bases.

F. Lighting for Offices: 50 footcandles at desk top height, exterior lighting a. entrance doors.

G. Fire Extinguishers: Appropriate type fire extinguisher at each office and each storage area.

H. Interior Materials in Storage Sheds: As required to provide specified conditions for storage of products.

2.03 ENVIRONMENTAL CONTROL

A. Heating, Cooling, and Ventilating for Offices: Automatic equipment to maintain 68 degrees F heating and 76 degrees F cooling.

B. Storage Spaces: Heating and ventilation as needed to maintain Products in accordance with Contract Documents; adequate lighting for maintenance and inspection of Products.

2.04 CONTRACTOR OFFICE AND FACILITIES

A. Size: For Contractor's needs and to provide space for project meetings.

B. Telephone: As specified in Section 01510.

C. Fax: As specified in Section 01510.

D. Furnishings in Meeting Area: Conference table and chairs to seat at least eight persons; racks and files for Contract Documents, submittals, and project record documents.

E. Other Furnishings: Contractor's option.

2.05 STORAGE AREAS AND SHEDS

A. Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products to requirements of Section 01620.

**PART 3 - EXECUTION**

3.01 MAINTENANCE AND CLEANING

A. Maintain approach walks free of mud, water, and snow.

C. Sanitary service as needed to maintain clean, odor-free environment.

3.02 REMOVAL

A. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

END OF SECTION

# SECTION 01620 - PRODUCT DELIVERY, STORAGE & PROTECTION

## PART 1 - GENERAL

### 1.01 APPLICABILITY

A. This Section applies to all products furnished under this Agreement. Shipments of equipment or materials to be used by the Contractor or its subcontractors shall be delivered to the site only during regular working hours. All shipping papers and shipments shall be addressed and consigned to the Contractor giving the name of the Project with address. Under no circumstances will Owner accept shipments directed to it or the Architect/Engineer unless otherwise specified.

### 1.02 DELIVERY

A. Products shall not be delivered to the Owner or the Architect/Engineer.

B Products shall not be delivered to the project site until related shop drawings have been reviewed by the Architect/Engineer.

C. Products shall not be delivered to the project site until appropriate storage facilities are in place (on-site storage space is very limited).

D. Products shall be delivered to the site in manufacturer's original, unopened, labeled containers.

E. The Contractor shall not drop, roll or skid products off delivery vehicles. Hand carry or use suitable materials-handling equipment.

### 1.03 STORAGE AND PROTECTION

A. General:

1. The Contractor shall store and protect products in accordance with the manufacturer's recommendations and the requirements specified herein. No on-site existing storage facilities are available for use by the Contractor. All on-site facilities for storage shall be furnished by the Contractor.

2. The Contractor shall not block or restrict the use of public right-of way, access roads or private property with stored materials.

3. The Contractor shall not store products where they will interfere with operations of the Owner.

4. The Contractor shall protect all products from damage or deterioration by weather.

5 . The Contractor shall not store any products directly on the ground.

6. The Contractor shall not store any products in drainage ditches or areas where water may stand.

7. The Contractor shall label containers to identify materials inside using the terminology found in these Specifications.

B. Uncovered Storage:

1. The following types of materials may be stored out of doors without cover:

   a. Masonry units
   b. Reinforcing steel
   c. Piping
   d. Precast concrete items
   e. Castings

2. The above mentioned materials shall be stored on wood blocking.

C. Fully Protected Storage:

1. The Contractor shall store all products not named above in buildings or trailers which have a concrete or wooden floor, a roof; and fully enclosed walls on all sides.

2. The Contractor shall provide heated storage space for materials which would be damaged by freezing.

3. The Contractor shall protect mechanical and electrical equipment from being contaminated by dust and dirt.

4. The Contractor shall maintain temperature and humidity at levels recommended by manufacturer(s) for electrical and electronic equipment.

END OF SECTION

# SECTION 01650 - STARTING OF SYSTEMS

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Starting systems.

B. Demonstration and instructions.

C. Testing, adjusting, and balancing.

### 1.02 RELATED SECTIONS

A. Section 01400 - Quality Control: Manufacturers field reports.

B. Section 01700 - Contract Closeout: System operation and maintenance data and extra materials.

### 1.03 STARTING SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Owner seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable manufacturer's representative or Contractors' personnel in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

### 1.04 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of Products to Owner's personnel prior to date of Substantial Completion.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

1. Warranty period to begin at start-up of season.

C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.

D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time at designated location.

E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

F. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

## PART 2 - PRODUCTS

Not Used.

## PART 3 - EXECUTION

Not Used.

END OF SECTION

## SECTION 01700 - PROJECT CLOSEOUT REQUIREMENTS OF CONTRACTOR

### PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Adjusting.

D. Project record documents.

E. Operation and maintenance data.

F. Spare parts and maintenance products.

G. Warranties and bonds.

1.02 RELATED SECTIONS

A. Section 01650 - Starting of Systems: System start-up, testing, adjusting, and balancing.

1.03 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's review.

B. Provide submittals to Architect/Engineer that are required by governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

D. Deliver all close-out documents to the Architect within forty-five (45) days of the date of Substantial Completion. Indemnify the Architect for failure to perform this requirement including legal fees incurred by the Architect in enforcing this requirement. Failure to deliver all required close-out documents to the Architect within forty-five (45) days from sign-off of AIA Document G704, "Certificate of Substantial Completion," shall invoke costs of the Architect's services to be borne by the Contractor.

E. Submit Certificate of Substantial Completion: AIA Document G704, 1992 Edition.

F. Submit Contractor's Affidavit of Payment of Debts and Claims: AIA Document G706, 1994 Edition.

G. Submit Contractor's Affidavit of Release of Liens: AIA Document G706A, 1994 Edition.

H. Submit certification prior to submission of final application for payment attesting that certain products meet Factory Mutual (FM) approval.

1.04 FINAL CLEANING

A. Execute final cleaning prior to final project assessment. Use experienced workmen or professional cleaners for final cleaning.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

D. Replace filters of operating equipment.

E. Clean debris from roofs, gutters, downspouts, and drainage systems.

F. Clean site; sweep paved areas, rake clean landscaped surfaces.

G. Remove waste and surplus materials, rubbish, and construction facilities from the site weekly (or more often as required by accumulation). Remove waste materials, rubbish and debris from the site and legally dispose of at public or private dumping areas off-site at least once a week. Site to be approved by Owner.

H. Each subcontractor has the responsibility for protecting equipment and finishes at the job site from damages resulting from work under his control, for all cleaning required as a result of his failure to protect equipment and finishes, and for removal of protective covers.

I. Safety Standards: Maintain project in accordance with the OSHA safety standards, as stipulated under the Occupational Safety and Health Act of 1970 and printed May 29, 1971 in the Federal Register.

J. Fire Protection: Store volatile waste in covered metal containers and remove from premises daily.

K. Pollution Control: Conduct cleanup and disposal operations to comply with local ordinances and anti-pollution laws.

   1. Disposal of volatile fluid wastes (such as mineral spirits, oil, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.

L. Vacuum clean interior building areas when ready to receive finish painting and continue vacuum cleaning on an as-needed basis until building is ready for acceptance or occupancy.

M. Repair, patch and touch-up marred surfaces to match adjacent finishes. Coordinate with requirements specified under the various sections of these specifications.

N. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly-painted surfaces.

1.05 ADJUSTING

A. Adjust operating Products and equipment to ensure smooth and unhindered oper-ation.

## 1.06 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents in clean, dry, legible condition; record actual revisions to the Work:
   1. Drawings
   2. Specifications
   3. Addenda
   4. Change Orders and other modifications to the Contract.
   5. Reviewed Shop Drawings, Product Data, and Samples.
   6. Manufacturer's instruction for assembly, installation, adjusting, maintenance and operation.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress. Label each document "Project Record."

E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawings: Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish first floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   4. Field changes of dimension and detail.
   5. Details not on original Contract drawings.
   6. Review applied changes to C.A.D. drawings.

G. Submit documents to Architect/Engineer prior to claim for final Application for Payment.
   1. The Contractor shall submit to the Architect one set of "Record" drawings which accurately reflect the actual installation of any and all materials, piping, conduit, etc., which were not installed exactly in accordance with the contract drawings.
   2. Contractor shall submit to the Architect two (2) (corrected) final record copies of shop drawings marked "for job use" which reflect all changes required in previous submittals including these marked "Approved as Noted," or similarly revised by the Engineer.

## 1.07 OPERATION AND MAINTENANCE DATA

A. Submit data bound in 8½ x 11 inch (A4) text pages, three D side ring binders with durable plastic covers.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS."

C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, typed on white paper, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/ Engineer, Contractor, Subcontractors, and major equipment suppliers.

   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.
      b. Air and water balance reports.
      c. Certificates.
      d. Originals of warranties.

E. Submit 1 draft copy of completed volumes 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect/Engineer comments. Revise content of all document sets as required prior to final submission.

F. Submit three (3) sets of revised final volumes to Architect/Engineer within thirty (30) days of Architect/Engineer review.

1.08 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra Products in quantities specified in individual specification sections.

B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

1.09 WARRANTIES AND BONDS

A. Provide notarized copies.

B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.

C. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.

D. Submit one (1) original and two (2) copies prior to final Application for Payment. All such documents shall indicate the name and location of the project and the name of the purchaser.

E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

**PART 2 - PRODUCTS**

Not Used.

**PART 3 - EXECUTION**

Not Used.

END OF SECTION

# DIVISION II - SITE WORK

# SECTION 02100 - EROSION CONTROL

## PART 1. GENERAL

### 1.1 Work Included

Submit KPDES Notice of Intent (NOI) and all follow-up information. Take responsibility for locating, furnishing, installing, and maintaining temporary sediment and erosion control best management practices for earth disturbing activity areas and developing a Best Management Practices (BMP) Plan using good engineering practices as required by the Kentucky Pollutant Discharge Eliminating System (KPDES) Permit. Make and record inspections of BMPs and areas as required by the KPDES Permit. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal, State or Local agencies, adhere to the more restrictive laws, rules, or regulations.

### 1.2 Related Work

A. Section 02110 - Site Clearing
B. Section 02200 - Earth and Rock Work
C. Section 02936 - Seeding

## PART 2. PRODUCTS

Not used

## PART 3. EXECUTION

As the permittee, submit the KPDES Notice of Intent (NOI) form to the Division of Water. Additionally, delegate in writing to Manager, KPDES Branch, who will have signature authority for reports. Provide the Engineer a copy of the NOI and a BMP Plan to represent and warrant compliance with the Kentucky Division of Water (KDOW) KPDES Permit, related rules, and specifications prior to starting work.

Locate, furnish, install, and maintain temporary sediment and erosion control best management practices (BMP) to represent and warrant compliance with the Clean Water Act, (33 USC Section 1251 et seq.), the 404 permit, the 401 Water Quality Certification, local government agency requirements, and other related rules and permits until the project has a formal release issued.

Provide the Engineer a copy of all weekly and rainfall event inspections as they are completed. Ensure all reports are signed by the delegated authority. keep a current BMP Plan and all inspection records available for public inspection as required by the KPDES Permit.

These provisions survive the completion and/or termination of the contract. The following provisions must be followed:

1. Take full responsibility and make all corrections when a governmental agency or a local governmental authority finds a violation of the above noted requirements; that the BMPs are incomplete; that the BMP Plan is incomplete; or that the implementation of the BMP Plan is not being performed correctly or completely.

2. Make payment to the Owner for the full amount, within 10 Calendar Days of notification, when a governmental agency or a local governmental authority furnishes an assessment, damage judgment or finding, fine, penalty, or expense for a violation of the above noted requirements; the BMPs being incomplete; or the BMP Plan being incomplete or its implementation not being performed correctly or completely. The Owner may withhold the amount of money requested for the above from the next pay estimate and deliver that sum to the governmental agency or local governmental authority issuing the assessment, damage judgment or finding, fine, penalty or expense.

3. Indemnify and hold harmless the Department, and reimburse the Department for any assessments, damage judgment or finding, fine, penalty, or expense as a result of the failure of performing this portion of the Contract. The Owner may withhold the amount of any assessments, damage judgments or finding, fine, penalty or expense from the next pay estimate.

4. The Owner will find the Contract in default if a governmental agency or a local governmental authority furnishes a stop work order for any of the following: a violation of the above noted requirements, that the BMPs are incomplete, that the BMP Plan is incomplete, that the implementation of the BMP Plan is not being performed correctly or completely.

5. When the Owner or any government regulatory agency finds a violation of the above noted requirements, or that the BMPs are incomplete, or that the "BMP Plan is incomplete or that the implementation of the BMP Plan is not being performed correctly or completely, correct and mitigate the conditions within 48 hours of notification by the Owner or regulatory agency. Failure to correct non-compliant site conditions will result in the Owner applying a penalty of $500 per day until corrective actions are completed.

Upon completion of the project, provide the Engineer with a copy of the submitted KPDES Notice of Termination (NOT) form. Retain all records for 3 years or provide them to the Engineer for retention.

End of Section

# SECTION 02110 - SITE CLEARING

## PART 1. GENERAL

### 1.1 Work Included

A. Furnish all labor and equipment required and perform all clearing, grubbing and stripping of topsoil complete as shown on the Drawings and as specified herein.

B. Protect existing improvements and vegetation indicated to remain.

### 1.2 Related Work

A. Section 02200 - Earth and Rock Work.

## PART 2. PRODUCTS

Not used.

## PART 3. EXECUTION

### 3.1 Protection

A. Protect existing improvements, bench marks, monuments and other reference points.

B. Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning of bark, piling construction materials or excavated materials within drip line, excess traffic or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to remain.

### 3.2 Site Clearing

A. Remove trees, shrubs, grass and other vegetation, improvements, or obstructions, interfering with installation of new construction. All stumps, roots, and root clusters shall be grubbed out to a depth of at least two feet below subgrade elevation.

B. Strip topsoil to whatever depths encountered in a manner to prevent mixing with subsoil or other material.

### 3.3 Removal

A. Remove waste materials and unsuitable topsoil from to location designated by the Engineer.

End of Section

# SECTION 02200 - EARTH AND ROCK WORK

## PART 1. GENERAL

### 1.1 Work Included

A. This section includes all labor, materials, equipment, and related items to complete all earth and rock work.

B. The extent of earth and rock work is shown on drawings. The following work is included:

1. Strip top soil and vegetation from the work area.
2. Perform earthwork to achieve the required grades.
3. Establish and maintain horizontal and vertical ground control throughout the work.
4. Locate and clearly mark all utilities on or adjacent to the site.

### 1.2 Related Work Specified Elsewhere

A. Section 02100 - Erosion Control
B. Section 02110 - Site Clearing
C. Section 02936 - Seeding

### 1.3 Excavation Classification

A. All mass, structural, and trench excavation shall be considered unclassified. No adjustments will be allowed to the contract price for rock encountered during mass or structural excavation.

### 1.4 Quality Assurance

A. Codes and Standards: Perform earth and rock work in compliance with applicable requirements of governing authorities having jurisdiction. Applicable references include the following:

- ASTM D422 Particle Size Analysis of Soils.
- ASTM D423 Test for Liquid Limit of Soils.
- ASTM D424 Test for Plastic Limit and Plasticity Index of Soils.
- ASTM D698 Laboratory Compaction Characteristics of Soil Using Standard Effort
- ASTM D3017 Moisture content of Soil Aggregates in Place by Nuclear Methods (Shallow Depth).

B. Testing and Inspection Service: A testing laboratory will be employed to perform soil testing and inspection services for quality control testing during earth and rock work operations. Testing laboratory employed is to observe, test and report to the Engineer that the compaction requirements specified herein have been obtained.

1.5 Submittals

A. Test Reports-Excavating: Coordinate and schedule in a timely manner the following quality related items. The following reports shall be submitted directly to the Engineer from the testing services, with copy to the Contractor:

- Test reports on borrow material.
- Field density test reports of sufficient number to verify compaction of structural fill.
- One optimum moisture-density curve for each type of soil encountered. Determine particle size, liquid limit, plastic limit, plasticity index and maximum density of each type of soil.
- Observe proof-rolling.

1.6 Job Conditions

A. Site Information. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that the Owner will not be responsible for interpretations or conclusions drawn by the Contractor. The data is made available for the convenience of the Contractor and is not guaranteed to represent all condition that may be encountered. No claim for extra compensation, or for extension of time, will be allowed on account of subsurface conditions inconsistent with the data shown. Additional test borings and other site examination and exploratory operations may be made by Contractor at no cost to Owner. Notify Owner prior to making any subsurface exploration.

B. Groundwater. Groundwater may be encountered during the excavation. Control the ground water to a level at least three feet below the top of the subgrade.

C. Explosives. Blasting shall only be conducted by licensed blasters and shall be in accordance with state and local requirements, and after conducting a thorough pre-blast survey.

D. Protection of Persons and Property. Barricade open excavations occurring as part of this work and post with warning lights.

E. Bench Marks and Monuments. Maintain carefully all bench marks, monuments and other reference points. If disturbed or destroyed, replace as directed at no cost to the owner.

F. Notify the Engineer 48 hours prior to the beginning of any excavation work.

PART 2. PRODUCTS

2.1 Materials

A. Satisfactory soil. Satisfactory soils are materials complying with Unified Soil Classification System (USCS), ASTM D 2487-93, soil classification group SP, SM, SC, ML, MH and CL.

PART 3. EXECUTION

3.1 Excavation

A. Excavation consists of removal and disposal of material encountered when establishing required finish grade elevations. For the purpose of this contract, mass, structural and trench excavation of all materials shall be considered unclassified. Adjustments for rock or similar materials will not be considered.

B. Unauthorized excavation. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer.

- Unauthorized excavation, as well as remedial work directed by Engineer, shall be at Contractor's expense.
- Backfill and compact unauthorized excavations, as specified for authorized excavations of same classification, unless otherwise directed by Engineer.

C. Additional Excavation. When excavation has reached required subgrade elevations, notify Engineer who will make an inspection of conditions.

- If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by Engineer.
- Removal of unsuitable bearing material and its replacement as directed will be paid on basis of contract conditions relative to changes in work.

D. Stability of Excavations. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restriction or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

E. Shoring and Bracing. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross-braces, in good serviceable condition.

- Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.
- Maintain shoring and bracing in excavations, regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

F. Dewatering. Prevent surface water and subsurface or ground water from flowing into excavations and flooding project site and surrounding area.

- Do not allow water to accumulate in excavations. Remove water to prevent softening of excavation bottoms and soil changes detrimental to stability of subgrades. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- Convey water removed from excavations and rain water to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches. Site grading should be maintained during construction so that positive drainage of the site is promoted at all times.

G. Material Storage. Stockpile satisfactory excavated materials, where directed by Engineer, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.

- Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.
- Dispose of excess soil material and waste materials as herein specified.

H. Cold Weather Protection. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F (1 degree C).

I. Proofrolling. After excavation and before any fill placement, entire subgrade shall be proof-rolled with a loaded pneumatic tired vehicle, such as a dual axle dump truck with a gross weight of 16 to 20 tons, or similar equipment. Remove any soft, organic, or highly plastic soil encountered during proof-rolling and replace it with properly compacted fill.

3.2 Compaction

A. General. Control soil compaction during construction, providing minimum percentage of density specified for each area classification.

B. Lift Thickness. Soil used for structural fill construction should be placed in layers no greater than 10 inches in loose placement for heavy equipment placement, or 5 inches for hand operated whacker or vibratory plate placement.

C. Percentage of Maximum Density Requirements. Compact soil as required by the Geotechnical Report to the required percentage of the maximum dry density.

D. Moisture Control. Maintain soil moisture to required range of optimum moisture content. Where soil must be moisture conditioned before compaction, uniformly apply water to prevent free water from appearing on surface during or subsequent to compaction operations. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density. Soil material that has been removed because it is too wet to permit compaction may be

stockpiled or spread and allowed to dry. Assist drying by disking, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.3 Backfill and Fill

A. General. Place acceptable soil material in layers to required subgrade elevations.

B. Backfill excavations as promptly as work permits, but not until acceptance of construction below finish grade and removal of trash and debris.

C. Ground Surface Preparation. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

D. Placement and Compaction. Place backfill and fill materials in layers to provide lift thickness.

3.4 Grading

Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

3.5 Field Quality Control

A. Quality Control Testing During Construction. Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed. It shall be the Contractor's responsibility to notify the testing agency at least 24 hours prior to beginning any work which requires testing.

B. If in opinion of Engineer, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense to the Owner.

3.6 Maintenance

A. Protection of Graded Areas. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and reestablish grades in settled, eroded and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas. Where completed compacted areas are disturbed by subsequent construction operations or weather, scarify surface, reshape and compact to required density prior to further construction.

C. Settling. Where settling is measurable or observable at excavated areas during general project warranty period, add backfill material, compact, and replace surface treatment. Restore appearance, quality and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

D. Desiccation. Where desiccation cracks are observable, remove and replace soil to restore appearance, quality and condition of surface.

3.7 Disposal of Excess and Waste Materials

Stockpile excess excavated material at a location near the site designated by the Engineer.

End of Section

# SECTION 02511 - HOT-MIXED ASPHALT PAVING

## PART 1. GENERAL

### 1.1 Work Included

A. This Section includes provisions for hot-mixed asphalt paving over prepared subbase.

B. Prepared subbase is specified in Section 02200 - Earth and Rock Work.

### 1.2 Submittals

A. Submit certificates that each material item meets or exceeds specified requirements.

### 1.3 Site Conditions

A. Weather Limitations: Apply prime and tack coats when ambient temperature is above 50 degrees F (10 deg. C) and when temperature has not been below 35 degrees F (1 deg. C) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.

B. Construct hot-mixed asphalt surface course when atmospheric temperature is above 40 degrees F (4 deg. C) and when base is dry. Base course may be placed when air temperature is above 30 degrees F (-1 deg. C) and rising.

C. Grade Control: Establish and maintain required lines and elevations.

### 1.4 Quality Assurance

A. Codes and Standards: Comply with State Department of Transportation standard specifications, latest edition, and with local governing regulations if more stringent than herein specified.

## PART 2. PRODUCTS

### 2.1 Materials

A. General: Use locally available materials and gradations that exhibit a satisfactory record of previous installations.

B. Coarse Aggregate: Sound, angular crushed stone, crushed gravel, complying with ASTM D 692-88.

C. Fine Aggregate: Sharp-edged natural sand or sand prepared from stone complying with ASTM D 1073.

D. Asphalt Cement: ASTM D 3381 for viscosity-graded material; ASTM D 946 for penetration-graded material.

E. Prime Coat: Cut-back asphalt type, ASTM D 2027; MC-30, MC-70 or MC-250.

F. Tack Coat: Emulsified asphalt, ASTM D 977.

G. Subgrade shall be in accordance with applicable provisions of "Kentucky Standard Specifications for Road & Bridge Construction".

H. Dense Graded Aggregate Base shall be in accordance with Section 303 of "Kentucky Standard Specifications for Road and Bridge Construction."

I. Lane Marking Paint: Chlorinated rubber-alkyd type, ready-mixed, complying with AASHTO M 248, (FS TT-P-115), Type III. Color shall be White.

J. Asphalt - Aggregate Mixture: Bituminous Concrete shall be Class 1 and shall be in accordance with "Kentucky Standard Specifications for Road and Bridge Construction".

PART 3. EXECUTION

3.1 Systems Defined

A. Refer to the Drawings for thickness of base and surfacing.

3.2 Surface Preparation

A. General: Remove loose material from compacted subbase surface immediately before applying herbicide treatment or prime coat.

B. Proof roll prepared subbase surface to check for unstable areas and areas requiring additional compaction.

C. Notify Engineer of unsatisfactory conditions. Do not begin paving work until deficient subbase areas have been corrected and are ready to receive paving.

D. Prime Coat: Apply at rate of 0.20 to 0.50 gallons per square yard, over compacted subgrade. Apply material to penetrate and seal, but not flood, surface. Cure and dry as long as necessary to attain penetration and evaporation of volatile.

E. Tack Coat: Apply to contact surfaces of previously constructed asphalt or Portland cement concrete and surfaces abutting or projecting into hot-mixed asphalt pavement. Distribute at rate of 0.05 to 0.15 gallons per square yard of surface.

F. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.

3.3 Placing Mix

A. General: Place hot-mixed asphalt mixture on prepared surface, spread, and strike off. Spread mixture at minimum temperature of 225 degrees F (107 deg. C). Place areas inaccessible to equipment by hand. Place each course to required grade, cross-section and compacted thickness.

B. Paver Placing: Place in strips not less than 10 feet wide, unless otherwise acceptable to Engineer. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.

C. Immediately correct surface irregularities in finish course behind paver. Remove excess material forming high spots with shovel or lute.

D. Joints: Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of hot-mixed asphalt course. Clean contact surfaces and apply tack coat. At joining of new paving with existing, cut out and trim existing paving to straight lines. Prime or seal existing edges prior to placement of new material so as to produce bonded, watertight joining.

3.4 Rolling

A. General: Begin rolling when mixture will bear roller weight without excessive displacement.
B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.

D. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been evenly compacted.

E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained 95 percent laboratory density.

F. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot, hot-mixed asphalt. Compact by rolling to specified surface density and smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.5 Traffic and Lane Markings

A. Cleaning: Sweep and clean surface to eliminate loose material and dust.

B. Striping: Use chlorinated-rubber base traffic lane-marking paint, factory-mixed, quick-drying, and non-bleeding. Color shall be White.

C. Do not apply traffic and lane marking paint until layout and placement have been verified with Engineer.

D. Apply paint with mechanical equipment to produce uniform, straight edges. Apply at manufacturer's recommended rates to provide minimum 12 to 15 mils. dry thickness.

3.6 Field Quality Control

A. General: Test in-place hot-mixed asphalt courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by Engineer.

B. Thickness: In-place compacted thickness tested in accordance with ASTM D 3549 will not be acceptable if in excess of the following variations:

1. Base Course: Plus or minus 1/2 inch.
2. Surface Course: Plus or minus 1/4 inch.

C. Surface Smoothness: Test finished surface of each hot-mixed asphalt course for smoothness, using 10-foot straightedge applied parallel with and at right angles to centerline of paved area. Surfaces will not be acceptable is in excess of the following tolerances for smoothness:

1. Base Course Surface: 1/4 inch.
2. Wearing Course Surface: 3/16 inch.
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

End of Section

# SECTION 02520 - PORTLAND CEMENT CONCRETE PAVING

## PART 1. GENERAL

### 1.1 Work Included

A. This section includes furnishing labor, materials, equipment and related items required to complete all Portland cement concrete paving as shown on drawings.

### 1.2 Related Work

A. Section 02200 - Earth and Rock Work
B. Section 03300 - Concrete

### 1.3 Quality Assurance

A. Codes and Standards: Comply with local governing regulations if more stringent than herein specified.

### 1.4 Submittals

A. Furnish samples, manufacturer's product data, test reports and materials certifications as required in referenced sections for concrete and joint fillers and sealers.

B. The Contractor shall prepare, in a place on the site approved by the Engineer, samples of each type concrete paving specified hereunder for evaluation and approval by the Engineer. Samples shall be not less than 36" x 36" x specified thickness, and prepared in sufficient numbers as required to establish final standards of quality and finish desired. Finally approved samples, properly identified, shall remain at the site until paving work is completed, and all work shall closely match the approved samples. At completion of the work, samples shall be removed from the site and disposed of by the Contractor.

## PART 2. PRODUCTS

### 2.1 Materials

A. Forms: Steel, wood or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.

1. Use flexible spring steel forms or laminated boards to form radius bends as required.

2. Coat forms with a non-staining form release agent that will not discolor or deface surface of concrete.

B. Concrete Materials: Comply with requirements of applicable Division 3 Sections for concrete materials, admixtures, bonding materials, curing materials and others as required.

C. Expansion joint material shall be 5/8" thick by the depth of the concrete section and shall be asphaltic, premolded, non-extruding type filler confirming to ASTM D1752.

D. Welded wire mesh shall be 6 x 6, W2.9 cold drawn steel wires arranged at right angles to each other and electrically welded together at all intersections and conforming to ASTM A185.

E. Steel wire used in securing reinforcement shall be cold drawn steel conforming to the requirements of ASTM A-82.

F. Joint sealer for installation at joints in concrete paving, etc., shall be a self-leveling one part urethane sealant conforming to ASTM D412-51T and ASTM D-746 and shall be "Sonolastic Paving Joint Sealant" as manufactured by Sonneborn Building Products, Inc., "Colma Joint Sealer" as manufactured by the Sika Chemical Company, or approved equal. Color shall be gray from manufacturer's standards.

G. Primers shall be as manufactured and recommended for each sealant used in the work.

H. Backer rod to be used in all joints shall be a soft, closed cell polyryhylene foam meeting requirements of AASHTO Specifications M153-54, Type I and III and shall be Ethafoam SB as manufactured by the Dow Corning Corporation, or approved equal as manufactured by the Sonneborn Building Products, Inc., Williams Products, Inc.

I. Liquid-Membrane Forming Curing Compound: Complying with ASTM C 309, Type I, Class A unless other type acceptable to Engineer. Moisture loss not more than 0.055 gr./sq. cm. when applied at 200 sq. ft./gal.

Products: Subject to compliance with requirements, provide one of the following:

"Sealkure"; Toch Div. - Carboline.
"Kure-N-Seal"; Sonneborn-Contech.
"Klearseal"; Setcon Industries.

2.2 Concrete Mix Design and Testing

1. Comply with requirements of applicable Division 3 Sections for concrete mix design, sampling and testing, and quality control, and as herein specified.

2. Test cylinder shall be made as specified in Division 3, except as a minimum 3 test cylinders shall be made for each day's pour.

3. Design mix to produce normal-weight concrete consisting of Portland cement, aggregate, water-reducing or high-range water-reducing admixture (super plasticizer), air-entraining admixture and water to produce the following properties:

Compressive Strength: 4000 psi, minimum at 28 days, unless otherwise indicated.

Slump Range: 8" for concrete containing HRWR admixture (super-plasticizer); 3" for other concrete.

Air Content: 4% to 5%.

PART 3. EXECUTION

3.1 Surface Preparation

A. Grading. Prepare subgrades to the required elevations and sections.

B. Preparation of Subgrade. Loosen exceptionally hard spots and recompact. Remove spongy and otherwise unsuitable material and replace with stable material. Fill and tamp traces of utility trenches.

C. Compaction of Subgrade. Compact the subgrade of all surface areas with appropriate compacting equipment or by other means to such degree as will insure against settlement of the superimposed work. All surfaces shall be proof-rolled with suitable equipment to verify stability of base.

D. Checking Subgrade. Maintain all subgrades in satisfactory condition, protected against traffic and properly drained until the surface improvements are placed. Immediately in advance of concreting, check subgrade levels with templates riding the forms, correct irregularities and compact thoroughly any added fill material. On areas to receive concrete pavement, place grade stakes spaced sufficiently to afford facility for checking subgrade levels. Correct irregularities prior to concreting.

E. Utility Structures. Check for correct elevation and position all manhole covers, drainage castings, valve boxes and similar items located within areas to be paved and make or have made any necessary adjustments.

3.2 Form Work

A. Formwork shall produce concrete that strictly conforms to the shapes, lines and dimensions as called for on the drawings. Procedures and control shall be in accordance with ACI 347 "Recommended Practice for Concrete Formwork" or as modified herein.

1. Formwork for concrete steps shall be to such tolerances that the finished steps shall conform with the Kentucky Building Code for Dimensional Uniformity. There shall be no variations exceeding 3/16" in the depth of adjacent treads or the height of adjacent risers. The tolerance between the largest and smallest riser or between the largest and smallest tread shall not exceed 3/8" in any flight of stairs.

2. Formwork for walks and curbs shall meet the following tolerances:

Top of forms not more than 1/8" in 10' deviation from proposed line.

Vertical face on longitudinal axis, not more than 1/8" in 10' deviation from proposed line.

B. Forms shall be clean, smooth, sufficiently watertight to prevent leakage of mortar; securely tied together and braced to maintain shape and position while being filled, and shored to support construction loads. Form ties shall be of an approved type.

C. All removable forms shall be treated with oil on inside faces or thoroughly drenched and saturated with water on both faces before concrete is placed therein.

D. The time for removal of forms shall be subject to the approval of the Engineer. Forms shall be removed in such a manner as to insure the complete safety of the structure.

3.3 Reinforcement

A. Locate, place and support reinforcement as specified in Division 3 Sections, unless otherwise indicated.

3.4 Concrete Placement

A. General: Comply with requirements of Division 3 Sections for mixing and placing concrete and as herein specified.

B. Install No. 57 crushed stone subbase where shown on the details. Do not place concrete until subbase and forms have been checked for line and grade. Moisten subbase if required to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

C. Place concrete using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.

1. Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hour, place a construction joint.

2. Do not operate equipment on concrete until pavement has attained sufficient strength to carry loads without injury.

D. All exposed concrete curbs surfaces shall be rubbed to a smooth even finish with carborundum stone, removing all form marks, imperfections and any unevenness which may appear on the surfaces of the concrete. Saw cut curbs per details within 24 hours of removing forms.

1. Automatic extruding machines may be used for curb and gutter placement at Contractor's option. If machine placement is to be used, submit revised mix design and laboratory test results which meet or exceed minimums specified. Machine placement must produce curbs and gutters to required cross section, lines, grades, finish and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified.

3.5 Joints

A. General: Construct expansion, weakened-plane (contraction) and construction joints true-to-line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.

1. When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction joints: All construction joints in 6" thick concrete pavements shall be keyed.

1. Keyed joints shall have longitudinal keyway formed at slab edge by means of bevel cut treated wood form, or by other means approved by the Engineer.

C. Contraction Joints: Contraction joints shall be tooled or sawed as noted on the Drawings, provided where shown and as detailed on the Drawings or otherwise as directed by the Engineer.

1. Tooled joints shall be made in the plastic concrete during the finishing operation by means of a sidewalk tool. Round all edges of such joints to a uniform 1/4" radius. Depth of tooled joints shall be a minimum depth of 1" or shall be one-fourth (1/4) the thickness of the slab. See Drawings for more restrictive requirements.

2. Sawed joints shall be constructed by sawing a groove in the hardened concrete with a power-driven saw to the full depth, or depths indicated. The time of sawing shall be varied depending on existing and anticipated weather conditions and shall commence as soon as the concrete has

hardened sufficiently to permit cutting the concrete without chipping, spalling or tearing. Immediately after each joint is sawed, the saw cut and adjacent concrete surface shall be thoroughly flushed with water until all waste from the sawing is removed from the joint.

D. Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for a period of more than 1/2 hour, except where such placements terminate at expansion joints. Construction joints must occur only at location of proposed contraction joints as shown on the drawings.

1. Construct joints as shown or, if not shown, use standard metal keyway-section forms.

E. Expansion Joints: Provide premolded joint filler for expansion joints, manholes, structures, walks and other fixed objects, unless otherwise indicated.

1. Locate expansion joints at 40 inches on center for each pavement lane, unless otherwise indicated.

2. Extend joint fillers full-width and depth of slab and not less than 1/2" or more than 1" below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.

3. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together.

4. Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.

5. Fillers and Sealants: Comply with the requirements of applicable Division 7 Sections for preparation of joints, materials, installation and performance except as noted herein.

3.6 Concrete Finishing

A. In general, tamp and screed concrete true to grade and section, bringing sufficient mortar to the surface for finishing. Paving finishes shall be as specified for respective paving types specified hereinbefore, and shall match closely the approved samples.

B. After striking-off and consolidating concrete, smooth surface by screening and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

C. After floating, test surface for trueness with a 10' straightedge. Distribute concrete as required to remove surface irregularities and refloat repaired areas to provide a continuous smooth finish.

D. Work edges of slabs, gutters, back top edge of curb and formed joints with an edging tool and round to 1/2" radius unless otherwise indicated. Eliminate tool marks on concrete surface.

E. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finish as follows:

1. Float finishes shall be made by means of a wood hand float of type approved by the Engineer, applied circularly so as to provide a uniform medium textured surface.

2. Broom finishes shall be made by means of stiffer fiber brooms of types approved by the Engineer, applied lineally with uniform pressures as necessary to produce uniformly striated surface of required coarseness.

3. Exposed aggregate finishes may be made by one of the following methods: The Contractor shall not change methods once the work is started.

(a) Sandblasted exposed aggregate finishes shall be made by means of wet sandblasting surfaces of paving to lightly erode concrete matrix to expose coarse aggregate slightly. A deep exposure of aggregate is not desired or acceptable.

(b) Washed exposed aggregate surfaces shall be an integral finish produced by exposing the aggregate in the concrete mix. Produce finish on "green" concrete as soon as practicable. Wet the concrete surface thoroughly and scrub with stiffer fiber or wire brushes, using water freely, until the top concrete mortar surface is removed and the aggregate uniformly exposed. Rinse scrubbed surface with clean water. Remove only enough concrete mortar from the surface to match the sample approved by the Engineer. When concrete has become too hard to produce the required finish with normal scrubbing procedures, use a diluted muriatic acid while scrubbing or sandblast areas of insufficient exposure to match sample. Protect adjacent surfaces and finishes from damage.

(c) The Contractor shall exercise extreme caution to ensure all exposed aggregate concrete matches the approved sample. Retarders will not be permitted since only a very light exposure shall be required.

F. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects as directed by the Engineer.

3.7 Curing

A. Exposed surfaces of concrete shall be cured with an approved membrane curing compound meeting ASTM C309. Curing compound shall be applied by roller for uniform coverage and not

exceeding 450 square feet coverage per gallon of material, and otherwise, in strict accordance to manufacturer's instructions.

3.8 Repairs and Protections

A. Repair or replace broken or defective concrete as directed by Engineer.

B. Drill test cores where directed by Engineer when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

1. Sweep concrete pavement and wash free of stains, discolorations, dirt and other foreign material just prior to final inspection.

End of Section

SECTION 02610 - POTABLE WATER LINES

I. GENERAL

A. Work Included - The Contractor shall furnish all labor, material, and equipment necessary to install water main piping together with all appurtenances as shown and detailed on the Drawings and specified herein.

B. Products

1. Pipe and Fittings

a. Polyvinyl Chloride (PVC) Pipe, Fittings and Joints:

(1) PVC pipe and fittings shall conform to the requirements of ASTM Standard Specifications Designation D-2241. Unless otherwise specified, pipe shall be not less than pressure Class 160.

(2) Joints shall be of the push-on type conforming to ASTM D 3139 and F477 requirements for elastometric-gasket joints. All jointing material and lubricants shall be non-toxic.

(3) Unless specifically approved by the Engineer, pipe shall be furnished in lengths of not more than 20 feet.

(4) PVC pipe shall be clearly marked at intervals of 5 feet or less with the manufacturer's name or trademark, nominal pipe size, PVC cell classification, and the designation ASTM D 2241.

(5) Directions for handling and installing the pipe shall be furnished to the Contractor by the manufacturer at the time of delivery of pipe to the job. PVC pipe installation shall conform to the latest ASTM standards.

b. Ductile Iron Pipe (D.I.P.) and Fittings

(1) Ductile iron pipe (D.I.P.) shall conform to ANSI/AWWA C150/A21.50, ANSI/AWWA C151/A21.51 Standard. The pipe, fittings and joints should be capable of accommodating pressure up to 250 psi. The ductile iron pipe shall be as manufactured by Clow Corporation, U.S. Pipe & Foundery Co. or approved equal.

(2) Push-on type joints shall be single rubber gasket, with cast gasket socket and recessed bell with a tapered annular opening and flared socket and shall conform to ANSI/AWWA C111/A21.11. Plain spigot ends shall be suitably beveled to permit easy entry into the bell, centering and compressing the gasket.

(3) Ductile iron flanged joint pipe shall conform to ANSI/AWWA C115/A21.15 Standard and have a thickness class of 53. The pipe shall have a rated working pressure of 250 psi with Class 125 flanges. Gaskets shall be ring gaskets with a thickness of 1/8-inch. Flange bolts shall conform to ANSI B 16.1.

(4) Flanged fittings shall meet all requirements of ANSI/AWWA C110/A21.10 and have Class 125 flanges. Fittings shall accommodate a working pressure up to 250 psi and be supplied with all accessories.

(5) Ductile iron mechanical joint fittings shall have a body thickness and radii of curvature conforming to ANSI A21.10 and have joints in accordance with ANSI/AWWA C111/A21.11. Fittings and joints shall be supplied with all accessories.

(6) All pipe and fittings shall be tar coated outside and shall receive a standard cement lining with bituminous seal coat on the inside in accordance with ASA Specification A21.40 (AWWA-C104).

(7) Cement mortar lining and seal coating for pipe and fittings, where applicable, shall be in accordance with ANSI/AWWA C104/A21.4. Bituminous outside coating shall be in accordance with ANSI/AWWA C151/A21.51 for pipe and ANSI/AWWA C110/A21.10 for fittings.

(8) All ductile fittings shall be rated at 250 psi water working pressure plus water hammer. Ductile iron fittings shall be ductile cast-iron grade 80-60-03 per ASTM Specification A339-55.

(9) All valves, fittings, and hydrants or other appurtenances shall be bolted with all thread bolts when connected in series.

(10) No separate pay item has been established for fittings and no determination of the number of fittings required on the job has been made. The Contractor, during the bidding phase, shall determine the number of fittings required on the job and include the cost of the fittings and installation in the lump sum price for pipe.

c. Gate Valves and Boxes:

(1) All gate valves shall be of the resilient double disc, parallel seat type, iron body, non-rising stem, fully bronze mounted with O-ring seals. Valves shall be of standard manufacture and of the highest quality both as to materials and workmanship and shall conform to the latest revisions of AWWA Specification C-500. Valves shall have a rated working pressure of 200 psi.

(2) Gate valves for buried service shall be furnished with mechanical joint and connections, unless otherwise shown on the plans or specified herein. The end connections shall be suitable to receive PVC Pipe, unless ductile iron is specified.

(3) All gate valves shall have the name or monogram of the manufacturer, the year the valve casting was made, the size of the valve, and the working pressure cast on the body of the valve.

(4) Buried service gate valves shall be provided with a 2" square operating nut and shall be open by turning to the left (counter-clockwise).

(5) Gate valves shall be installed in a vertical position with valve box as detailed on the plans. They shall be set vertically and properly adjusted so that the cover will be in the same plane as the finished surface of the ground or street. There shall be a 24" square, 4" thick concrete pad around all valve box tops.

(6) Valves shall be those manufactured by Mueller, M&H Valve Company, American, or approved equal.

d. Tapping Valves and Sleeves:

(1) Tapping valves and sleeves shall be installed in the locations shown on the Contract Drawings. The valves shall be a gate valve with a mechanical joint outlet and a flanged joint connection to the sleeves. They shall be provided with a valve box, counterclockwise opening and installed as described in detail on the plans.

(2) The sleeves shall be of the mechanical joint type and have a 200 psi working pressure when cast iron or ductile iron. The mechanical joint gaskets shall be sized to match the existing tapped pipe outside diameter. A flanged outlet shall connect to the tapping valve and a thrust block poured as detailed in the Contract Drawings. On Asbestos Cement or PVC pipe applications, stainless steel sleeves shall be used, Rockwell #662 or equal.

e. Fire Hydrants:

(1) Fire hydrants shall be approved AWWA compression model with 5 1/4" hydrant valve, two (2) 2 1/2" hose outlets, one (1) 4 1/2" pumper nozzle, national standard threads, national standard pentagon operating nut opening left. Fire hydrant shall be equipped with safety flanges designed to prevent barrel breakage when struck by a vehicle, flanged inlets and auxiliary gate valves. All hydrants shall be 3 1/2 foot bury type unless specifically designated otherwise in drawings. Fire hydrants connected to

mains 4" and larger shall have 6" inlet shoes. Fire hydrants shall be as manufactured by Mueller Company, M&H Valve Co., Waterous, Kennedy or approved equal.

(2) Inlet cover depth shall be 42" and the minimum dimension from ground to centerline of lowest opening shall be 18". Fire hydrants shall be supported on a poured in place concrete thrust block and provided with a drainage pit as indicated on Standard Detail Sheet.

(3) All fire hydrants shall receive two (2) field coats of approved OSHA red enamel.

II. PIPE LAYING

A. Laying Depths. In general, water mains shall be laid with a minimum cover of 30 inches above the top of the pipe, except as otherwise indicated on the Drawings.

B. All pipe shall be laid with ends abutting and true to the lines and grades indicated on the plans. The pipe shall be laid straight between changes in alignment and at uniform grade between changes in grade. Pipe shall be fitted and matched so that when laid in the trench, it will provide a smooth and uniform invert. Supporting of pipe shall be as set out in Part J#XII . "Trench Bedding and Backfilling" and in no case shall the supporting of pipe on blocks be permitted.

C. Before each piece of pipe is lowered into the trench, it shall be thoroughly swabbed out to insure its being clean. Any piece of pipe or fitting which is known to be defective shall not be laid or placed in the lines. If any defective pipe or fitting shall be discovered after the pipe is laid, it shall be removed and replaced with a satisfactory pipe or fitting without additional charge. In case a length of pipe is cut to fit in a line, it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe and beveled to match the factory bevel for insertion into gasketed joints. Bevel can be made with hand or power tools.

D. The interior of the pipe, as the work progresses, shall be cleaned of dirt, jointing materials, and superfluous materials of every description. When laying of pipe is stopped for any reason, the exposed end of such pipe shall be capped so as to exclude earth or other material.

E. Anchorage of Bends:

1. At all tees, plugs, caps and bends of 11-1/4 degrees and over, and at reducers or in fittings where changes in pipe diameter occur, movement shall be prevented by using suitable harness, thrust blocks or ballast. Thrust blocks shall be as shown on the Drawings. Care shall be taken to leave weep holes unobstructed and allow for future tightening of all nearby joints. Unless otherwise directed by the Engineer, thrust blocks shall be placed so that pipe and fitting joints will be accessible for repair.

2. Bridles, harness or pipe ballasting shall meet with the approval of the Engineer. Steel rods and clamps shall be galvanized or otherwise rust-proofed or painted.

3. No extra pay shall be allowed for work on proper anchorage of pipe, fittings or other appurtenances; such items shall be included in the unit price or lump sum bid for the supported item.

F. No backfilling (except for securing pipe in place) over pipe will be allowed until the Engineer has the opportunity to make an inspection of the joints, alignment and grade in the section laid, but such inspection shall not relieve the Contractor of further liability in case of defective joints, misalignment caused by backfilling and other such deficiencies that are noted later.

## III. JOINTING

A. All joint surfaces shall be cleaned immediately before jointing the pipe. The bell or groove shall be lubricated in accordance with the manufacturer's recommendation. Each pipe unit shall then be carefully pushed into place without damage to pipe or gasket. All pipe shall be provided with home marks to insure proper gasket seating. Details of gasket installation and joint assembly shall follow the direction of the manufacturer's of the joint material and of the pipe. The resulting joints shall be watertight and flexible.

## IV. EXISTING UTILITIES AND OTHER OBSTRUCTIONS

A. Prior to the commencement of construction on the project, the Contractor shall contact the utility companies whose lines, above and below ground, may be affected during construction and verify the locations of the utilities as shown on the Contract Drawings. The Contractor shall ascertain from said companies if he will be allowed to displace or alter, by necessity, those lines encountered or replace those lines disturbed by accident during construction, or if the companies themselves are only permitted by policy to perform such work. If the Contractor is permitted to perform such work, he shall leave the lines in as good condition as were originally encountered and complete the work as quickly as possible. All such lines or underground structures damaged or molested in the construction shall be replaced at the Contractor's expense, unless, in the opinion of the Engineer, such damage was caused through no fault of the Contractor.

## V. CREEK AND UTILITY CROSSING CONCRETE ENCASEMENT

A. At locations shown on the Contract Drawings, required by the Specifications, or as directed by the Engineer, concrete and/or pipe encasement shall be used.

B. Concrete shall be Class B (3000 psi) and shall be mixed sufficiently wet to permit it to flow between the pipes to form a continuous bridge. In tamping the concrete, care shall be taken not to disturb the grade or line of either pipe or damage the joints.

C. Concrete and labor used are not separate pay items and will be considered incidental to water main installation.

## VI. BITUMINOUS PAVEMENT REPLACEMENT

A. Sections of pavement shall be replaced as required to install the pipelines under the work of this Section. Disturbed pavement shall be reconstructed to original lines and grades with bituminous binder as detailed on the Drawings and in such manner as to leave all such surfaces in fully as good or better condition than that which existed prior to these operations.

B. Prior to trenching, the pavement shall be scored or cut to straight edges along each side of the proposed trench to avoid unnecessary damage to the remainder of the paving. Edges of the existing pavement shall be recut and trimmed as necessary to square, straight edges after the pipe has been installed and prior to placement of the binder course.

C. Backfilling of trenches shall be in accordance with the applicable portions of #J-XII.

D. Bituminous concrete pavement shall be in accordance with applicable provisions of the Kentucky Department of Highways Standard Specifications, Section 402.

1. Placement and compaction of bituminous course shall be in accordance with Section 402 of the Kentucky Department of Highways Standard Specifications. Minimum thickness after compaction shall be as shown on the Drawings.

E. Bituminous pavement replacement is not a separate pay item and will be paid for in the base bid.

## VII. TESTING OF WATER MAINS

A. The completed work shall comply with the provisions listed herein, or similar requirements which will insure equal or better results. Suitable test plugs, water pump or other equipment and apparatus, and all labor required to properly conduct the tests shall be furnished by the Contractor at no additional expense to the Owner.

B. Water main piping shall be pressure tested to 250 percent of the normal system operating pressure or to 150 percent of the rated working pressure of the pipe, whichever is less. At no time shall the test pressure exceed 150 percent of the pipe's working pressure. A pipe section shall be accepted if the test pressure does not fall more than 5 psi during the minimum 2-hour test period. The pipe shall be tested for allowable leakage according to AWWA C-600 (latest revision) concurrently with the pressure test.

C. Where practicable, pipelines shall be tested between line valves or plugs in lengths of not more than 6000 feet. Testing shall proceed from the source of water toward the termination of the line. The line shall be tested upon the completion of the first 6000 feet. After the completion of the two consecutive tests without failure, the Contractor, at his option and with the Engineer's approval, may discontinue testing until the system is complete.

D. All pipe, fittings and other materials found to be defective under test shall be removed and replaced at the Contractor's expense.

E. Before applying the specified test pressure, air shall be expelled completely from the pipe, valves and hydrants. If permanent air vents are not located at high points within the test section, the Contractor shall install corporation cocks at such points so that the air can be expelled as the line is filled with water.

F. Should the sections under test fail to meet the requirements, the Contractor shall do all work of locating and repairing the leaks and retesting as the Engineer may require without additional compensation. All visible leaks are to be repaired regardless of the amount of leakage.

## VIII. DISINFECTION OF WATER MAINS

A. All water mains shall be disinfected by the use of chlorine or chlorine compound in such amounts as to produce a concentration of at least 50 ppm and a residual of at least 25 ppm at the end of the twenty-four (24) hours. Lines shall be thoroughly flushed upon meeting the chlorine residual requirements. Before the lines are placed in service, samples of the water must be taken by the Contractor and submitted to the State Department of Health for testing. No lines shall be placed in service until the samples have been approved by the Health Department. The Contractor shall bear all the cost of the sampling, testing and postage. The cost of the disinfection and sampling shall be included in the price of the pipe.

B. Copies of the results of the testing shall be submitted to the Owner and/or Engineer.

## IX. SITE CLEARING

### A. General - Work Included

1. Clear site within construction limits of plant life and grass.
2. Remove root system of trees and shrubs.
3. Remove surface debris.

### B. Regulatory Requirements

Conform to applicable local codes and ordinances for disposal of debris.

### C. Execution

1. Existing Trees and Other Vegetation

   a. The Contractor shall not cut or injure any trees or other vegetation outside right-of-way or easement lines and outside areas to be cleared, as indicated on the Drawings, without written permission from the Engineer. The Contractor shall be responsible for all damage done outside these lines.

   b. The Engineer shall designate which trees are to be removed within permanent and temporary easement lines or right-of-way lines. Generally, all trees within the permanent easement are to be taken down; those in the temporary easement shall remain.

2. Clearing

   a. From areas to be cleared, the Contractor shall cut or otherwise remove all trees, brush, and other vegetable matter such as snags, bark and refuse. The ground shall be cleared to the width of the permanent easement or right-of-way unless otherwise directed by the Engineer.

   b. Except where clearing is done by uprooting with machinery, trees, stumps, and stubs to be cleared shall be cut as close to the ground surface as practicable, but no more than 6" above the ground surface for small trees and 12" for larger trees.

c. Elm bark shall be either buried at least 1 foot deep or burned in suitable incinerators off site with satisfactory antipollution controls and fire prevention controls, to prevent the spread of Dutch Elm disease and as required by applicable laws.

3. Grubbing

From areas to be grubbed, the Contractor shall remove completely all stumps, remove to a depth of 12" all roots larger than 3" in diameter, and remove to a depth of 6" all roots larger than 1/2" in diameter. Such depths shall be measured from the existing ground surface or the proposed finished grade, whichever is lower.

4. Stripping of Topsoil

Prior to starting general excavation, strip topsoil to a depth of 6-inches or to depths required by the Engineer. Do not strip topsoil in a muddy condition and avoid admixture of subsoil. Stockpile the stripped topsoil within easement or right-of-way lines for use in finish grading and site restoration. Topsoil stockpiled, shall be free from trash, brush, stones over 2-inches in diameter and other extraneous material.

5. Protection

a. Protect plant growth and features remaining as final landscaping.

b. Protect bench marks and existing work from damage or displacement.

c. Maintain designated site access for vehicle and pedestrian traffic.

6. Removal

a. All material resulting from clearing and grubbing and not scheduled for reuse shall become the property of the Contractor and shall be suitably disposed of off-site, unless otherwise directed by the Engineer, in accordance with all applicable laws, ordinances, rules and regulations.

b. Such disposal shall be performed as soon as possible after removal of the material and shall not be left until the final period of cleaning up.

7. Erosion Control

a. The Contractor shall do all work and take all measures necessary to control soil erosion resulting from construction operations, shall prevent the flow of sediment from the construction site, and shall contain construction materials (including excavation and backfill) within his protected working area so as to prevent damage to the adjacent property.

b. The Contractor shall not employ any construction method that violates a rule, regulation, guideline or procedure established by Federal, State or local agencies having jurisdiction over the environmental effects of construction.

c. Pollutants such as chemicals, fuels, lubricants, bitumen, raw sewage and other harmful waste shall not be discharged into or alongside of any body of water or into natural or man-made channels leading thereto.

## X. EXCAVATION

### A. General Work Included

The Contractor shall make excavations in such manner and to such widths and depths as will give suitable room for building structures and laying pipe to the lines, grades and elevations shown on the Drawings. Materials, equipment, labor, etc. required herein are to be considered as part of the requirements and costs for installing the various improvements they are incidental to.

### B. Execution

1. Excavation For Trenches

a. Unless otherwise directed by the Engineer, trenches are to be excavated in open cuts.

(1) Where pipe is to be laid in gravel bedding or concrete cradle, the trench may be excavated by machinery to, or just below, the designated subgrade, provided that the material remaining at the bottom of the trench is no more than slightly disturbed.

b. Trenches shall be of sufficient width to provide free working space on each side of the pipe and to permit proper backfilling around the pipe, but unless

specifically authorized by the Engineer, trenches shall in no case be excavated or permitted to become wider than 2'-6" plus the nominal diameters of the pipe at the level of or below the top of pipe. Trenches cut in roads and streets shall not exceed a maximum width of 3'-6" plus the nominal diameters of the pipe at the level of the road or street surface.

(2) The Contractor shall remove only as much of any existing pavement as is necessary for the prosecution of the work. The pavement shall be cut with pneumatic tools, without extra compensation to the Contractor, to prevent damage to the remaining road surface. Where pavement is removed in large pieces, it shall be disposed of before proceeding with the excavation.

c. All excavated materials shall be placed a safe distance from the edge of the trench.

d. Unless specifically directed otherwise by the Engineer, not more than 500 feet of trench shall be opened ahead of the pipe laying work of any one crew, and not more than 500 feet of open ditch shall be left behind the pipe laying work of any one crew. Watchmen or barricades, lanterns and other such signs and signals as may be necessary to warn the public of the dangers in connection with open trenches, excavations and other obstructions, shall be provided by and at the expense of the Contractor.

e. When so required, or when directed by the Engineer, only one-half of street crossings and road crossings shall be excavated before placing temporary bridges over the side excavated, for the convenience of the traveling public. All backfilled ditches shall be maintained in such manner that they will offer no hazard to the passage of traffic. The convenience of the traveling public and the property owners abutting the improvements shall be taken into consideration. All public or private drives shall be promptly backfilled or bridged at the direction of the Engineer.

f. Where unstable materials are encountered or where the depth of excavation in earth exceeds 5-feet, the sides of the trench or excavation shall be supported by substantial sheeting, bracing and shoring, or the sides sloped to the angle of repose. Sloping the sides of the trench to the angle of repose will not be permitted in streets, roads, narrow rights-of-way or other constricted areas unless otherwise specified. The design and installation of all sheeting, sheet piling, bracing and shoring shall be based on computations of pressure exerted by the materials to be retained. Adequate and proper shoring of all excavation shall be the entire responsibility of the Contractor. The Standards of the Federal Occupational Safety and Health Act shall be followed.

g. Trench excavation shall be unclassified and shall include the removal of earth, rock, or other materials encountered in the excavating to the depth and extent shown or indicated on the Drawings.

2. Removal of Water

a. The Contractor, at his own expense, shall provide adequate facilities for promptly and continuously removing water from all excavation.

b. To ensure proper conditions at all times during construction, the Contractor shall provide and maintain ample means and devices (including spare units kept ready for immediate use in case of breakdowns) with which to remove promptly and dispose properly of all water entering trenches and other excavations. Such excavation shall be kept dry until the structures, pipes, and appurtenances to be built therein have been completed to such extent that they will not be floated or otherwise damaged.

c. Excavated soil material shall not be placed adjacent to the wetlands or watercourses in a manner that will cause it to be washed away by high water or runoff. Earth berms or diversions shall be constructed to intercept and divert runoff water away from critical areas. Diversion outlets shall be stable or shall be stabilized by means acceptable to the Engineer. If for any reason construction materials are washed away during the course of construction, the Contractor shall remove those materials from the fouled areas as directed by the Engineer.

d. For work within easements or rights-of-way, all materials used in construction such as excavation, backfill, roadway, and pipe bedding and equipment shall be kept within the limits of these easements or rights-of-way.

e. The Contractor shall not pump silt-laden water from trenches or other excavations into the wetlands, or adjacent watercourses. Instead, silt-laden water from his excavations shall be discharged within areas surrounded by baled hay or into sediment traps to ensure that only sediment-free water is returned to the watercourses. Damage to vegetation by excessive watering or silt accumulation in the discharge area shall be avoided.

f. Prohibited construction procedures include, but are not limited to, the following:

(1) Dumping of spoil material into any streams, wetlands, surface waters, or unspecified locations.

(2) Indiscriminate, arbitrary, or capricious operation of equipment in wetlands or surface waters.

(3) Pumping of silt-laden water from trenches or excavations into surface waters, or wetlands.

(4) Damaging vegetation adjacent to or outside of the construction area limits.

(5) Disposal of trees, brush, debris, paints, chemicals, asphalt products, concrete curing compounds, fuels, lubricants, insecticides, washwater from concrete trucks or hydroseeders, or any other pollutant in wetlands, surface waters, or unspecified locations.

(6) Permanent or unauthorized alteration of the flow line of any stream.

(7) Open burning of debris from the construction work. Exceptions to burning shall be by permit only.

g. Any temporary working roadways required shall be clean fill approved by the Engineer. In the event fill is used, the Contractor shall take every precaution to prevent the fill from mixing with native materials of the site. All such foreign fill materials shall be removed from the site following construction.

## XI. ROCK REMOVAL

### A. General - Work Included

1. The Contractor shall excavate rock, if encountered, as directed by the Engineer, and shall dispose of the excavated material, and shall furnish acceptable material for backfill in place of the excavated rock, if required.

2. In general, rock in pipe trenches shall be excavated so as to be not less than 12 inches from the sides of the pipe after it has been laid.

### B. References

1. NFPA 495 - Code for the Manufacture, Transportation, Storage and Use of Explosive Materials.

2. Commonwealth of Kentucky Department of Mines and Minerals, Laws and Regulations Governing Explosives and Blasting.

### C. Regulatory Requirements

1. Conform to Kentucky Department of Mines and Minerals code for explosive disintegration of rock.

2. Obtain permits from local authorities having jurisdiction before explosives are brought to site or drilling is started.

D. Products

1. Materials

a. Rock Definition: Solid mineral material that cannot be removed with a power shovel.

b. Explosives: Type recommended by explosives firm and required by authorities having jurisdiction.

c. Delay Devices: Type recommended by explosives firm and conforming to State regulations.

d. Blasting Materials: Type recommended by explosives firm and conforming to State regulations.

E. Execution

1. Explosives

a. The Contractor shall keep explosives on the site only in such quantity as may be needed for the work under way and only during such time as they are being used. He shall notify the Engineer, in advance, of his intention to store and use explosives. Explosives shall be stored in a secure manner and separate from all tools. Caps or detonators shall be safely stored at a point over 100 feet distance from the explosives. When the need for explosives has ended, all such materials remaining on the work shall be promptly removed from the premises.

b. The Contractor shall observe all State, Federal and municipal laws, ordinances and regulations relating to the transportation, storage, handling and use of explosives. In the event that any of the above-mentioned laws, ordinances or regulations require a licensed blaster to perform or supervise the work of blasting, said licensed blaster shall, at all times, have his license on the work and shall permit examination thereof by the Engineer or other officials having jurisdiction.

2. Blasting Precautions

a. No explosives shall be used within 20 feet of:

(1) Buildings and/or structures constructed or under construction.

(2) Underground and/or overhead utilities whether existing or partially constructed.

b. Permission for any deviation from the restrictions set forth above shall be secured from the Engineer, in writing; however, permission for any such deviations shall not relieve the Contractor from any responsibility in the event of damage to buildings, structures or utilities.

c. All operations involving explosives shall be conducted with all possible care to avoid injury to persons and property. Blasting shall be done only with such quantities and strengths of explosives and in such a manner as will break the rock approximately to the intended lines and grades and yet will leave the rock not to be excavated in an unshattered condition. Care shall be taken to avoid excessive cracking of the rock upon or against which any structure will be built, and to prevent injury to existing pipes or other structures and property above or below ground. Rock shall be well covered with logs or mats, or both, where required. Sufficient warning shall be given to all persons in the vicinity of the work before a charge is exploded.

d. The Contractor shall be solely responsible for his blasting operations. The Contractor shall not hold the Owner and/or the Engineer liable for any damages resulting from his blasting operations on this project.

3. Payment

Rock excavation shall be bid as unclassified and will not be paid for separately.

## XII. TRENCH BEDDING AND BACKFILLING

### A. General - Work Included

1. The Contractor shall furnish, place and compact all bedding and backfill materials specified herein or denoted on the Drawings. The materials, equipment, labor, etc. required herein are to be considered as part of the requirements and costs for installing the various pipes, structures and other items they are incidental to.

B. Products

1. Materials

a. Crushed stone material shall conform with the requirements of the applicable sections of the Kentucky Bureau of Highways Standard Specifications and shall consist of clean, hard, and durable particles or fragments, free from dirt, vegetation or objectionable materials.

b. Two classes of crushed stone material are used in this Section. The type of material in each class is as follows:

(1) Class I - No. 9 Aggregate.
(2) Class II - Dense Graded Aggregate (DGA)

C. Execution

1. Pipe Bedding

a. There are two cases for water pipe bedding. They are as follows:

Case I. Earth-bottom trench.
Case II. Rock-bottom trench.

(1) Case I. The water pipe shall be allowed to rest on the trench bottom such that the bottom quadrant of the pipe rests on undisturbed earth. The Contractor shall cup out under the bells of each joint such that the joint is not strained in its final resting position.

(2) Case II. The water pipe shall be laid on a bed of Class I aggregate (No. 9 stone). The bedding shall be placed to a minimum of 4" deep. Aggregate bedding shall be graded to provide for a uniform and continuous support beneath the pipe at all points.

(3) Any uneven areas in the trench bottom shall be shaved-off or filled-in with Class I granular bedding. When the trench is made through rock, the bottom shall be lowered to provide 4 inches below the bottom of the pipe. Class I granular bedding shall be used to bring the trench bottom to grade and up to the spring line of the pipe.

b. In wet, yielding and mucky locations where pipe is in danger of sinking below grade or floating out of grade or line, or where backfill materials are of such a fluid nature that such movements of pipe might take place during the placing of the backfill, the pipe must be weighted or secured permanently in place by such means as will prove effective.

c. Where an unstable (i.e., water, mud, etc.) trench bottom is encountered, stabilization of the trench bottom is required. This is to be accomplished by undercutting the trench depth and replacing to grade with a foundation of crushed stone aggregate.

d. The depth of the foundation is dependent upon the severity of the trench bottom. The size of stone aggregate used in the foundation will be determined by the condition of the unstable material. Once the trench bottom has been stabilized, the required Class I bedding material can be placed.

e. It should be noted that no pipe shall be laid on solid or blasted rock.

f. Pipe bedding as required in Paragraphs a through e of this article is not considered a separate pay item.

2. Backfilling

a. Initial Backfill:

(1) This backfill is defined as that material which is placed over the pipe from the spring line to a point 12-inches above the top of the pipe. There are two cases for initial backfilling. They are as follows:

Case I. Earth-bottom trench.
Case II. Rock-bottom trench.

(a) Case I. Earth. The initial backfill material shall be rock-free earth.

(b) Case II. Rock. The initial backfill material shall be No. 9 stone or rock-free earth.

(2) In either case, the backfill material may be machine placed without compaction. Uneven places shall be leveled by hand.

(3) Material used, whether earth or drushed stone Class I, in the initial backfilling is NOT a separate pay item. Payment for the material is included in the unit price per linear foot of water main.

(4) In areas where large quantities of rock are excavated and the available excavated earth in the immediate vicinity is insufficient for placing the required amount of backfill over the top of the pipe as set forth in Paragraph a.(1), the Contractor shall either haul in earth or order Class I material for backfilling over the pipe. Neither the hauling and placement of earth nor the ordering and placement of Class I material to fulfill the backfill requirements set forth herein is considered a separate pay item.

b. Final Backfill:

(1) There are two cases where the method of final backfilling varies. The various cases and their trench situations are as follows:

(a) Case I - Areas not subject to vehicular traffic.

(b) Case II - Paved areas including streets, drives and walks.

(2) In all cases, walking or working on the completed pipelines, except as may be necessary in backfilling, will not be permitted until the trench has been backfilled to a point twelve (12) inches above the top of the pipe. The method of final backfilling for each of the above cases is as follows:

(a) Case I - The trench shall be backfilled from a point 12 inches above the top of the pipe to a point 8 inches below the surface of the ground with earth material free from large rock acceptable to the Engineer. The remainder of the trench shall be backfilled with earth material reasonably free of any rocks.

(b) Case II - The trench shall be backfilled from the bottom to a point 12-inches below the existing pavement surface with Class I (No. 9 crushed stone aggregate) material. The remaining backfill shall be Class II (dense graded aggregate) material mechanically tamped to maximum possible compaction. The trench may be left with a slight mound if permitted by the Engineer. Where required by State or local regulations, a 3-inch bituminous coarse detailed on the Drawings and specified in Section J-VI shall be incorporated in the final backfill along with 6" reinforced concrete cap under bituminous pavement.

(3) Earth and Class I material used in final backfill is not a separate pay item.

(4) Class II material used in final backfill shall be included in the lump sum price.

c. A sufficient amount of Class II material shall be stockpiled to insure immediate replacement by the Contractor of any settled areas. No extra payment will be made for the filling in of settled or washed areas by the Contractor.

d. Excavated materials from trenches, in excess of quantity required for trench backfill, shall be disposed of by the Contractor. It shall be the responsibility of the contractor to obtain location or permits for its disposal, unless specific waste areas have been designated on the Drawings or noted in these specifications. Unit prices for the various pipe sizes shall include the cost of disposal of excess excavated materials, as set forth herein, no additional compensation being allowed for hauling or overhaul.

## XIII. SITE RESTORATION

### A. General - Clean-Up

1. Upon completion of the installation of the water mains and appurtenances, the Contractor shall remove all debris and surplus construction materials resulting from his work. The Contractor shall grade the ground along each side of the pipe trench and/or structure in a uniform and neat manner leaving the construction area in a shape as near as possible to the original ground line.

### B. Products

1. Seed

Grass seed shall be mixed and guaranteed by the supplier to consist of the following:

| | | | | | |
|---|---|---|---|---|---|
| Yards: | Annual Rye | 60% | Other: Annual Rye | | 50% |
| | Kentucky Bluegrass | 20% | Kentucky 31 Fescue | | 50% |
| | Creeping Red Fescue | 20% | | | |

2. Topsoil

Topsoil shall be material stripped and stored under work and shall be used for all work under this Section. If the quantity of stored topsoil is inadequate or if none has been salvaged from the project site, the Contractor shall furnish at his own expense sufficient topsoil to properly install all work as specified herein. Topsoil shall be original surface loam obtained from well drained areas from which topsoil has not been removed previously, either by erosion, clearing and removal of trees or mechanical means. It shall not contain subsoil material and shall be clean and free of clay lumps, roots, stones or similar substances more than 2-inch in diameter, debris, discarded fragments of building materials or weeds and weed seeds.

3. Soil Improvements

a. Commercial fertilizers shall be of analyses specified, or as recommended by the Agricultural Extension Service for treatment of topsoils in the area from which removed, and shall conform to the applicable State fertilizer laws. Fertilizer shall be uniform in composition, dry and free flowing, and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any fertilizer which becomes caked or otherwise damaged making it unsuitable for use will not be accepted.

b. Lime, if recommended for soil treatment by the Agricultural Extension Service, shall be ground limestone (Dolomite) containing not less than 85% of total carbonates, and shall be ground to such a fineness that 50% will pass through a 100-mesh sieve, and 90% will pass through a 20-mesh sieve. Coarser material shall be acceptable provided that required rates of application are increased proportionally on the basis of quantities passing the 100-mesh sieve.

C. Execution

1. Site Restoration

a. After installation of water mains and appurtenances, topsoil shall be spread evenly to a minimum 4-inch depth and lightly compacted. No topsoil shall be spread in a frozen or muddy condition.

(1) Any stored topsoil remaining after work is in place shall be disposed of by the Contractor as directed by the Engineer.

b. Soil improvements shall be made if and as recommended by the Agricultural Extension Service prior to seeding, if required by the Engineer.

(1) Ground limestone, if required, shall be applied at the recommended rates per square yard and shall be thoroughly mixed into the topsoil.

(2) Fertilizers, if required, shall be of analysis and rates per square yard as recommended in the topsoil analysis and shall be mixed lightly in the top few inches of topsoil.

c. Immediately before any seed is to sown, the ground shall be scarified as necessary and shall be raked until the surface is smooth, friable and of a uniformly fine texture. Areas shall be seeded evenly with a mechanical spreader at a rate of 2 pounds per 1,000 square feet, lightly raked and watered with a fine spray.

d. After seed has been distributed, the Contractor shall cover areas that are likely to wash out with straw to a depth of 1-1/2 inches.

e. Seeded areas shall be protected and maintained by watering, regular mowings and reseeding as may be necessary to produce a uniform stand of grass. Maintenance shall continue throughout the guarantee period until a dense, uniform turf is established.

f. All paved streets, roads, sidewalks, curbs, lawns, etc. disturbed during construction shall be replaced, and all materials and workmanship shall conform to standard practices and specifications of the Owner and/or the Kentucky Department of Highways, whichever applies.

g. The Contractor shall remove from the site all equipment, unused materials, and other items at his expense. The construction site shall be left in a neat, orderly condition, clear of all unsightly items, before the work is finally accepted.

End of Section

# SECTION 02720 - STORM DRAINAGE SYSTEMS

## PART 1. GENERAL

### 1.1 Work Included

A. Storm drainage pipe fittings, and accessories.

B. Storm water structures

### 1.2 Submittals

A. Submit product data under provisions of Section 01300.

## PART 2. PRODUCTS

### 2.1 Reinforced Concrete Pipe

A. Reinforced concrete pipe shall meet requirements of ANSI/ASTM C76, Class I with Wall Type A; B; C; mesh reinforcement; inside nominal diameter as required; bell and spigot end joints.

B. Joint device shall meet requirements of ANSI/ASTM C443, rubber compression gasket joint.

C. Fittings shall be of the same material as pipe, molded or formed to suit pipe size and end design, in required 'T', bends, elbows, cleanouts, reducers, traps, and other configurations required.

### 2.2 HDPE Pipe

HDPE pipe shall meet the following requirements:

- ASTM D1248 Standard Specification for Polyethylene Plastics Molding and Extrusion Materials
- ASTM F405 Standard Specification for Corrugated Polyethylene (PE) Tubing and Fittings
- ASTM F667 Standard Specification for Large Diameter Corrugated Polyethylene Tubing and Fittings.

### 2.3 Storm Water Structures

Storm water structures shall meet the following requirements, as applicable:

- ACI 304 - Guide for Measuring, Mixing, Transporting and Placing Concrete
- ACI 318 - Building Code Requirements for Reinforced Concrete

- ASTM C478 - Specification for Precast Reinforced Concrete Manholes Sections
- ASTM 1433 - Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers
- ASTM C1478 - Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes and Laterals
- ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
- ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealant
- CRSI Manual of Standard Practice

## PART 3. EXECUTION

### 3.1 Pipe Installation

A. Verify that trench cut is ready to receive work, and excavations, dimensions, and elevations are as indicated on Drawings.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal joints watertight.

C. Lay pipe to slope gradients noted on drawings, with maximum variation from true slope of 1/8 inch in 10 feet.

### 3.2 Storm Water Structure Installation

A. Precast concrete products shall be installed to the lines and grades shown in the contract documents or otherwise specified.

B. Products shall be lifted by suitable lifting devices at points provided by the precast concrete producer.

C. Products shall be installed per the precast concrete producer's recommendation.

End of Section

# SECTION 02936 - SEEDING

## PART 1. GENERAL

### 1.1 Work Included

The work described herein shall consist of application of seed, fertilizer and agricultural limestone to establish turf on all lawn areas shown on the drawings and disturbed by the construction work and not intended to receive other surfaces.

### 1.2 Submittals

Submit certificates of analysis and weight for all fertilizers to the Engineer. The tags from each package shall be delivered to the Engineer.

## PART 2. PRODUCTS

### 2.1 Seed

Seed shall be certified seed to be the latest season's crop and shall be delivered in original sealed packages bearing the producer's guaranteed analysis for percentages of mixtures and pure live seed. Seed shall be labeled in conformance with U.S. Department of Agriculture rules and regulations under the Federal Seed Act and applicable state seed laws. Seed that has become wet, moldy, or otherwise damaged will not be acceptable.

| Seed Mixture | Lbs./Acre PLS |
|---|---|
| For <u>permanent</u> cover: | |
| Kentucky 31 Tall Fescue | 15 |
| Birdsfoot Trefoil | 8 |

For <u>temporary</u> cover during application period from February 15 to May 15 and August 1 to November 1:

| | |
|---|---|
| Either | |
| Annual Ryegrass | 5 |
| or | |
| Perennial Ryegrass | 10 |

For <u>temporary</u> cover during application period from May 15 to August 1:

| | |
|---|---|
| Either | |
| Foxtail Millet | 12 |

| | |
|---|---|
| Pearl Millet | 10 |
| Japanese Millet | 15 |
| Weeping Lovegrass | 2.5 |
| or Bermuda Grass | 4 |

For temporary cover for application period from November 1 to February 15:

| | |
|---|---|
| Winter Wheat | 100 |

2.2 Agricultural Limestone

Agricultural limestone shall have a minimum calcium carbonate equivalent of not less than 85 percent and shall be ground to such a fineness that at least 90 percent will pass a 20-mesh sieve and at least 50 percent will pass a 100-mesh sieve.

2.3 Fertilizer

Fertilizer shall be commercial grade, free flowing, uniform in composition.

Fertilizer shall be 10-10-10.

2.4 Mulch

Mulch shall be clean straw.

PART 3. EXECUTION

3.1 General

Seed all areas disturbed by the construction work not scheduled for other surfaces.

3.2 Preparation for Planting Lawns

The finished surface shall be free of bumps, depressions or other irregularities or foreign materials. Spread topsoil evenly. Ground limestone shall be applied evenly at a rate of 50 pounds per 1,000 square feet. Fertilizer shall be applied evenly at a rate of 20 pounds per 1,000 square feet.

3.3 Seeding

A. Sowing of Seed. Immediately before any seed is to be sown, the ground shall be scarified as necessary and shall be raked until the surface is smooth, friable and of uniformly fine texture. Lawn areas shall be seeded evenly with a mechanical drilling seeder at the rate of 6 pounds per

1,000 square feet of area, lightly raked, rolled with a 200 pound roller and watered with a fine spray.

B. Mulching. All seeded areas shall be mulched with a straw and asphalt mat or netting or with a spray mulch of an approved material. Straw and asphalt mat shall be applied at the rate of one hundred pounds of straw and 11 gallons of asphalt per one thousand square feet. Asphalt shall either be emulsified RS1 grade or cutback RC1 grade. The type and method of mulching may be varied at the discretion of the Contractor on his own responsibility to establish a uniform turf free of erosion.

3.4 Maintenance

Seeded areas shall be protected and maintained by watering and replanting as may be necessary to produce a uniform stand of grass. Maintenance shall continue until a dense, uniform turf is established composed of the grasses specified and until acceptance, and shall include repair of damage caused by erosion.

End of Section

# DIVISION III - CONCRETE

## SECTION 03110 - CONCRETE FORMWORK

### PART 1 - GENERAL

A. The general provisions of the Contract, including General Conditions and Requirements, apply to the work specified in this section.

### PART 2 - DESCRIPTION OF WORK

A. The extent of formwork is indicated by the concrete structures shown on the drawings.

B. The work includes providing formwork and shoring for cast-in-place concrete, and installation into formwork of items furnished by others, such as anchor bolts, setting plates, bearing plates, anchorages, inserts, frames, nosings and other items to be embedded in concrete (but not including reinforcing steel).

### PART 3 - QUALITY ASSURANCE

A. The Installer must examine the substrate and the conditions under which concrete formwork is to be performed, and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

### PART 4 - CODES AND STANDARDS

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

B. Construct formwork to provide completed cast-in-place concrete surfaces complying with the tolerances specified in ACI 347, and as follows:

1. Variation from plumb in lines and surfaces of walls, and arises; l/4" per 10 ft., but not more than 1". For exposed control joint grooves, and other conspicuous lines, 1/4" in any bay or 20 ft. max; l/2" max. in 40 ft. or more.

2. Variation from level or grade in slab, walls and in arises l/8" in 10 ft., 3/8" in any bay or 20 ft. max., and 3/4" in 40 ft. or more. For exposed horizontal grooves and other conspicuous lines, 1/4" in any bay or 20 ft. max. and l/2" in 40 ft. or more.

3. Variation from position of the linear building lines and related walls, and partitions, l/2" in any bay or 20 ft. max., and 1" in 40 ft. or more.

4. Variation in cross-sectional dimensions of thickness of slabs and walls, minus ¼" and plus ½".

5. Variations in footings plan dimensions, minus 1/2" and plus 2"; misplacement or eccentricity, 2% of the footing width in direction of misplacement but not more than 2"; thickness reduction minus 2%.

6. Variation in steps; in a flight of stairs, 1/8" for rise and 1/4" for treads; in consecutive steps, 1/16" for rise and 1/8" for treads.

C. Before concrete placement check the lines and levels of erected formwork. Make corrections and adjustments to ensure proper size and location of concrete members and stability of forming systems.

D. During concrete placement check formwork and related supports to ensure that forms are not displaced and that completed work will be within specified tolerances.

## PART 5 - SUBMITTALS

A. For information only, submit 2 copies of manufacturer's data and installation instructions for proprietary materials including form coatings, manufactured form systems, ties and accessories.

B. Submit shop drawings for fabrication and erection of specific finished concrete surfaces as shown or specified.

C. Architects review will be for general architectural applications and features only. Design of formwork for structural stability and sufficiency is the Contractor's responsibility.

## PART 6 - FORM MATERIALS

A. Unless otherwise shown or specified, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood-faced or other panel type materials acceptable to Architect, to provide continuous, straight, smooth as-cast surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.

1. Use plywood complying with U.S. Product Standards PS-1, "B-B (Concrete Form) Plywood" Class 1, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing the legible trademark of an approved inspection agency.

B. Form concrete surfaces which will be unexposed in the finished structure with plywood, lumber, metal, or other acceptable material. Provide lumber that is dressed on at least 2 edges and 1 side for tight fit.

C. Provide factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.

D. Unless otherwise shown, provide ties so that portion remaining within concrete after removal of exterior parts is at least 1½" from the outer concrete surface. Unless otherwise shown, provide form ties which will not leave a hole larger than 1" diameter in the concrete surface.

E. Form ties fabricated on the project site and wire ties are not acceptable.

F. Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.

G. Provide metal inserts for anchorage of materials or equipment to concrete construction, not supplied by other trades and as required for the work.

## PART 7 - DESIGN OF FORMWORK

A. Design, erect, support, brace and maintain formwork so that it will safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.

B. Design forms and falsework to include assumed values of live load, dead lead, weight of moving equipment operated on formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of structure during construction.

C. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof. Provide trussed supports when adequate foundations for shores and struts cannot be secured.

D. Support form facing materials by structural members spaced sufficiently close to prevent deflection. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities and within allowable tolerances.

E. Provide temporary openings in wall forms, and at other locations necessary to permit inspection and clean-out.

F. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

G. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.

H. Side forms of footings may be omitted and concrete placed directly against excavation only when requested by Contractor and accepted by Architect.When omission of forms is accepted, provide additional concrete required beyond the minimum design profiles and dimensions of the footings as detailed, at no cost to the Owner.

## PART 8 - FORM CONSTRUCTION

A. General: Construct forms complying with ACI 347, to the exact sizes, shapes, lines and dimensions shown, and as required to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screens, bulkheads, anchorages and inserts, and other features required. Use selected material to obtain required finishes.

B. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.

C. Provide temporary openings where interior area of formwork in inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Brace temporary closures and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms in as inconspicuous location as possible, consistent with project requirements.

D. Form intersecting planes to provide true, clean-cut corners, with edge grain of plywood not exposed as form for concrete.

E. Provide openings in forms to accommodate other work, including mechanical and electrical work. Accurately place and securely support items required to be built into the forms.

## PART 9 - FORMS FOR EXPOSED CONCRETE

A. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Do not splinter forms by driving ties through improperly prepared holes.

B. Do not use metal cover plates for patching holes or defects in forms.

C. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.

D. Use extra studs, walers and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material which will produce bow.

E. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.

F. Form molding shapes, recesses and projections with smooth-finish materials, and install in forms with sealed joints to prevent displacement.

G. Form chamfers with 3/4" x 3/4" strips, unless otherwise shown, accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Extend terminal edges to required limit and miter chamfer strips at changes in direction.

H. Unexposed corners may be formed either square or chamfered.

## PART 10 - CONTROL JOINTS

A. See 3A section for treatment of control and construction joints, including wood screeds, metal keyways and sawcuts. Locate as indicated.

## PART 11 - PROVISION FOR OTHER TRADES

A. Provide openings in concrete formwork to accommodate work of other trades, including those under separate prime contracts (if any). Size and location of openings, recesses and chases are the responsibility of the trade requiring such items. Accurately place and securely support items to be built into forms.

## PART 12 - CLEANING AND TIGHTENING

A. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is to be placed. Retighten forms immediately after concrete placement as required to eliminate mortar leaks.

## PART 13 - FORM COATINGS

A. Coat form contact surfaces with form-coating compound before reinforcement is placed. Do not allow excess form coating material to accumulate in the forms or to come into contact with surfaces which will be bonded to fresh concrete. Apply in compliance with manufacturer's instructions.

B. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

## PART 14 - REMOVAL OF FORMS

A. General: Formwork not supporting concrete, such as sides of walls, and similar parts of the work, may be removed after cumulatively curing at not less than 50°F for 24-hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided that curing and protection operations are maintained.

## PART 15 - RE-USE OF FORMS

A. Clean and repair surfaces of forms to be re-used in the work. Split, frayed, delaminated or

otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to the Architect.

## PART 16 - CAST-IN-PLACE CONCRETE WALLS

A. Forms for concrete work shall be so constructed as to produce finished concrete of precise sizes, shapes, lines, and locations shown on drawings, as approved by the Architect.

B. Forms shall be substantially built with sufficient strength and rigidity to support dead-weight of wet concrete, impact at pouring, force of vibration of concrete without spreading or buckling, accurately put together with tight joints to prevent leakage of cement and water.

C. Forms shall be clean, free of papers, sawdust, dirt debris. Temporary clean-out panels shall be provided in column, interior side of wall forms and at other points where necessary to facilitate cleaning and inspection immediately before depositing concrete. Dust or debris will not be tolerated in forms when concrete is to be placed. Joints in forms for cleanout panels shall be located away from finished surfaces wherever possible. Such joints shall be neat, tight, and leave only marks of type which can be removed by light grinding finished concrete. Provide cover of polyethylene sheeting for column and wall forms to prevent accumulation of dirt, debris, etc., in forms.

D. Form ties for finished walls, if used, must be lined up, uniformly spaced in each panel in both horizontal and vertical directions. Form tie patching shall be approved by the Architect for profile and finish. Where openings occur at right regular spacings do not use wall ties above, below or between openings. Use wall ties only through openings. Provide walers, bracing beams above, below, between openings as required to contain freshly placed concrete.

1. This Contractor shall construct forms for openings, slots, beam pockets, light recesses, notches or chases required in concrete members for installation by other trades as directed by subcontractor requiring same.

End of Section

## SECTION 03210 - CONCRETE REINFORCEMENT

### PART 1 - GENERAL

A. The general provisions of the Contract, including General Conditions and Requirements, apply to the work specified in this section.

B. Codes and Standards: Comply with requirements of the following codes and standards, except as herein modified:

C. Also, the work includes reinforcement for independent foundations and retaining walls.

### PART 2 - QUALITY ASSURANCE

A. The Installer must examine the substrate and the conditions under which concrete reinforcement is to be placed, and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

B. Codes and Standards: Comply with requirements of the following codes and standards, except as herein modified:

1. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."

2. American Concrete Institute, ACI 318 "Building Code Requirements for Reinforced Concrete".

C. For information only, submit 2 copies of steel producer's certificates of mill analysis, tensile and bend tests for reinforcing steel.

D. Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with the ACI 315, "Manual of Standard Practice for Detailing Reinforced concrete Structures". Show Bar schedules, stirrup spacing, diagrams of bent bars, arrangements and assemblies, as required for the fabrication and placement of concrete reinforcement.

E. Deliver reinforcement to the project site bundled, tagged and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

## PART 3 - MATERIALS

A. Reinforcing Bars (ReBar): ASTM A 615, ASTM A 616 or ASTM 617, as follows:

1. Provide Grade 60 for Bars No. 2 to 11

B. Steel Wire: ASTM A 82

C. Welded Wire Fabric (WWF): ASTM A 185

D. Supports for Reinforcements: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcement in place.

1. Use wire bar type supports complying with CRSI recommendations, unless otherwise indicated. Do not use wood, brick, and other unacceptable materials.

E. Over waterproof membranes, use precast concrete chairs to prevent penetration of the membrane.

## PART 4 - FABRICATION

A. General: Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI "Manual of Standard Practice". In case of fabricating errors, do not re-bend or straighten reinforcement in a manner that will injure or weaken the material.

B. Unacceptable Materials: Reinforcement with any of the following defects will not be permitted in the work:

1. Bar lengths, depths and bends exceeding specified fabrication tolerances.

2. Bend or kinks not indicated on drawings or final shop drawings.

3. Bars with reduced cross-section due to excessive rusting or other cause.

## PART 5 - INSTALLATION

A. Comply with the specified codes and standards, and Concrete Reinforcing Steel Institute recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean reinforcement to remove loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

C. Position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.

D. Place reinforcement to obtain the minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports together with 16 gage wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.

E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with 16 gage wire. Do not make end laps midway between supporting beams, or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps.

F. Provide sufficient numbers of supports and of strength to carry reinforcement. Do not place reinforcing bars more than 2" beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

G. Splices: Provide standard reinforcement splices by lapping ends, placing bars on contact, and tightly wire tying. Comply with requirements of ACI 318 for minimum lap of spliced bars.

H. Welded wire fabric must have end laps of one full mesh plus two (2) inches between cross wires and edge laps. Welded wire fabric should extend into supporting beams and walls for anchorage unless an expansion joint is called for on the drawings.

I. Provide dowels in walls at all construction joints and in wall footings, equivalent in size and number to vertical steel extending 30 bar diameters into footing and 30 bar diameters into wall. Lap vertical wall and column rebars 30 bar diameters unless otherwise shown.

J. Reinforcing steel bends to be made as per diagram, and/or in accordance with the ACI Code.

End of Section

## SECTION 03310 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

A. The general provisions of the Contract, including General Conditions and Requirements, apply to the work of this section.

### PART 2 - DESCRIPTION OF WORK

A. Work includes furnishing, forming and placing of all concrete work as shown on the drawings, and specified herein, including the following:

1. All anchor bolts required for anchoring steel columns to concrete installed only.
2. All inserts, anchors, etc., that must be placed in forms for later attachment of work of other trades, except Mechanical-Electrical.
3. Building-in of inserts, anchors, sleeves, etc., as furnished by the Mechanical-Electrical Contractors and Structural Steel Supplier.
4. Expansion Joint Filler.
5. Joint Filler and sealer at edge of slabs.
6. Waterstops.
7. Crushed stone fill under slabs on grade.
8. Vapor barrier under slabs on grade.
   a. 8 mil. polyethylene
   b. Vapor Seal l/8" Heavy Duty
9. Curing Compound, Sealer and Hardener.

B. The extent of cast-in-place concrete (CIP-Conc) work is shown on the drawings.

C. The work includes providing cast-in-place concrete (CIP-Conc) consisting of portland cement, fine and coarse aggregate, water, and selected admixtures; combined, mixed, transported, placed, finished and cured as herein specified.

### PART 3 - RELATED WORK SPECIFIED ELSEWHERE

A. Concrete Formwork: Section 03110.

B. Concrete Reinforcement: Section 03210.

### PART 4 - CODES AND STANDARD

A. Comply with the provisions of the following codes, specifications and standards, except as otherwise shown or specified.
   1. ACI 301 "Specifications for Structural Concrete for Buildings".
   2. ACI 318 "Building Code Requirements for Reinforced Concrete".
   3. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".
   4. ACI 311 "Recommended Practice for Concrete Inspection".

B. Where provisions of the above codes and standards are in conflict with building code in force for this project, the building code shall govern.

C. The Contractor shall employ, at his own expense, a testing laboratory experienced in design and testing of concrete materials and mixes to perform material evaluation tests and to design concrete mixes.

1. Testing agency shall meet the requirements of ASTM E329.

D. Selection of a testing laboratory is subject to the Architect's acceptance.

E. The testing laboratory shall perform field quality control testing. The Contractor shall provide free access and facilities at any time during the progress of the work.

F. Materials and installed work may require testing and retesting, as directed by the Architect, at any time during the progress of the work. Allow free access to material stockpiles and facilities at all times. Tests, including the retesting of rejected materials and installed work, shall be done at the Contractor's expense.

## PART 5 - TESTS FOR CONCRETE MATERIALS

A. For normal weight concrete, test aggregates by the methods of sampling and testing of ASTM C33.

B. For portland cement, sample the cement and determine the properties by the methods of test of ASTM C150.

C. Submit written reports to the Architect for each material sampled and tested, prior to the start of work. Provide the project identification name and number, date of report, name of contractor, name of concrete testing service, source of concrete aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.

## PART 6 - SUBMITTALS

A. For information only, submit 2 copies of manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures, bonding agents, waterstops, joint systems, chemical floor hardeners, and dry shake finish materials.

B. Submit samples of materials as specified and as otherwise may be requested by the Architect, including names, sources and descriptions as required.

C. Submit 2 copies of laboratory test reports for concrete materials and mix design tests. The Architect's review will be for general information only. Production of concrete to comply with specified requirements is the Contractor's responsibility.

D. Provide materials certificates in lieu of materials laboratory test reports only when permitted by the Architect. Material certificates shall be signed by the material manufacturer and the Contractor, certifying that each material item complies with, or exceeds, the specified requirements.

E. Delivery Tickets: Furnish copies of delivery tickets for each load of concrete delivered to the site. Provide items of information as specified.

## PART 7 - CONCRETE

A. All concrete shall conform and be designed, mixed, placed, tested and cured in accordance with the ultimate strength provisions of the American Concrete Institute Building Code. All concrete shall develop the following compressive strength in 28 days.

Compressive Strength Concrete Schedule

| | Minimum 28-Day Compressive Strength | Max. - Min. Slump (inch) | Air Content (%) |
|---|---|---|---|
| All concrete not otherwise indicated | 3,500 | 4-1 | 2%-4% |
| Exterior plaza slabs | 4,000 | 3-1 | 4%-7% |

## PART 8 - CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, as follows:
   1. Provide Type I cement, except as otherwise indicated. Type 3 cement may be used in lieu of Type I at Contractor's option, when acceptable to the Architect.
   2. Provide Type 3 cement for High-Early Strength concrete for exterior concrete when acceptable to the Architect.

B. Use only one brand of cement for each required type throughout the project, unless otherwise accepted by the Architect.

C. Aggregates: ASTM C 33, and as herein specified.

   1. Local aggregates not complying with ASTM C 33 but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Architect.

   2. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite or ochre which can cause stains on exposed concrete surfaces.

   3. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances.

   4. Dune sand, bank run sand and manufactures sand are not acceptable.

   5. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter.

   6. Crushed stone, processed from natural rock or stone.

   7. Washed gravel, either natural or crushed. Use of pit or bank run gravel is not permitted.

   8. Maximum Aggregate Size: Not larger than one-fifth of the narrowest dimension between sides of forms, one-third of the depth of slabs, nor three-fourths of the minimum clear spacing between individual reinforcing bars or bundles of bars.

D. Supply of Aggregates: Provide aggregates from one source of supply to ensure uniformity in color, size and shape.

E. Water: Clean, fresh, drinkable.

F. Provide admixtures produced by established reputable manufacturers and use in compliance with the manufacturer's printed directions. Do not use admixtures which have not been incorporated and tested in the accepted mixes, unless otherwise authorized in writing by the Architect.

1. Air-Entraining Admixtures: ASTM C 260.
2. Water-Reducing Admixture: ASTM C 494, Type A.

G. Calcium Chloride: Do not use calcium chloride in concrete, unless otherwise authorized in writing by the Architect. Do not use admixtures containing calcium chloride where concrete is placed against galvanized steel, or in mix using high-early strength cement.

## PART 9 - PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type of concrete. Use an independent testing facility acceptable to the Architect for preparing and reporting proposed mix designs.

B. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the project for each class of concrete required, complying with ACI 211.1 and report to the Architect the following data:

1. Complete identification of aggregate source of supply.
2. Tests of aggregates for compliance with specified requirements.
3. Scale weight of each aggregate.
4. Absorbed water in each aggregate.
5. Brand, type and composition of cement.
6. Brand, type and amount of each admixture.
7. Amounts of water used in trial mixes.
8. Proportions of each material per cu. yd.
9. Gross weight and yield per cu. yd of trial mixtures.
10. Measured slump.
11. Measured air content.
12. Compressive strength developed at least 7 days and 28 days, from not less than 3 test cylinders cast for each 7 and 28-day test, and for each design mix.

C. Submit written reports to the Architect of each proposed mix for each type of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by the Architect.

D. Laboratory Trial Batches: When laboratory trial batches are used to select concrete proportions, prepare test specimens in accordance with ASTM C 192 and conduct strength tests in accordance with ASTM C 39, as specified in ACI 301.

E. Establish a curve showing relationship between water-cement ratio (or cement content) and compressive strength, with at least 3 points representing batches which produce strengths above and below that required. Use not less than 3 specimens tested at 28-days, or an earlier age when acceptable to the Architect, to establish each point on the curve.

F. Field Experience Method: When field experience methods are used to select concrete proportions, establish proportions as specified in ACI 301.

G. Strength data for establishing standard deviation will be considered suitable if the concrete production facility has certified records consisting of at least 30 consecutive tests in one group or the statistical average for 2 groups totaling 30 or more tests, representing similar materials and project conditions.

1. Standard Deviation: If standard deviation exceeds 600 psi or if no suitable records available, select proportions to produce an average strength of at least 1200 psi greater than the required compressive strength concrete.

2. After sufficient experience and test data become available from the job, using ACI 214 methods of evaluation, the standard deviation may be reduced when the probable frequency of tests more than 500 psi below required compressive strength will not exceed 1 in 100, and that the probable frequency of an average of 3 consecutive tests below required compressive strength will not exceed 1 in 100.

H. Adjustment to Concrete Mixes: Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to the Owner and as accepted by the Architect. Laboratory test data for revised mix designs and strength results must be submitted to and accepted by the Architect before using in the work.

I. Use air-entraining admixture in exterior exposed concrete, unless otherwise shown or specified. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content within the following limits:

1. Concrete structures and slabs exposed to freezing and thawing or subjected to hydraulic pressure:
   a. 4% for maximum 2" aggregate.
   b. 6% for maximum 3/4" aggregate.
   c. 7% for maximum 1/2" aggregate.

2. Other Exterior Concrete: 2% to 4% air.

J. Use amounts of admixtures as recommended by the manufacturer for climatic conditions prevailing at the time of placing. Adjust quantities and types of admixtures as required to maintain quality control

K. Proportion and design mixes to result in concrete slump at the point of placement as follows:

1. Ramps and Sloping Surfaces: Not more than 3".

2. Reinforced Foundation Systems: Not less than 1" and not more than 3".

3. All Other Concrete: Not less than 1" and not more than 3".

## PART 10 - CONCRETE MIXING

A. Concrete may be mixed at batch plants or it may be transit-mixes as specified herein. Batch plants must comply with the requirements of ACI 304, with sufficient capacity to produce concrete of the qualities specified in quantities required to meet the construction schedule. All plant facilities are subject to testing laboratory inspection and acceptance of the Architect.

B. Comply with the requirements of ASTM C 94, and as herein specified, provided the quantity and rate of delivery will permit unrestricted progress of the work in accordance with the placement schedule. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required, as specified below. Proposed changes in mixing procedures, other than herein specified, must be accepted by the Architect before implementation.

   1. Plant equipment and facilities: Conform to National Ready-Mix Concrete Association "Check List for Certification of Ready-Mixed Concrete Production Facilities.

C. Modifications to ASTM C 94 are as follows:

   1. Quality of Concrete: Provide concrete materials, proportions, and properties as herein specified, in lieu of ASTM Section 4.

   2. Tolerances in Slump: Provide slump of not more than the values as herein specified, in lieu of ASTM Section 5.1. Comply with other criteria of ASTM Section 5.

   3. Mixing and Delivery: Delete the references for allowing additional water to be added to the batch for material with insufficient slump. Addition of water to the batch will not be permitted as specified in ASTM Section 9.7, when the air temperature is between 85 degrees F. and 90 degrees F., reduce the mixing and delivery time to 60 minutes. When a truck mixer is used for the complete mixing of the concrete, begin the mixing operation within 30 minutes after the cement has been intermingled with the aggregates.

   4. Certification: Furnish duplicate delivery tickets with each load of concrete delivered to the site, one for the Architect and one for the Contractor. In addition to the requirements of ASTM Section 14.1, provide the following information on delivery tickets:
      a. Type and brand of cement.
      b. Cement content per cu. yd. of concrete.
      c. Maximum size of aggregate.
      d. Amount and brand name of each admixture.
      e. Total water content expressed as water/cement ratio.

   5. Strength: Delete ASTM Section 15; comply with concrete testing requirements as herein specified.

D. Maintain equipment in proper operating condition, with drums cleaned before charging each batch. Schedule rates of delivery in order to prevent delay of placing the concrete after mixing, or holding dry-mixed materials too long in the mixer before the addition of water and admixtures.

## PART 11 - FIELD QUALITY CONTROL

A. Perform sampling and testing for field quality control during the placement of concrete, as follows:

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

2. Slump: ASTM C 143; one test for each concrete load at point of discharge; and one for each set of compressive strength test specimens.

3. Air Content: ASTM C 231, pressure method; one for every other concrete load at point of discharge, or when the indicating of change requires.

4. Compression Test Specimens: ASTM C 31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed.
   a. Cast and store cylinders for laboratory cured test specimens and field-cured test specimens as specified in ASTM C 31.

5. Concrete Temperature: Test hourly when air temperature is 40 degrees F. and below, and when 80 degrees F. and above and each time a set of compression test specimens made.

6. Compressive Strength Tests: ASTM C 39; one set for each 25 cu. yds. or fraction thereof, of each mix design placed in any one day ; 1 specimen tested at 7 days, 2 specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

   a. When the frequency of testing will provide less than 5 strength tests for a given mix design, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.

   b. When the strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

B. Report test results in writing to the Architect, Contractor, and Ready-Mix supplier on the same day that tests are made. Reports of compressive strength tests shall contain the project identifications name and number, date of concrete placement, name of contractor, name of concrete supplier and truck number, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.

C. The testing service will make additional tests of in-place concrete when test results indicate the specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect. The testing service shall conduct tests to determine the strength and other characteristics of the in-place concrete by compression tests on cored cylinders complying with ASTM C 42, or by load testing specified in ACI 381, or other acceptable non-destructive testing methods, as directed. The Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

D. Do not use concrete delivered to the final point of placement which has slump or total air content outside the specified values.

E. Compressive strength tests for laboratory-cured cylinders will be considered satisfactory is the averages of all sets of three consecutive compressive strength tests results equal or exceed the 28-day design compressive strength of the type or class of concrete; an, no individual strength test falls below the required compressive strength by more than 500 psi.

F. Strength tests of specimens cured under field conditions may be required by the Architect to check the adequacy of curing and protection of the concrete places. Specimens shall be molded by the filed quality control laboratory at the same time and from the same samples as the laboratory cured specimens.

G. Provide improved means and procedures for protecting concrete when the 28-day compressive strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders.

H. When laboratory-cured cylinder strengths are appreciably higher than the minimum compressive strength, field-cured cylinder strengths need not exceed the minimum required compressive strength by more than 500 psi even though the 85% criterion is not met.

I. If individual tests of laboratory-cured specimens produce strengths more than 500 psi below the required minimum compressive strength, or if tests of field-cured cylinders indicate deficiencies in protection curing, provide additional measures to assure that the load-bearing capacity of the structure is not jeopardized. If the likelihood of low-strength concrete is confirmed and computations indicate the load-bearing capacity may have been significantly reduced, tests of cores drilled from the area in question may be required.

J. If the compressive strength tests fail to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength and subject to additional testing as herein specified.

## PART 12 - FORMED CONCRETE DIMENSIONAL TOLERANCES

A. Formed concrete having any dimension smaller or greater than required, and outside the specified tolerance limits, will be considered deficient in strength and subject to additional testing as herein specified.

B. Formed concrete having any dimension greater than required will be rejected if the appearance or function of the structure is adversely affected, or if the larger dimensions interfere with other construction. Repair, or remove and replace rejected concrete as required to meet the construction conditions. When permitted, accomplish the removal of excessive material in a manner to maintain the strength of the section without affecting function and appearance.

## PART 13 - STRENGTH OF CONCRETE STRUCTURES

A. The strength of the concrete structure in-place will be considered potentially deficient if it fails to comply with any of the requirements which control the strength of structure, including the following conditions.
   1. Failure to meet compressive strength tests requirements.

   2. Concrete which differs from the required dimensions or location in such a manner to reduce strength.

   3. Concrete subjected to damaging mechanical disturbances; particularly load stresses, heavy shock, and excessive vibration.

   4. Poor workmanship and quality control likely to result in deficient strength.

B. When there is evidence that the strength of the concrete structure in-place does not meet specification requirements, the concrete testing service shall take cores drilled from hardened concrete for compressive strength determination, complying with ASTM C 42 and as follows:

   1. Take at least 3 representatives cores from each member or area or suspect strength, from locations directed by the Architect.

   2. Test cores in a saturated-surface-dry condition per ACI 318 if the concrete will be wet during the use of the completed structure.

   3. Test cores in an air-dry condition per ACI 318 if the concrete will be dry at all times during use of the completed structure.

   4. Strength of concrete for each series of cores will be considered satisfactory if their average compressive strength is at least 85% and no single core is less than 75% of the 28-day required compressive strength.

   5. Report test results in writing to the Architect on the same day that tests are made. Include in test reports the project identification name and number, date, name of contractor, name of concrete testing service, location of test core sample, nominal maximum size aggregate, design compressive strength, compression breaking strength and type of break (corrected for length-diameter ratio) direction of applied load to core with respect to horizontal plane of the concrete as placed, and the moisture condition of the core at time of testing.

6. Fill core holes solid with patching mortar, and finish to match adjacent concrete surfaces.

7. Conduct static load test and evaluations complying with ACI 318 if the results of the core tests are unsatisfactory, or if core tests are impracticable to obtain, as directed by the Architect.

C. Concrete work which does not conform to the specified requirements, including strength, tolerances, and finishes, shall be corrected at the Contractor's expense, without extension of time therefore. The Contractor shall also be responsible for the cost of corrections to any other work affected by or resulting from corrections to the concrete work.

## PART 14 - JOINT MATERIALS

A. Preformed Expansion Joint Fillers: Type 1 - Standard - highly resilient.

B. Joint Sealing Compound: Polysulfide sealants, elastomeric caulk; Hornflex by Construction Products Division, W.R. Grace & Company or an approved equal.

## PART 15 - MOISTURE BARRIER

A. Provide moisture barrier cover over prepared base material where shown on drawings. Use only materials which are resistant to decay when tested in accordance with ASTM E 154, as follows:

1. Polyethylene sheet not less than 10 mils thick.
2. Water resistance barrier paper consisting of heavy Kraft paper laminated together with glass fiber reinforcement and overcoated with black polyethylene on each side.

## PART 16 - BONDING AGENT

A. Chemical Bonding Agent: Film-forming, freeze-thaw resistant compound suitable for brush or spray application complying with Mil B-19235.

B. Provide concrete bonding agent as manufactured by one of the following or approved equal.

1. Polyweld; Chem-Master Corp.
2. Daraweld-PBA; W,R, Grace

## PART 17 - FLOOR FINISH MATERIALS

A. Chemical Floor Hardener (ChHd-Fn): Colorless, transparent, oil free moisture, sodium silicate or polyurethane seals, dust proofs, hardens interior concrete floors. Place on floor slab concrete and slab on grades, interior concrete floors only.

1. Apply to exposed concrete slabs not indicated or scheduled to receive subsequent finishes.

2. Products offered by manufacturers to comply with the requirements for colorless liquid chemical floor hardener include the following:
   a. Sonsothane - Sonneborn-Contech
   b. Horn One-Kote - A.C. Horn/W. R. Grace & Co.
   c. Lithoplate; Protex Industries

B. Under no circumstances shall dry cement or mixture of cement and sand be used to absorb surface moisture or to stiffen surface to be finished. See manufacturer's recommendation for curing and sealant.

C. Hard Steel Trowel Finish - After slab concrete has been placed, surface shall be brought to established grade, with straight-edge and bull floated to "smooth out" surface. When water sheen has disappeared, surface shall be floated with power and/or wood floats. After floating with power and no water appears when trowel is operated, surface shall be troweled until smooth hard surface is obtained free of pin holes and other imperfections. All hard trowel finishes shall be treated with a one component, oil free, polyurethane sealer and hardener applied in strict accordance with the manufacturer's recommendations, and specifications for structural concrete for buildings ACI 301-72, Chapter 11 - Slabs, Exposed.

D. This Contractor shall take care to protect concrete work and finished concrete during construction. If work is damaged or finished surfaces marred by subsequent construction, this Contractor shall restore to rebuild concrete work to satisfaction of the Architect and remove damaged materials from site at this Contractor's expense.

E. Work on slabs on grade shall begin only after earth subgrade has been thoroughly compacted as described under another Section of the Specifications, after pipes and drains to be located under slabs are placed, tested and approved.

F. Work under this Section includes furnishing, placing and compacting of clean porous fill of washed gravel or crushed stone under slabs on grade. Porous fill shall be 6" thick and shall be compacted by rollers and by machine driven tampers or by mechanical vibration. Fill shall be free from protrusions which would puncture vapor barrier.

G. At edge of interior slabs adjoining foundation walls and at all other places where floor slab is pierced, provide joint filler and sealer as specified herein.

## PART 18 - CONTROL JOINTS

A. Form control joints in concrete wall where shown and as detailed on the Drawings.

## PART 19 - CONCRETE CURING MATERIALS

A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd. and complying with AASHO M 182, Class 3.

B. Moisture-Retaining Cover: One of the following, complying with ASTM C 171:
Waterproof Paper
Polyethylene Film
White Burlap-Polyethylene Sheet

C. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound complying with ASTM C 309, Type l, unless other type acceptable to the Architect.

1. Products offered by manufacturers to comply with the requirements for membrane-forming curing compounds include the following:
Masterseal; Master Builder's Co.
Clear Seal; A.C. Horn/W.R. Grace
Kure-N-Seal; Sonneborn-Contech
Polyclear; Upco Chemical/USM Corp.
Clear Cure; L&M Construction Chemicals
Klearseal; Castle Chemical Corp.
LR-151; Protect Industries

## PART 20 - PREPARATION

A. Before placing concrete, inspect and complete the form work installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts involved in ample time to permit the installation of their work; cooperate with other trades in setting such work, as required.

B. Forms shall be constructed of materials as indicated for use and purpose intended. See Architect's Drawings also.

C. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

## PART 21 - CONCRETE PLACEMENT

A. Place concrete in compliance with the practices and recommendations of ACI 304, and as herein specified.

B. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as herein specified. Perform concrete placing at such a rate that concrete which is being integrated with fresh concrete is still plastic. Deposit concrete as nearly as practicable to its final location to avoid segregation due to handling or flowing. Do not subject concrete to any procedure which will cause segregation.

C. Screed concrete which it is to receive other construction to the proper level to avoid excessive skimming or grouting.

D. Do not use concrete which becomes non-plastic and unworkable, or does not meet the required quality control limits, or which has been contaminated by foreign materials. Do not use re-tempered concrete. Remove rejected concrete from the project site and dispose of in an acceptable location.

E. Handle concrete from the point of delivery and transfer to the concrete conveying equipment and to the locations of final deposit as rapidly as practicable by methods which will prevent segregation and loss of concrete mix materials.

F. Provide mechanical equipment for conveying concrete to ensure a continuous flow of concrete at the delivery end. Provide runways for wheeled concrete conveying equipment from the concrete delivery point to the locations of final deposit. Keep interior surfaces of conveying equipment, including chutes, free of hardened concrete, debris, water, snow, ice, and other deleterious materials.

G. Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

H. Remove temporary spreaders in forms when concrete placing has reached the elevation of such spreaders.

I. Consolidate concrete placed in forms by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with the recommended practices of ACI 309, to suit the type of concrete and project conditions. Vibration of forms and reinforcing will not be permitted, unless otherwise accepted by the Architect.

J. Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate the layer of concrete that have begun to set. At each insertion, limit the duration of vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation of the mix.

K. Consolidate concrete during placing operations using mechanical vibrating equipment, so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

L. Bring slab surfaces to the correct level with a straight edge and strike off. Use bull flats or darbies to smooth the surface. Do not disturb the slab surfaces prior to beginning finishing operations.

M. Maintain reinforcing steel in the proper position continuously during concrete placement operations.

**PART 22 - BONDING**

A. Roughen surfaces of set concrete at all joints, except where bonding is obtained by use of a concrete bonding agent, and clean surfaces of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in manner to expose bonded aggregate uniformly and not to levee laitance, loose particles of aggregate, or damaged concrete at the surface.

## PART 23 - EXTERIOR AND INTERIOR WALLS

A. Grout air holes with mortar. Remove excess grout. Patches shall be ground to produce uniform surfaces, free of blemished and fins to the satisfaction of the Architect. Patches shall be kept continuously moist for a period minimum of six days.

B. Fill tie holes after form oil have evaporated sufficiently for good bond as specified for patching operation above. Exposed walls shall receive a rubbed finish.

C. At completion, concrete shall be of uniform texture and finish.

## PART 24 - COLD WEATHER PLACING

A. Protect all concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with the requirements of ACI 306 and as herein specified.

B. When the air temperature has fallen to or is expected to fall below 40 degrees F., provide adequate means to maintain the temperature in the area where concrete is being placed at either 70 degrees F for 3 days or 50 degrees F for 5 days after placing. Provide temporary housings or coverings including tarpaulins or plastic film. Keep protections in place and intact at least 24 hours after artificial heat is discontinued. Avoid rapid dry-out of concrete due to overheating, and avoid thermal shock due to sudden cooling or heating.

C. When air temperature has fallen to or is expected to fall below 40 degrees F. uniformly heat all water and aggregates before mixing as required to obtain a concrete mixture temperature of not less than 50 degrees F. and not more than 80 degree F. at point of placement.

D. Do not use frozen materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Ascertain that forms, reinforcing steel, and adjacent concrete surfaces are entirely free of frost, snow and ice before placing concrete.

E. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators.

## PART 25 - HOT WEATHER PLACING

A. When hot weather conditions exist that would seriously impair the quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

B. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F. Mixing water may be chilled, or chopped ice may be used to control the concrete temperature provided the water equivalent of the ice is calculated to the total amount of mixing water.

C. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

D. Wet forms thoroughly before placing concrete.

E. Use set-control admixtures when required and accepted in mix designs.

## PART 26 - CONSTRUCTION JOINTS

A. Locate and install construction joints, which are not shown on the drawings, so as not to impair strength and appearance of the structure, as acceptable to the Architect. Locate construction joints, if required but not shown as follows:
   1. In slabs on ground, so as to divide the slab into areas not in excess of 1200 sq.ft., unless otherwise accepted by the Architect. Conform to slab placement diagrams or pattern layout for placement, where shown.

B. Provide keyways at least 1½" deep in all construction joints in walls, slabs, and between walls and footings.

C. Place construction joints perpendicular to the main reinforcement. Continue all reinforcement across construction joints.

## PART 27 - ISOLATION JOINTS IN SLABS ON GROUND

A. Provide isolation joints in slabs on ground at all points of contact between slabs on ground and vertical surfaces, such as foundation walls, grade beams, and elsewhere as indicted.

B. Provide control joints in slabs on ground to form panels or patterns as shown. Use inserts ⅛" wide x 1¼" deep below the slab surface, after the concrete has cured for at least 7 days.

## PART 28 - FINISH OR FORMED SURFACES

A. Provide as-cast rough form finish to formed concrete surfaces that are to be concealed in the finish work or by other construction, unless otherwise indicated.

B. Standard form finish shall be the concrete surface having the texture imparted by the form facing material used, with tie holes and defective areas repaired and patched and all fins and other projections exceeding 1/4" in height rubbed down or chipped off.

C. Provide smooth rubbed (SmRbd-Fn) to front exterior exposed concrete surfaces, which have received smooth form finish treatment, not later than the day after form removal.

D. At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike off smooth and finish with a texture matching the adjacent formed surfaces. Continue the final surface treatment of formed surfaces uniformly across the adjacent unformed surfaces, unless otherwise shown.

E. After placing concrete slabs, do not work the surface further until ready for floating. Begin floating when the surface water has disappeared or when the concrete has stiffened sufficiently to permit the operation of a power-driven float, or both. Consolidate the surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level the surface plane to a tolerance not exceeding l/4" in l0' when tested with a l0' straightedge placed on the surface at not less than 2 different angles. Cut down high spots and fill all low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat the surface to a uniform smooth, granular texture.

## PART 29 - CHEMICAL-HARDENER FINISH: INTERIOR FLOOR TOPPING CONCRETE

A. Apply chemical-hardener finish to dry interior concrete floors where shown on the drawings or in schedules. Apply liquid chemical-hardener after complete curing and drying of the concrete surface. Dilute the liquid hardener with water, and apply in 3 coats; 2/3 strength. Evenly apply each coat, and allow 24 hours for drying between coats.

B. Apply proprietary chemical hardeners in accordance with the manufacturer's printed directions.

C. After the final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

## PART 30 - CONCRETE CURING AND PROTECTION

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperature, and maintain without drying at a relatively constant temperature for the period of time necessary for hydration of the cement and proper period of time necessary for hydration of the cement and proper handling of the concrete.

B. Start initial curing as soon as free moisture has disappeared from the concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 72 hours.

C. Begin final curing procedures immediately following initial curing and before the concrete has dried. Continue final curing for at least 7 days and in accordance with ACI 301 procedures. Avoid rapid drying at the end of the final curing period.

## PART 31 - CURING METHODS

A. Perform curing of concrete by moist curing, by moisture-retaining cover curing, by membrane curing, or by combinations thereof, as herein specified, optional to the Contractor with approval from the Architect.

1. For curing, use only water that is free of impurities which could etch or discolor exposed, natural concrete surfaces.

2. Keeping the surface of the concrete continuously wet by covering with water.

3. Continuous water-fog spray.

4. Covering the concrete surface with the specified absorptive cover, thoroughly saturating the cover with water, and keeping the absorptive continuously wet. Place absorptive cover so as to provide coverage of the concrete surfaces and edges, with a 4" lap over adjacent absorptive covers.

5. Cover the concrete surfaces with the specified moisture-retaining cover for curing concrete, placed in the widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during the curing period using cover material and waterproof tape.

6. Apply the specified membrane-forming curing compound to damp concrete surfaces as soon as the water film has disappeared. Apply uniformly in a 2-coat continuous operation by power spray equipment in accordance with the manufacturer's directions. Recoat areas which are subjected to heavy rainfall within 3 hours after initial application. Maintain the continuity of the coating and repair damage to the coat during the entire curing period.

7. Do not use membrane curing compounds on surfaces which are to be covered with a coating material applied directly to the concrete or with a covering material bonded to the concrete, such as other concrete, liquid floor hardener, waterproofing, damp proofing, membrane roofing, flooring, painting and other coatings and finish materials, unless otherwise acceptable to the Architect.

## PART 32 - CURING FORMED SURFACES

A. Cure formed concrete surfaces, including the undersides of girders, joist, beams, supported slabs and other similar surfaces by moist curing with the forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

## PART 33 - CURING UNFORMED SURFACES

A. Initially cure unformed surfaces, such as slabs and other flat surfaces by moist curing, whenever possible.

B. Final cure unformed surfaces, unless otherwise specified, by any of the methods specified above, as applicable.

C. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise acceptable to the Architect.

## PART 34 - FINAL CURING OF CONCRETE

A. During the curing period, protect concrete from damaging mechanical disturbances including load stresses, heavy shock, excessive vibration, and from damage caused by rain or flowing water. Protect all finished surfaces from damage by subsequent construction operations.

## PART 35 - MISCELLANEOUS CONCRETE ITEMS

A. Provide concrete grout for reinforced masonry lintels door jambs and bond beams where indicated on drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.

B. Fill-in holes and opening left in concrete structures for the passage of work by other trades, unless otherwise shown or directed, after the work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide all other miscellaneous concrete filling shown or required to complete the work.

C. Place dove tail slots in all concrete surfaces where concrete and masonry walls connect.

D. The concrete in each integral unit of the structure shall be placed continuously, and the Contractor shall not begin work without sufficient approved material on hand nor without sufficient forces and equipment to complete that unit without interruption in placing the concrete.

E. Reinforce all walls, unless otherwise specified or shown on the drawings, with number five (5) bars at 12 inches on centers horizontal and vertical.

F. Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

G. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on the drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of the manufacturer furnishing the machines and equipment.

## PART 36 - CONCRETE SURFACE REPAIRS

A. Repair and patch defective areas with cement mortar immediately after removal of forms, but only when directed by the Architect.

B. Cut out honeycomb, rock pockets, voids over 1/2" diameter, and holes left by tie rods and bolts, down to solid concrete but, in no case, to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Before placing the cement mortar, thoroughly clean, dampen with water, and brush-coat the area to be patched with neat cement grout. Proprietary patching compounds may be used when acceptable to the Architect.

C. For exposed-to-view-surfaces, blend white portland cement and standard portland cement so that, when dry, the patching mortar will match the color of the surrounding concrete. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with the patching. Compact mortar in place and strike off slightly higher than the surrounding surface.

D. Fill holes extending through concrete by means of a plunger-type gun or other suitable device from the least exposed face, using a flush stop held at the exposed face to ensure complete filling.

E. Repair of Unformed Surfaces: Test unformed surfaces, such as slabs, for smoothness and to verify surface plane to the tolerances specified for each surface and finish. Correct low and high areas as herein specified.

F. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having the required slope. Correct high and low areas as herein specified.

G. Repair finished unformed surfaces that contain defects which adversely affect the durability of the concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to the reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectional conditions.

H. Correct high areas in unformed surfaces by grinding, after the concrete has cured sufficiently so that repairs can be made without damage to adjacent areas.

I. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out the low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to the Architect.

J. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts, and expose reinforcing steel with at least 3/4" clearance all around. Dampen all concrete surfaces in contact with patching concrete and brush with a neat cement grout coating, or use concrete bonding agent. Place patching concrete before grout takes its initial set. Mix patching concrete of the same type or class as the original adjacent concrete. Place, compact and finish as required to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

K. Repair isolated random cracks and single holes not over 1" in diameter by the dry-pack method. Groove the top of cracks, and cut out holes to sound concrete and clean out dust, dirt and loose particles. Dampen all cleaned concrete surfaces and brush with a neat cement grout coating. Place dry-pack before the cement grout takes its initial set. Mix dry-pack, consisting of one part portland cement to 2½ parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than 72 hours.

L. Repair methods not specified above may be used, subject to the acceptance of the Architect.

End of Section

## SECTION 03371 - GROUT

### PART 1 - GENERAL

A. The general provision of the Contract, including General and Supplementary Conditions and Requirements, apply to the work specified in this section.

### PART 2 - RELATED WORK SPECIFIED ELSEWHERE

A. Structural steel base plates, anchoring devices and leveling shims: Section 5A.

### PART 3 - DELIVERY AND STORAGE

A. Prevent damage to or contamination of non-shrink grouting materials during delivery, handling and storage.

B. Store all non-shrink grouting materials in undamaged condition with seals and labels intact as packaged by the manufacturer.

C. Non-shrink grout - Sonogrout - Sonneborn - Contech by Sonneborn Building Products Division or approved equal to be used under bearing plates or for grouting rebar dowels into existing walls.

### PART 4 - MATERIALS

A. Non-shrink grout conforming to the following requirements:

1. Manufactured under rigid quality control specifically for grout used in transferring heavy loads.
2. Contain metallic and non-metallic aggregates especially graded to minimize bleeding.
3. Contain metallic aggregate that is ductile and capable of withstanding impact without fracturing.
4. Have an initial setting time of approximately one hour at 70 degrees F.
5. Produce no settlement or drying shrinkage at 3 days or thereafter.
6. Have higher strength at all ages than plain cement grout of the same flowability.
7. Resist attack by oil and water and have lower absorption than plain cement grout of the same flowability.

B. Portland Cement: ASTM C 150-72, Type I.

C. Sand: ASTM C 33-71a, Fine Aggregate.

D. Pea Gravel: ASTM C 33-71a. Coarse aggregate, graded so that at least 90 percent passes 3/8-inch sieve and 90 percent is retained by a number 4 sieve.

## PART 5 - MIXES

A. For less than 2-inch clearance, or where size or shape of space makes grouting difficult, grout mix shall consist of grout material and water.

B. For greater than 2-inch clearances where coarse aggregate will not obstruct free passage of the grout, extend grout by adding 50 pounds of pea gravel per 100 pounds of grout material.

C. Use the minimum amount of water necessary to produce a flowable grout without causing either segregation or bleeding.

D. Portland cement mortar for raked-out edges of non-shrink grout: 1 part Portland cement, 2 parts sand and 0.50 parts water by weight.

## PART 6 - MIXING

A. Mix non-shrink grouting materials and water in a mechanical mixer for no less than 3 minutes.

B. Mix grout as close to the work areas as possible and transport the mixture quickly and in a manner that does not permit segregation of materials.

C. After the grout has been mixed, do not add more water for any reason.

## PART 7 - PROCEDURES

A. Installation methods and procedures shall be approved by the Engineer's representative before work is begun.

## PART 8 - SURFACE PREPARATION

A. Remove all defective concrete, laitance, dirt, oil, grease, and other foreign material from concrete surfaces by bush-hammering, chipping, or other similar means, until a sound, clean concrete surface is achieved.

B. Lightly roughen the concrete, but not enough to interfere with the proper placement of grout.

C. Cover concrete area with waterproof membrane until ready to grout.

D. Remove foreign materials from all steel surfaces in contact with grout.

E. Align, level, and maintain final positioning of all components to be grouted.

F. Take special precautions during extreme weather conditions according to the manufacturer's written instructions.

G. Immediately before grouting, remove waterproof membranes and clean any contaminated surfaces.

H. Saturate all concrete surfaces with clean water; remove excess water and leave none standing.

## PART 9 - PLACING

A. Place non-shrink grouting material quickly and continuously by the most practical means permissible; pouring, pumping, or under gravity pressure.

B. Do not use either pneumatic-pressure or dry packing methods without written permission of the Architect.

C. Apply grout from one side only to avoid entrapping air.

D. Final installation shall be thoroughly compacted and free from air pockets.

E. Do not vibrate the placed grout mixture, or allow it to be placed if the area is being vibrated by nearby equipment.

F. Do not remove leveling shims for at least 48 hours after grout has been placed.

G. After shims have been removed, fill voids with plain cement-sand grout.

H. After the non-shrink grout has reached initial set, rake out all exposed edges approximately l-inch into the grouted area and point with portland cement mortar.

## PART 10 - CURING

A. Cure grout for 3 days after placing by keeping wet and covering with curing paper or by another approved method.

End of Section

# DIVISION IV - MASONRY

## SECTION 04100 - MORTAR

### PART 1 - SCOPE

A. This Section includes all labor, materials, equipment, and related items required for the work of mortar as shown on the Drawings and specified herein. The work includes but is not necessarily limited to the following:
   (1) Furnishing of all mortars required for the work of unit masonry.

B. This Section does not include the following related items:
   (1) Concrete or grout required for the filling of hollow masonry units, grouting door frames, etc.
   (2) Unit masonry work.

### PART 2 - PRODUCT HANDLING

A. All materials shall be delivered, stored, and handled in a manner to prevent damage by breakage, water, or moisture, or the inclusion of foreign particles. Packaged materials shall be delivered in unbroken packages with the manufacturer's name, brand, and applicable data plainly marked thereon. No materials shall be dumped or stored on the ground. Bulk materials shall be stored on a clean surface or platform as required and shall be protected from deterioration and foreign matter.

B. All tools and equipment shall be delivered, protected, and handled in a manner to prevent any damage which may make them defective for the purpose for which they are intended.

### PART 3 - MATERIALS

A. General. One manufacturer's brand and/or source of supply shall be utilized for each material specified hereinafter in order to maintain uniformity of mortars prepared under work of this section.

B. Portland cement shall conform to ASTM C150, Type I or III.

C. Masonry cement shall conform to ASTM C91.

D. Hydrated lime shall conform to ASTM C207.

E. Aggregate shall be natural river sand conforming to ASTM C144, shall be clean, sharp, well graded, and free from injurious amounts of dust, lumps, shale, alkalies, surface coating, and organic matter.

F. Water shall be clean and free from deleterious quantities of acid, alkali, oils, salts, and organic matter.

G. Admixtures. The use of admixtures in mortar shall not be permitted unless approved in writing by the Architect. If an admixture is approved, it shall be used throughout whatever segment of the work for which it is proposed.

H. Antifreeze Compounds. Antifreeze liquids, salts, and other substances shall not be used in order to lower the freezing point of mortar.

## PART 4 - MIXES

A. Mortar shall be freshly prepared and uniformly mixed in proportions by volume conforming to ASTM C270, Type N, 750 p.s.i. or Type S, 1,800 p.s.i. at 28 days as specified.

B. Mortar for use in all applications shall be mixed as follows. Proportions of mortar by volume shall conform to the following table, with the aggregate measured in a damp, loose, condition.

| Mortar Type | Portland Cement | Masonry Cement | Hydrated Lime or Lime Putty | Aggregate |
|---|---|---|---|---|
| N | None | 1 (Type II) | None | (Not less than 2¼ nor more than 3 times the sum of the cements and lime used) |
| N | 1 | None | Over ½ to 1¼ | |
| S | ½ | 1 (Type II) | None | |

C. The weights per cubic foot of materials in mortar are considered to be as follows:

| Material | Weight/Cubic Foot |
|---|---|
| Portland Cement | 94 lbs. |
| Masonry Cement | Weight printed on bag |
| Hydrated Lime | 40 lbs |
| Sand, damp and loose | 80 lbs. |

## PART 5 - MIXING

A. Measurement by volume shall be manufacturer's packages or other containers of known capacity or by approved batching device so that specified proportions shall be consistently maintained. Material that has partially set shall not be re-tempered or used; frozen, caked, or lumpy material shall not be used. Mix mortar with proper amount of water, for a minimum of 5 minutes to desired consistency, and uniform color is obtained in electric batch mixer.

B. Mortar Flow. Mortar of the materials and proportions used in the construction shall have a flow after section for one (l) minute of not less than 70 percent of that immediately before suction. The flow shall be determined by the method of the Water Retention Test of the Standard Specifications for Masonry Cement, ASTM C9l.

C. Mortar Consistency. The mortar shall be of as wet a consistency as can be conveniently handled, and it shall be re-tempered frequently if necessary. Mortar which has greatly stiffened or in which the cement material has started to set shall not be used.

End of Section

## SECTION 04200 - UNIT MASONRY

### PART 1 - GENERAL

A. This Section includes all labor, materials, equipment, and related items required for the work of unit masonry as shown on the Drawings and as specified.

### PART 2 - PRODUCT HANDLING

A. Store all masonry units on screeds and under cover to properly protect from the elements until ready for use. Dirty, cracked, chipped, or otherwise damaged masonry units shall not be used.

### PART 3 - ENVIRONMENTAL CONDITIONS

A. Masonry shall not be laid in freezing weather unless suitable means are used to heat the materials and protect the work from cold and frost, and to insure that the mortar will properly harden without freezing.

### PART 4 - PROTECTION

A. The Contractor shall protect exposed masonry materials of every kind against staining, and the tops of all walls shall be kept covered with non-staining waterproof covering at the end of each work day and at any time the work thereon is not in progress. When starting or resuming work at a new level, the top surface of the work in place shall be cleaned of all loose mortar and foreign materials and in drying weather thoroughly wetted with clean water. Then resume laying.

### PART 5 - MATERIALS

A. Masonry Units:

1. Face brick shall conform to ASTM C216, Grade SE, type FBS, (7 5/6" x 2-1/4" x 3-5/8" bed depth), solid or cored. See elevation for type.

    a. Provide all special matching face brick units for applications where indicated by the details or required, including sill units. Units shall conform to details and dimensions shown on the Drawings and finished surfaces shall be indistinguishable from those of face brick specified above.

2. Concrete block for general use throughout the project shall be hollow, load-bearing concrete masonry units complying with ASTM C90, Grade N-1, shall have nominal 8" x 16 face, or as shown, shall have a compressive strength of not less than 800 p.s.i. for individual units and an average of 1,000 for five units.

    a. Exterior CMU shall be Buff color, split-faced, waterproof with waterproof mortar.

    b. All aggregates for concrete masonry units shall conform to ASTM C331, and shall be expanded shale produced by the rotary kiln process.

c. All units shall be made with Portland cement complying with ASTM C150, and weighing not more than 100 lbs. per cubic foot.

d. All units shall be square, true, and have sharp arriser. They shall be of consistent texture, and shall be dimensionally stable with regard to height, width, and lengths. All units shall be free of organic impurities that will cause rusting, staining, or pop-outs, and shall contain no combustible matter.

e. Steam Curing. All concrete blocks shall be steamed in an atmosphere of 100 degrees F. for a period of 4 to 6 hours. Steam curing shall commence after masonry units have been allowed to "set" for a period of 1-1/2 to 2 hours. After steam curing, allow kiln temperature to drop slowly before removing blocks from kiln. Blocks shall be stored for a period of 30 days and protected from the weather during this period before delivery to site.

3. Fire rated concrete block for use in interior shafts shall conform to general specifications for other concrete block set forth above, and shall conform to Underwriter's Laboratories D-2 classification for two-fire rating.

a. Manufacturer of concrete block units shall provide U.L. standard certificate certifying that materials furnished meet classification specified to the Architect for approval prior to delivery of units to the site.,

B. Masonry Wall Reinforcement:

1. Provide all prefabricated internal or external corners required by installation.

C. Anchors and ties shall be of corrosion resistant metal equal in strength, size and numbers to conform with requirements of American standard A41.1 titled American Standard Building Code Requirements for Masonry.

1. Brick wall ties shall be Hohman & Barnard, Inc., DW-10HS on sheathing or equal.

2. Truss type reinforcement for horizontal reinforcing at concrete masonry partitions. Reinforcement shall be Dur-O-Wall Truss No. 9 gauge cross rod or approved equal. All components of anchor to ave a hot dipped galvanized finish. Place joint reinforcement directly on masonry and place mortar over wire to form bed joint.

## PART 6 - SAMPLE WALL

A. Before laying any wall construction, the Contractor shall build sample composite of concrete block, 5 feet wide x 4 feet high, for approval of the Owner and Architect. Approved wall shall be standard for wall construction and for brick and block. Sample wall shall demonstrate acceptable workmanship for bond specified.

## PART 7 - LAYING BRICK

A. Lay all face brick in exterior wall construction using Type N mortar furnished under work of Section 04100.

1. All brick shall be thoroughly wet before laying, except in freezing weather. All bed and head joints shall be completely filled with mortar. Fill all head joints with a heavy buttering or mortar on one side of the brick, press the brick down into the bed joint and push the brick into place so that the mortar squeezes out from the top and sides of the head joint. Mortar should correspondingly cover the entire side of a brick before placing with next brick. Attempting to fill joints by slushing or dashing will not be permitted. Partial filling of joints by buttering or spotting the vertical edges of the brick with mortar cut from the extruded bed joint will not be permitted. Where closures are required, the opening should be filled with mortar so that insertion of the closure will extrude mortar, both laterally and vertically. All brick work shall be plumb, true to line, courses level and properly anchored to back-up, abutting masonry and concrete as follows:

    a. Where composite wall construction is indicated, face brick shall be bonded to backup by installation of continuous masonry wall reinforcement, spaced 16" o.c. vertically, extending through both brick and backup as shown in the Drawings.

2. Face Brick Bond. The bond for brick laid in walls shall be running bond with tooled joints throughout. Coursing shall be accurately spaced and laid out in such manner that the bond is kept plumb throughout variations in the width of vertical joints shall be inconspicuous and made only as necessary to maintain the bond. Improper layout of bond will be rejected. Intersecting and abutting walls and corners shall be bonded together by interlocking alternate courses of brick. No brick smaller than 3-3/4" long shall be used as a jamb closure, and all cuts required shall be made with a masonry saw.

3. Face Joints. All face joints in brick shall be for horizontal joints as shown on the drawings, and for vertical or head joints may be from 5/l6" to 7/l6" to adjust bond and minimize cutting at openings. In exposed wall faces, joints shall be cut flush, and as the mortar takes its initial set, shall be tooled with l/2 inch diameter round tool 6" longer than the length of the masonry unit. Tooling shall compact the mortar tightly against the masonry units on both sides of the joints. Head joints shall be tooled first. Joints must be tooled smooth, even and uniform. At completion of work, all holes in joints of exposed masonry must be filled. Rake joints 3/8" deep at jambs of brick abutting other materials and at other joints shown to be caulked by others under work of Section 07900; except that caulked control joints shall be treated as specified below.

4. Control Joints. Provide continuous 3/8" wide vertical control joints in exterior face brick where indicated by cutting half-brick closures in alternate courses, omitting mortar continuously in the joint. Control joints shall fall at normal head joint locations and shall be absolutely plumb so as to be inconspicuous in the finish work. Caulking of control joints is specified under Section 07900.

5. Weeps. Provide weep holes in exterior brick wall surfaces in all joints containing through wall membrane flashing at spacing shown on the Drawings. Weeps shall be made by laying 3/8" cotton cords at required locations. Cords shall be treated for withdrawal from joints cleanly after mortar has set.

B. Water Repellent Treatment. All exterior surfaces of brick work shall be given a clear water repellent coating applied in strict conformance with the printed recommendations of the manufacturer of the material used. Surfaces shall be dry, clean and free from loose mortar prior to application. Coatings shall be applied after all cleaning is done, and surfaces have been inspected and approved by the Architect.

C. Workmanship. The Contractor is cautioned that the Architect will demand first class workmanship. All brick masonry shall be performed by experienced masons. Any chipped, cracked, or otherwise damaged or defective work will be rejected.

## PART 8 - LAYING CONCRETE BLOCK

A. Lay all concrete block in exterior and interior wall construction where indicated, using Type N mortar furnished under work of Section 04100, except that Type S mortar shall be used in laying concrete block below grade.

B. All bed and head joints shall be completely filled with mortar. Bed joints shall be filled by spreading a thick bed of mortar. Fill head joints with a heavy buttering of mortar on one side (each flange) of block, press the block down into the bed joint, and push the block into place so that the mortar squeezes out from the top and sides of the head joint. Mortar should correspondingly cover the end flange of the block before placing the next block. Attempting to fill joints by slushing or dashing will not be permitted. Partial filling of joints with mortar cut from the extruded bed joint will not be permitted. Where closures are required, fill with mortar so that the intersection of the closure will extrude mortar, both laterally and vertically. Extend walls and partitions to heights indicated, building in around joist bearings, etc. as shown or required. Cut units as required to properly course in plan and vertical section as shown on the Drawings or as directed by the Architect. All cuts shall be accurately made with masonry saw.

1. Anchorages of concrete block to various backup material shall be as specified under Article 8 above for brick.

C. Joints and Bond. All concrete masonry units shall be laid in running bond. Joints in concrete block work shall be 3/8" wide for both head and bed joints. Joints in masonry scheduled to receive separate finish or where concealed in the work shall be cut flush. Rake joints 3/8" deep at control joints, where masonry abuts concrete surfaces, etc., and otherwise where shown on the Drawings, for caulking by others under work of Section 07900.

D. Reinforcement. Concrete masonry walls and partitions shall be reinforced continuously in every other course, (16" o.c. vertically) using masonry wall reinforcement of types as hereinbefore specified. Reinforcement shall be seated in the mortar bed by lifting cross ties as work progresses. Lay internal and external corners and intersections as required for the completed job.

E. Chases for pipes, conduits, etc. shall be plumb and smooth on the inside, with offsets formed where required, kept free of obstructions and cleaned out on completion. There shall be at least 8" of masonry between chases and the jambs of openings.

F. Build units accurately to metal door frames, building in anchors furnished with frames. Slush solid with mortar at jambs and head.

G. Coordinate work with other trades, building in all items shown to be installed in concrete block work such as lintels, anchors, sleeves, etc. Prepare openings as shown or required for proper installation of mechanical, electrical, and other items.

H. Cleaning. Extreme care shall be exercised during laying to protect units from mortar droppings, etc. Upon completion of work, all exposed concrete block shall be properly cleaned with a stiff bristle brush to remove all excess mortar, dirt and stains. Do not use acid.

I. Workmanship. The contractor is cautioned that the Architect will demand first class workmanship. All concrete masonry work shall be performed by experienced masons. Any chipped, cracked or otherwise damaged or defective work will be rejected.

## PART 10 - THROUGH-WALL MEMBRANE FLASHING

A. Install York seal self adhering cavity, 40 mil thick, through-wall membrane flashing continuously or as indicated in horizontal joints of exterior walls, at window openings, etc. where shown on the Drawings. Installation shall be in strict accordance with manufacturer's printed instruction. Flashings shall extend generally from within ½" of exterior wall face through the wall as detailed.

1. Where laps occur, lap sheets at least 6" and seal with cold setting cement. Roll to insure full adhesion.

2. At obstructions, carry flashing up 6" and secure with cold setting cement.

3. Where ties or anchors, conduit, etc. penetrate through sheet, punctures shall be made minimum size possible and mastic troweled around place to thoroughly seal the puncture.

4. At lintels and shelf angles, flashings shall extend minimum of 6" beyond ends of lintels.

End of Section

# DIVISION IX - FINISHES

# SECTION 09260 - GYPSUM BOARD

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Related Documents: Provisions established in General and Supplementary Conditions of the Contract, Division 1 General Requirements, and the Drawings are collectively applicable to this Section.

B. Section Includes:

1. Metal stud wall framing studs, 20 gage material thickness.
2. Furred wall framing.
3. Metal channel ceiling framing.
4. Gypsum board.
5. Cementitious backer board.
6. Taped and sanded joint treatment.

### 1.02 SUBMITTALS

A. Submit under provisions of Section 01330.

B. Product Data: Provide data on metal framing, gypsum board, joint tape and joint compound.

C. Submit manufacturer's installation instructions for each product proposed for use.

### 1.03 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C 840, GA-201, GA-216 and GA-600.

### 1.04 DELIVERY, STORAGE, HANDLING

A. Deliver, store, handle, and protect products in conformance with manufacturer's instructions and in accordance with Section 01600.

B. Store inside building, on sleepers, and out of water.

### 1.05 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this section with minimum of 3 years documented experience.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated assemblies.

B. Refer to Drawings for details and references to UL and GA assemblies.

**PART 2 - PRODUCTS**

2.01 MANUFACTURERS - GYPSUM BOARD

A. Acceptable Manufacturers: Subject to compliance with requirements indicated, provide products of one of the following:

1. U. S. Gypsum.
2. National Gypsum.
3. Domtar Gypsum Co.
4. Republic Gypsum Co.

B. Substitutions: Under provisions of Section 01600.

C. Specific product references are these of U.S. Gypsum Company unless noted otherwise as a standard of quality.

2.02 GYPSUM BOARD MATERIALS

A. Fire Rated Gypsum Board: ASTM C 36; fire resistive type X or C, UL rated; 48 inch by 5/8 inch thick, maximum permissible length; ends square cut, tapered and beveled edges.

B. Moisture Resistant Gypsum Board: ASTM C 630; 48 by 5/8-inch thick, type X or C (fire-rated), maximum permissible length ends square cut, tapered edges.

C. Gypsum Backing Board: ASTM C 442; fire rated type 'X'; 5/8-inch thick; V-grooved edges, ends square cut, maximum permissible length.

2.03 MANUFACTURERS - FRAMING SYSTEMS

A. Acceptable Manufacturers: Subject to compliance with requirements indicated, provide products of one of the following:

1. Clark Steel Framing Systems, Inc., Hinckley, OH.
2. Consolidated Systems, Inc., Columbia, SC
3. Dale/Incor Industries, Dearborn, MI.
4. Delta Metal Products, Dallas, TX.
5. Dietrich Industries, Inc., Hutchins, TX.
6. Knorr Steel Framing Systems. Salem, OR.
7. The Steel Network Inc., Raleigh, NC.
8. Unimast, Inc., Houston, TX
9. Western Metal, Riverside, CA.

B. Substitutions: Under provisions of Section 01600.

2.04 FRAMING MATERIALS

A. Studs and Tracks: ASTM C 645; galvanized sheet steel, gage as indicated on Drawings, 'ST' series shape, depths as indicated on Drawings. Provide with floor and ceiling runners, 'C' shaped galvanized, 1-1/4 inch leg.

B. Shaft Wall Studs: Galvanized finish, length and depth as required, gage as recommended by manufacturer for heights encountered to maintain a maximum deflection of L/240 with 5 pound horizontal loading.

C. Furring, Framing and Accessories: Provide in conformance with ASTM C 645, GA-216, and GA-600 and as follows:

1. Cold Rolled Channels: 3/4inch, 1-1/2 inch and 2 inches, 16 gage, prime painted.

2. Furring Channels: 7/8 inch deep x 1-1/4 inch face, 25 gage, galvanized.

3. Resilient Furring: 7/8 inch deep x 1-1/4 inch face, 25 gage, galvanized with one leg attached only.

D. Fasteners: ASTM C 514 for nails and C 1002 for screws as follows:

1. Inserts, clips, bolts, nails or other screws as recommended by manufacturer, of type and size to suit application and to rigidly secure materials in place.
2. Self-drilling, self-tapping bugle head screws for use with power drive tool.

3. Metal Framing to Structure: Power driven screw fasteners to withstand 190 pound single shear resistance and 200 pound bearing force when drive through structural head or base and without exceeding allowable design stress in runner, fastener, or structural support.

4. Metal to Metal: 3/8 inch, Type S or S-12, pan head screws.

5. Gypsum Board to Sheet Metal Application: Type S screws.

6. Gypsum Board to Gypsum Board Application: Type G screws.

7. Vertical Deflection Connection (required under all steel beams where the top metal track is tied into the steel beam): Provide VertiClip® or VertiTrack™ deflection-accommodating anchorage devices, by The Steel Network Inc. Products shall conform to the following material properties and performance criteria:

a. Code Criteria:

1. Meet required head of wall connection criteria as required by applicable referenced code for cyclic wall movement.

b. Material Composition: Meeting ASTM A653/A, SS grade 50, class 1, 50 ksi minimum yield strength, 65 ksi minimum tensile strength, G-60 hot dipped galvanized coating.

c. Material Thickness: 0.036 inch thick for VertiClip SLD series.

d. Clips shall be designed for positive attachment to structure and stud web using step-bushing technology to provide frictionless vertical movement.

e. Provide clips with attached bushing and screw of the series, size, and configuration as recommended by manufacturer.

f. Friction-fit deep-leg track assemblies and tracks relying on steel flexure to perform are unacceptable.

g. Substitutions: Must comply with the following:

1. Meets ASTM A653/A, SS Grade 50, class 1 50 ksi minimum yield strength, 65 ksi minimum tensile strength, G-60 hot dipped galvanized coating.

2. Certified for use in UL 2079-approved assemblies for cyclic movement.

3. Structural testing performed per AISI requirements.

2.05 ACCESSORIES

A. U. S. Gypsum Company products specified below as a standard of quality, unless noted otherwise.

1. Acoustical Insulation: Refer to Section 07210.

2. Acoustical Sealant and Tape: Non-hardening, non- skinning, for use in conjunction with gypsum board; manufactured by Tremco, Pecora, or USG.

3. Corner Beads: Metal, equal to USG Durabead No. 103, galvanized.

4. Casing Beads: Equal to USG No. 200-A, galvanized. 5.

5. Control Joint: Equal to USG No. 093, galvanized.

6. Hanger Wire: Annealed galvanized wire, of gauges indicated (or required to suit application) to rigidly support ceiling components in place.

B. Joint Treatment and Texture Materials

1. Joint Tape:

a. ASTM C 475 or FS SS-J-570, Type II, perforated tape.

b. Joint compound:

1. ASTM C 475 or FS SS-J-570, Type I.

2. Acceptable Product:

i) Taping compound: USG Durabond Joint Compound Taping.

ii) Topping: USG Joint Compound-All Purpose.

C. Reveal Moldings

1. Extruded aluminum, 6063 T5 alloy, clear anodized unless otherwise noted, in profiles as indicated on the Drawings, as made by Pittcon or Fry Reglet.

**PART 3 - EXECUTION**

3.01 INSPECTION

A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings and instructed by the manufacturer.

B. Beginning of installation means acceptance of existing substrate.

3.02 METAL STUD INSTALLATION

A. Follow recommendations of U.S. Gypsum Co., "Gypsum Construction Handbook".

B. Install studding in accordance with ASTM C 754, GA-201, GA- 216, and GA-600.

C. Metal Stud Spacing: 16 inches on center, unless otherwise noted in schedule or on Drawings. Locate studs maximum of 2 inches from door frames, abutting partitions, corners, and other construction features.

D. Stud to Structure: Refer to Drawings for indication of partitions extending stud framing through the ceiling to the structure above. Provide vertical deflection accommodating devices where each stud connects to structural members above.

E. Stud to Ceiling: Refer to Drawings for indication of partitions extending to finished ceiling only and for partitions extending through the ceiling to the structure above.

F. Door Opening Framing: Install double studs at door frame jambs. Install stud tracks on each side of opening, at frame head height, and between studs and adjacent studs.

G. Blocking: Screw wood blocking to studs. Bolt or screw steel channels to studs. Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, shelving, toilet accessories, and hardware.

H. Coordinate installation of bucks, anchors, blocking, electrical and mechanical work placed in or behind partition framing.

I. Stud Connections: Secure studs to runners with screws at door and window frames, partition intersections and corners. Where required for additional height, splice studs by nesting a minimum lap of 18 inches and attach flanges together with 2 screws in each flange. Prevent structural loading of stud systems.

J. Restroom Chase Wall Studs: Position double row of studs vertically in runners so that studs are opposite each other in pairs with flanges pointed in same direction. Space at 16 inches on center unless otherwise noted. Anchor each stud to runner flanges with screws. Cross brace between rows of studs with wallboard, 12 inches by chase width, screw attached to stud webs at quarter points in partition height, with 1 inch screws spaced 8" off center in each stud web.

K. Seismic Requirements: Provide lateral bracing and other measures in accordance with seismic requirements of applicable codes and regulations.

3.03 WALL FURRING INSTALLATION

A. Erect wall furring for direct attachment to concrete block and concrete walls.

B. Erect furring channels vertically. Secure in place on alternate channel flanges at maximum 24 inches on center.

C. Space furring channels maximum 16 inches off center, not more than 4 inches from floor, ceiling lines and abutting walls.

D. Erect free-standing metal stud framing tight to concrete and concrete masonry walls, attached by adjustable furring brackets in accordance with manufacturer's instructions.

3.04 FURRING FOR FIRE RATINGS

A. Install furring as required for fire resistance ratings indicated.

3.05 SHAFT WALL INSTALLATION

A. Shaftwall Framing: In accordance with manufacturer's installation instructions. Space studs at 16 inches on center. Cut so that studs are no more than 1/2 inch shorter than rough opening.

3.06 CEILING FRAMING INSTALLATION

A. Install in accordance with ASTM C 754, GA-201, GA-216, and GA-600 and manufacturer's instructions.

B. Coordinate location of hangers with other work. Use 9 gage wire for single layer wall board, and 8 gage wire for double layer. Space at maximum 48 inches on center each way, unless ceiling framing occurs at more frequent intervals.

C. Install ceiling framing independent of walls, columns, and above-ceiling work. Locate members within 6 inches of walls. Unless shown otherwise, use 1-1/2 inch cold-rolled channels, 2 inch on double layer board, at 48 inches off center main framing with furring channels at 24 inches on center, 16 inches on center for double layer board.

D. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.

E. Laterally brace entire suspension system.

3.07 ACOUSTICAL ACCESSORIES INSTALLATION

A. Install resilient channels at maximum 24 inches on center. Locate joints over framing members.

B. Place acoustical insulation in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions.

C. Install acoustical sealant at wall perimeter of designated partitions as follows:

1. Metal Framing: Two beads at contact area at intersecting walls, floors and ceilings.

2. Base Layer Gypsum Board: One bead.

3. Seal penetrations of partitions by conduit, pipe, ductwork, rough-in boxes, and access door frames.

3.08 GYPSUM BOARD INSTALLATION

A. Install gypsum board in accordance with GA 201, GA 216, GA-600 and U.S.G. "Gypsum Construction Handbook".

B. Erect interior board horizontally if space is small so as to avoid end butt joint; otherwise install gypsum board vertically, with ends and edges occurring over firm bearing. Stagger end joints to occur at different locations on opposite sides of wall. Apply board to suspended ceilings with long dimension at right angles to framing.

C. Erect exterior gypsum sheathing horizontally, with edges butted tight and ends occurring over firm bearing. Abut boards without forcing. Neatly fit ends and edges of boards and make cuts and penetrations so that paper facing and gypsum core are not damaged.

D. Use screws when fastening gypsum board to metal furring or framing and nails to wood studding. Stagger fasteners opposite each other on adjacent ends and edges. Space fasteners as recommended in U.S.G., "Gypsum Construction Handbook". Do not attach gypsum board to top track on partitions extending from floor to structure above.

E. Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum ceiling board with sealant.

F. Place control joints at changes in back-up material, at maximum 20'-0" off center in exterior walls , and at maximum 30'- 0" off center at interior partitions. In ceilings, install at maximum 30'-0" off center each way. Provide fire resistant protections behind control joints in fire rated assemblies.

G. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

H. On fire rated assemblies, seal penetrations and make air-tight. Refer to Section 07840 for firestopping requirements and materials.

I. Thicken partitions to eliminate wall surface jogs for the full length of the wall within a room to conceal structural members, pipes, panels, specialty items, and accessories.

J. Coordinate door and other frame thicknesses as required.

3.09 JOINT TREATMENT

A. Tape, fill, and sand exposed joints, edges, and corners to produce surface ready to receive finishes. The intent is to provide the highest quality of joint treatment work consistent with commercial construction. Leave surfaces smooth, uniform, and free of fins, depressions, ridges, cracks, and other imperfections.

B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.

C. Levels of Finish:

1. Comply with GA-214; italicized commentary is excluded; replace words "may" and "should" with "shall."

2. Locations to receive Level 4 finish: Areas to be painted.

3. Locations to receive Level 3 finish: Areas to receive moisture resistant gypsum board used as a tile substrate.

4. Locations to receive Level 2 finish: Fire-rated, sound-rated, and smoke-rated assemblies in ceiling plenums and concealed areas.

5. Locations to receive Level 1 finish: Non-fire-rated, non-sound-rated, and non-smoke-rated assemblies in ceiling plenums and concealed areas.

## 3.10 TOLERANCES

A. Maximum Variation from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

# SECTION 09511 - SUSPENDED ACOUSTICAL CEILINGS

## PART 1 - GENERAL

1.01 Work Included

A. Suspended metal grid ceiling system.

B. Acoustical tile panels.

1.02 Related Work

A. Air diffusion devices in ceiling system.

B. Light fixtures in ceiling system.

1.03 References

A. ASTM C635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

B. ASTM C636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

C. UL - Underwriter's Laboratories System Ratings.

1.04 Quality Assurance

A. Manufacturer: Company specializing in the manufacture of ceiling suspension system and ceiling tile panels, three years minimum experience.

B. Installer: Company shall have experience installing the approved manufacturer.

1.05 Regulatory Requirements

A. Conform to applicable code for fire rated assembly where required.

1.06 Submittals

A. Submit shop drawings and product data for review.

B. Indicate on shop drawings, grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to system.

C. Provide product data on metal grid system components, and acoustic units.

D. Submit samples to Owner and Architect for review.

E. Submit manufacturer's installation instruction.

1.07 Environmental Requirements

A. Maintain uniform temperature of minimum 60 degree F (16 degrees C), and humidity of 20 to 40 percent prior to, during, and after installation.

1.08 Sequencing/Scheduling

A. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated and overhead work is completed, tested, and approved.

B. Schedule installation of acoustic units after interior work is dry.

1.09 Extra Stock

A. Provide one carton [of each type used] extra tile panels to Owner.

**PART 2 - PRODUCTS**

2.01 Manufacturer - Suspension System

A. Suspension system shall be from the same manufacturer as acoustic units.

2.02 Suspension System

A. Armstrong "15/16" Prelude ML" exposed tee system for square lay-in units.

B. Grid Finish: White

C. Support Channels and Hangers: Size and type to suit application, to rigidly secure acoustic ceiling system including integral mechanical electrical components with maximum deflection of 1/360.

2.03 Acoustic Units

A. Armstrong "Fine Fissured" #1713, 24"x24"x¾", square lay-in, color: white, or approved equal.

Specifications:

1. Composition: . . . . . Wet-formed mineral fiber
2. Light Reflectance: . . . . . 0.85
3. NRC : . . . . . 0.55
4. CAC : . . . . . 33
5. Classification: . . . . . ASTM E1264, Type III, Form 2, Pattern CE
6. Fire Resistance: . . . . . Class A

## PART 3 - EXECUTION

3.01 Inspection

A. Verify that existing conditions are ready to receive work.

B. Verify that layout of hangers will not interfere with other work.

C. Beginning of installation means acceptance of existing conditions.

3.02 Installation

A. Install system in accordance with ASTM C636 manufacturer's instructions and as supplemented in this Section.

B. Install system capable of supporting imposed loads to a deflection of 1/360 maximum.

C. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.

D. Supply hangers or inserts for installation of mechanical and electrical if metal deck is not supplied with hanger tabs, coordinate the installation of hanger clips during steel deck erection. Provide additional hangers and inserts as required.

E. Hang system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts are other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers (and related carrying channels) to span the extra distance.

G. Center system on room axis leaving equal border units, unless otherwise directed by reflected ceiling plan.

H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

I. Do not eccentrically load systems, or produce rotation of runners.

J. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.

K. Form expansion joints as required.

L. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.

M. Install acoustic units level, in uniform plane, and free from twist, warp and dents.

3.03 Tolerances

A. Variation from flat and level surface: 1/8 inch in 10 ft.

End of Section

## SECTION 09650 - RESILIENT FLOORING

## PART 1 - GENERAL

1.01 SUMMARY

B. Extent of resilient flooring and accessories as shown on Drawings and Specified herein.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for resilient flooring and accessories in accordance with Section 01300.

B. Samples: Submit, for verification purposes, samples of each type, color and pattern of resilient flooring and accessory required, indicating full range of color/pattern variation.

C. Maintenance Instructions: Submit copies of manufacturer's recommended maintenance practices for each type of resilient flooring required to Owner.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of standard quality of manufacturers as specified. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

B. Provide materials and adhesives which do not contain asbestos.

## PART 2 - PRODUCTS

2.01 MATERIALS - Refer to Finish Schedule on drawings for colors and styles of floor finishes.

A. Vinyl Composition tile: Shall be 12" x 12" x 1/8" thick, conforming to Fed. Spec. SS-T-312B(1), Type IV Comp 1, and ASTM-F-1066, Comp 1, Class 2.

B. Vinyl Cove Base: Shall be 4" top-set cove base, 1/8" gauge, complying with FS-SS-W-40, Type II.

C. Resilient Edge Strips: 1/8" thick, homogeneous vinyl or rubber, tapered or bullnose edge, color to match flooring, or as selected by Architect from standard colors available.

D. Adhesives: Waterproof, stabilized type as recommended by flooring manufacturer to suit material and substrate conditions.

E. Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.

F. Leveling Compound: Latex type as recommended by flooring manufacturer.

## PART 3 - EXECUTION

### 3.01 PREPARATION

A. Inspection

7. Make a thorough examination of surfaces to receive resilient flooring. If surfaces are defective and will not permit a proper finished installation, immediately notify the Architect in writing, or assume responsibility for and rectify any resulting unsatisfactory condition.

8. Inspect floor for holes, cracks and smoothness. Test for dryness. Do not proceed with laying until subfloors are dry and smooth, holes and cracks filled.

B. Maintain a minimum temperature of 65°F in spaces to receive resilient flooring for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Store resilient flooring materials in spaces where they will be installed for at least 48 hours before beginning installation. Subsequently, maintain minimum temperature of 55°F in areas where work is completed.

C. Prepare surfaces by cleaning, leveling and priming as required. Test adhesive for bond before general installation. Level to 1/8" in 10' tolerance.

### 3.02 INSTALLATION

A. Comply with manufacturer's instructions and recommendations. Install in proper relation to adjacent work. Extend flooring into toe spaces, door reveals, and into closets and similar openings.

B. Tile Floors

1. Lay tile from center marks established with principal walls, discounting minor offsets, so that tile at opposite edges of room are of equal width. Adjust as necessary to avoid use of cut widths less than ½ tile at room perimeters.

a. Lay tile square to room axis, unless otherwise shown.

b. Lay tile in "checkerboard" fashion with grain reversed in adjacent tiles.

2. Match tile for color and pattern by using tile from cartons in same sequence as manufactured and packaged if so numbered. Cut tile neatly around all fixtures. Broken, cracked, chipped or deformed tiles are not acceptable.

3. Adhere tile flooring to substrates using full spread of adhesive applied in accordance with flooring manufacturer's recommendations.

C. Vinyl Cove Base shall be cemented to backing in full, using adhesive as recommended by manufacturer. Use pieces of base in as long of lengths as practical. At completion, all base shall be in perfect alignment, in contact with flooring, and securely adhered to backing throughout its length.

D. Resilient Edge Strips: Wherever resilient flooring adjoins concrete floors at exposed edges, install manufacturer's standard beveled edging strips. Cement securely in place against edge of exposed tile or sheet products.

3.03 CLEANING AND PROTECTION

A. Remove any excess adhesive or other surface blemishes, using neutral type cleaners as recommended by manufacturer.

B. Wax and machine buff to high shine, using self-polishing polymeric floor finish as recommended by the manufacturer.

C. Protect all resilient flooring after installation as required with approved non-staining coverings.

3.04 EXTRA STOCK

A. Provide the Owner with the following: one (1) unopened carton of each vinyl tile selection specified on this project.

End of Section

## SECTION 09681 - MODULAR CARPET

## PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Carpet Tile as specified on the drawings.
   1. Moldings, adhesives cements for glued-down installation.

B. Specified in Other Sections:
   1. Wall Base.
   2. Transition edges

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's complete technical product data for each type of edge trim, tack strip, cement and adhesive types and other related materials necessary to complete the installation.

B. Submit carpet samples for verification of color and patterns:

1.03 QUALITY ASSURANCE

A. Products and methods of installation specified herein are compatible with and approved by carpet manufacturer.

B. General Terminology/Information Standard: Carpet and Rug Institute's "Carpet Specifier's Handbook".

C. Flame/Smoke Resistance Standards: Provide materials meeting the following test rating standards as required Building Code Requirements.

   1. Pill Test: ASTM D 2859, or DOC FF-1-70.
   2. Floor Radiant Panel Test: ASTM E 648, with minimum average radiant flux ratings not less than 0.22 watts/sq. cm.
   3. Smoke Density Test: ASTM E 662 or NFPA No. 258 rating within limit required by governing regulation.

1.04 PRODUCT HANDLING

A. Contractor is responsible for receiving and handling, on-site, all carpet materials furnished by Owner.

   1. For each material delivery, the Contractor shall fill out receiving reports furnished by Owner. Each delivery shall be inspected for damage. All damage shall be noted on the carriers delivery slips and shall be forwarded to the Construction Manager immediately upon receipt of delivery. If damaged material is not reported when discovered, the Contractor assumes full responsibility.

B. Storage areas shall be secure and dry with temperatures maintained above 65°F at all times.

1.05 PROJECT CONDITIONS

A. Coordination: Coordinate this Work with the Work of other Sections to avoid any delay or interference with other Work.

B. Maintain 70°F. during and 24 hours before and after installation. Maintain temperature of 55°F and a relative humidity range of 35% to 50% in completed areas.

C. Notify Construction Manager of any defects, mismarking or evidence of damage to carpet materials or appearance of moisture, mildew or fungus.

1.06 WARRANTY

A. Warrant carpet installation for one year from opening date of facility from becoming unserviceable or causing an objectionable appearance resulting from defects such as:

1. Release from the substrate.
2. Bunching and rippling.
3. Opening of seams.

1.07 MAINTENANCE MATERIALS

A. Deliver 20 carpet squares of each carpet type to Owner at completion of installation for his reserve supply. In addition save squares over 1/2 square in size for the Owner's reserve.

**PART 2 - PRODUCTS**

2.01 ACCEPTABLE PRODUCTS

A. Carpet Tile: See Architectural drawings Finish Schedule for materials to be provided.

2.02 CARPET ACCESSORIES

A. Adhesive:

1. Water resistant, non-staining type meeting flammability requirements for installed carpet.
2. Acceptable Products: Adhesive as recommended by Manufacturer of modular carpet tiles.

**PART 3 - EXECUTION**

3.01 PREPARATION

A. Repair minor holes, cracks, depressions and rough areas using material recommended by carpet and adhesive manufacturer. Remove contaminants and dirt. Prepare floor as recommended by carpet manufacturer. Leave floor clean and dry.

3.02 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for joint locations and carpet direction. Maintain uniformity of carpet direction and lay of pile. Center joints at door openings.

B. Extend carpet under open-bottomed obstructions and under removable flanges and furnishings, and into alcoves and offsets of each space.

1. Install edge guard with epoxy where carpeting ends against other materials. Center edge guard under doors in door openings.

C. Provide cutouts where required. Install edge guards where edge of carpet is exposed.

3.03 GLUE-DOWN INSTALLATION

A. Test substrate to demonstrate effectiveness of adhesive. Remove sample demonstrating procedure to minimize damage to carpet. Apply primer to entire substrate as necessary for adequate bond of carpet.

B. Layout carpet tile prior to adhering. Maintain straight joints, true with lines of building. Except where patterns are indicated, install carpet squares centered in space in both directions. However, no edge tiles shall be cut to less than 1/2 of their width. Carpet tiles shall be laid with 5 adhesive spots per tile. Unless otherwise indicated, install tiles with the nap all running in the same direction.

C. Securing base of pile at cut edges with seaming cement without evidence on carpet face.

D. Apply adhesive to substrate in accordance with manufacturer's instructions. Butt carpet edges tightly together to form joints without gaps. Roll lightly to eliminate air pockets and ensure uniform total-area bond of carpet to substrate. Remove adhesive (if any appears) promptly from face of installed carpet.

3.04 SUBSEQUENT OPERATIONS

A. Remove and dispose of debris and all cut squares less than 1/2 square in size.

B. Vacuum carpet using commercial machine with face-beater element. Remove spots and replace carpet where spots cannot be removed. Remove protruding face yarn.

END OF SECTION

# SECTION 09900 - PAINTING

## PART 1 - GENERAL

### 1.01 DESCRIPTION OF WORK

A. Extent of painting work is shown on drawings and schedules, and as herein specified.

B. The work includes painting and finishing of interior and exterior exposed items and surfaces throughout Project, except as otherwise indicated.

1. Surface preparation, priming, and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.

C. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate, or finish coats.

D. Surfaces to be Painted: Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces whether or not colors as designated in "schedules". Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect will select these from standard colors or finishes available.

E. Do not paint over any code-required labels such as Underwriters Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

### 1.02 QUALITY ASSURANCE

A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer on published product data pages, and use only within recommended limits.

B. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used. Test existing surfaces scheduled to receive new paint or epoxy coating to insure compatibility of new primer and paint system.

C. Employ only experienced and competent mechanics.

D. Field Quality Control: Prepare and finish a sample area or room as directed. Finish in accordance with specification requirements for Architect's approval of materials, color and workmanship. Approved area or room shall serve as Project Standard.

## 1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use.

B. Provide Owner at completion of job, one gallon of paint of each color selected. Provide original unopened labeled containers with color sample and list of room numbers where used.

## 1.04 DELIVERY AND STORAGE

A. Deliver materials to job site in original, new, and unopened packages and containers bearing manufacturer's name and label, and following information:
   1. Name or title of material.
   2. Federal Specification number, if applicable.
   3. Manufacturer's stock number and date of manufacturer.
   4. Manufacturer's name.
   5. Contents by volume, for major pigment and vehicle constituents.
   6. Thinning instructions.
   7. Application instructions.
   8. Color name and number.

B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue.
   1. Protect from freezing where necessary. Keep storage area neat and orderly. Remove oily rags and waste daily. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing, and application of paints.

## 1.05 JOB CONDITIONS

A. Coordinate with other trades to insure adequate ventilation and dust-free environment during application and drying of paint.

B. Maintain temperature and humidity within Manufacturer's recommended tolerances.

C. Do not apply paint in snow, rain, fog, or mist; or when humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by paint manufacturer's printed instructions.
   1. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

D. Painting Contractor shall provide stand mounted, high intensity, portable lighting for their use during painting to provide adequate illumination.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide paint products of one of the following:
   1. Glidden Professional
   2. Porter Paints
   3. PPG
   4. Benjamin Moore and Co.
   5. The Sherwin-Williams Company

### 2.02 MATERIALS

A. Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.
   1. Proprietary names used to designate colors or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers.

## PART 3 - EXECUTION

### 3.01 INSPECTION

A. Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Applicator.

B. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.

C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

### 3.02 SURFACE PREPARATION

A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.

   1. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify Architect in writing of any anticipated problems in using the specified coating systems with substrates primed by others.

   2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.

3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease in accordance with SSPC SP-1, prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.

B. Cementitious Materials: Prepare cementitious surfaces of concrete, concrete block, to be painted by removing efflorescence, chalk, dust, dirt, grease, oils in accordance with ASTM D 4258/D 4259/D 4261 (CMV).

1. Determine alkalinity and moisture content of surfaces to be painted by performing ASTM D 4262. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

C. Wood: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.

1. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.

2. When transparent finish is required, use spar varnish for backpriming.

3. Seal tops, bottoms, and cut-outs of unprimed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to job.

D. Ferrous Metals: Clean ferrous surfaces which are not galvanized or shop-coated of oil, grease, dirt, loose mill scale, and other foreign substances by solvent or mechanical cleaning in accordance with SSPC SP-1.

1. Touch up shop-applied prime coats wherever damaged or bare, where required by other sections of these specifications.
   a. Clean and touch-up with same type shop primer.

E. Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent such as Great Lakes Laboratories "Clean N' Etch".

## 3.03 MATERIALS PREPARATION

A. Mix and prepare painting materials in accordance with manufacturer's directions.

B. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3.04 APPLICATION

A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in "Schedules" of the Contract Documents.

2. Provide finish coats which are compatible with prime paints used.

3. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint, until paint film is of uniform finish, color, and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces. Dry film thickness will be measured according to SSPC PA-2.

4. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.

5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat non-specular black paint such as Sherwin-Williams: PM 400 Black, B30 or B400.

6. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.

7. Finish exterior doors on tops, bottoms, and side edges same as exterior faces unless otherwise indicated.

8. Sand lightly between each succeeding enamel or varnish coat.

9. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted unless otherwise indicated.

B. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

C. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer. Dry film thickness will be measured according to SSPC PA-2.

D. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to those items exposed in mechanical equipment rooms and in occupied spaces, and exposed exterior work that is not factory finish painted.

E. Prime Coats: Apply prime coat of material which is required to be painted or finished, and which has not been prime coated by others.

1. Re-coat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

F. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

G. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats unless otherwise indicated.

H. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

## 3.05 CLEAN-UP AND PROTECTION

A. Clean-Up: During progress of work, remove from site discarded paint materials, rubbish, cans, and rags at end of each work day.

1. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

B. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

1. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

2. At the completion of work of other trades, touch up and restore all damaged or defaced painted surfaces.

3.06 ADJUST AND CLEAN

A. Clean surfaces of spills, splatters, drips and stains from painting application.

B. Replace and adjust finish hardware, accessories, fixtures and similar items removed from work.

C. Touch-up damaged paint surface prior to acceptance of building by the Owner. Mix or thin touch-up paint as recommended by the Manufacturer and blend into existing paint.

3.07 PAINT SYSTEMS

A. Paints listed are those of Glidden Professional unless noted otherwise.
Painting subcontractor wishing to use other products must submit their "or equal" for review during the bidding process. Please note that ***colors have been selected***.

B. Exterior Coating Systems:

1. Ferrous Metals

Primer: 4160-1000 Devguard Multi-Purpose Tank & Structural Primer 2-2.5 DFT
1st Coat: 4160-1000 Devguard Multi-Purpose Tank & Structural Primer @ 2.0-2.5 mils dft
2nd Coat: 4308-0100 Devguard Alkyd Industrial Enamel @ 2.0-2.5 mils dft per coat
3rd Coat: 4308-0100 Devguard Alkyd Industrial Enamel @ 2.0-2.5 mils dft per coat

a. Typical Applications: Overhead doors and frames, steel doors and frames, piping, pipe railing, miscellaneous metals.

2. Zinc Coated Metals

Primer: 4160-1000 Devguard Multi-Purpose Tank & Structural Primer @ 2.0-2.5 mils dft
1st Coat: 4308-0100 Devguard Alkyd Industrial Enamel @ 2.0-2.5 mils dft per coat
2nd Coat: 4308-0100 Devguard Alkyd Industrial Enamel @ 2.0-2.5 mils dft per coat

3. Concrete Block

Provide clean and dulled surface for application of new paint as recommended by paint manufacturer.
1st Coat: 4000-1000 Bloxfil 4000 Heavy Duty Block Filler @ 7.0-14.5 mils dft
2nd Coat: 4206-0100 Devflex Interior/Exterior Waterborne Acrylic Semi-Gloss @ 1.5-2.0 mils dft
3rd Coat: 4206-0100 Devflex Interior/Exterior Waterborne Acrylic Semi-Gloss @ 1.5-2.0 mils dft

C. Interior Coating Systems:

1. Interior Ferrous Metal: Door Frames, Miscellaneous Metals: 2 coats of an all purpose industrial enamel, over a fast drying, rust inhibitive alkyd enamel.

   1st Coat: 4160-1000 Devguard Multi-Purpose Tank & Structural Primer @ 2.0-2.5 mils dft
   2nd Coat: 4308-0100 Devguard Alkyd Industrial Enamel @ 2.0-2.5 mils dft per coat
   3rd Coat: 4308-0100 Devguard Alkyd Industrial Enamel @ 2.0-2.5 mils dft per coat

2. Interior Gypsum Drywall (semi-gloss): 2 coats of an interior waterborne acrylic semi-gloss, durable and non-yellowing, over an interior vinyl acrylic latex wall primer.

   1st Coat: 1000-1200 Prep & Prime Interior Latex Wall Primer Sealer @ 1.2-1.5 mils dft
   2nd Coat: 1406-0100 Dulux Pro Premium Semi-Gloss Interior Enamel @ 1.5 mils dft
   3rd Coat: 1406-0100 Dulux Pro Premium Semi-Gloss Interior Enamel @ 1.5 mils dft

3. Interior Gypsum Drywall (flat): 2 coats of an interior latex flat, durable and non-yellowing, over an interior latex wall primer.
   Primer: 1000-1200 Prep & Prime Interior Latex Wall Primer Sealer @ 1.2-1.5 mils dft
   1st Coat: 1200-0100 Dulux Pro Premium Interior Flat Latex Finish @ 1.4-2.0 mils dft
   2nd Coat: 1200-0100 Dulux Pro Premium Interior Flat Latex Finish @ 1.4-2.0 mils dft

4. Interior Gypsum Drywall (eggshell): 2 coats of an interior latex eggshell, durable and non-yellowing, over an interior latex wall primer.

   Primer: 1000-1200 Prep & Prime Interior Latex Wall Primer Sealer @ 1.2-1.5 mils dft
   1st Coat: 1402-0100 Dulux Pro Premium Eggshell Enamel Finish @ 1.5 mils dft
   2nd Coat: 1402-0100 Dulux Pro Premium Eggshell Enamel Finish @ 1.5 mils dft

5. Galvanized Metal: 2 coats of an interior waterborne acrylic semi-gloss, durable and non yellowing
   1st Coat: 4020-0100 Deflex DTM Flat Interior/Exterior Primer & Finish @ 2.2-3.5 mils dft
   2nd Coat: 4216-0100 Devflex HP Waterborne Acrylic Semi-Gloss @ 1.5-4.0 mils dft

6. Aluminum: 2 coats of an interior waterborne acrylic semi-gloss, durable and non yellowing.

   1st Coat: 4216-0100 Devflex HP Waterborne Acrylic Semi-Gloss @ 1.5-4.0 mils dft
   2nd Coat: 4216-0100 Devflex HP Waterborne Acrylic Semi-Gloss @ 1.5-4.0 mils dft

7. Wood-Closed Grain: Stained: 2 coats of a satin waterborne polyurethane over an interior oil based stain.

   1st Coat: 1700-0000 WoodPride Interior Oil Wood Stain
   2nd Coat: 1802-0000 WoodPride Interior Aquacrylic Satin Varnish
   3rd Coat: 1802-0000 WoodPride Interior Aquacrylic Satin Varnish

8. Sealed Concrete Floors: 2 coats of waterbased coating, clear finish – #3214 Groundworks waterbased concrete sealer by Glidden Professional.
   Note: Concrete must cure 45 days. Smooth-troweled concrete must be etched with muriatic acid prior to finishing. Do not apply to areas scheduled to receive flooring.

9. Concrete Floors with Epoxy Coating: 2 coats of epoxy coating over 2 coats of epoxy primer/sealer.

   1st & 2nd Coat: AMERLOCK Sealer (PPG) penetrating epoxy primer sealer (2 mils dft per coat)

   3rd & 4th Coat: Novaguard 840, two-component solvent free amine cured novolac phenolic epoxy coating (8-10 mils dft per coat)

END OF SECTION

# DIVISION V - METALS

## SECTION 05120 - STRUCTURAL STEEL

### PART I - GENERAL

A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this section.

### PART 2 - RELATED WORK SPECIFIED ELSEWHERE

A. Grouting under base and bearing plates, Division 3.

### PART 3 - FURNISHED BUT INSTALLED ELSEWHERE

A. Anchor bolts, loose bearing plates which will be installed under Division 3.

### PART 4 - REQUIREMENTS FOR REGULATORY AGENCIES

A. AISC Specification Structural Steel for Buildings shall mean AISC Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings, current edition.

B. Specification for Structural Joints shall mean "Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts, approved by the Research Council on Riveted and Bolted Joints of the Engineering Foundation, current edition.

C. AWS Building Code shall mean AWS "Code for Welding in Building Construction", DI .0-69.

### PART 5 - QUALIFICATIONS

A. Welding procedures, welders, welding operations and tackers shall be qualified in accordance with AWS Building Code.

### PART 6 - SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings indicating all shop and erection details, including cuts, copes, connection, holes, threaded fasteners and welds.

2. All welds, both shop and field shall be indicated by AWS "Welding Symbols" A2.0-68.

B. Erection Procedure: Submit descriptive data to illustrate the structural steel erection procedure, including the sequence of erection and temporary staying and bracing.

C. Welding Procedure: Submit written description as required to illustrate each welding procedure to be performed in the specified work.

D. Field Welding Equipment: Submit descriptive data for field welding equipment, including

type, voltage and amperage.

E. Reports of mechanical tests for high strength threaded fasteners.

## PART 7 - PRODUCT HANDLING

A. Delivery of materials to be installed under other sections:

1. Anchor bolts and other anchorage devices which are embedded in cast-in-place concrete or masonry construction shall be delivered to the project site in time to be installed before the start of cast-in-place concrete operations or masonry work.

2. Provide setting drawings, templates, and directions for the installation of the anchor bolts and other devices.

B. Storage of Materials:

1. Structural steel members which are stored at the project site shall be above ground on platforms, skids or other supports.

2. Steel shall be protected from corrosion.

3. Other materials shall be stored in a weathertight and dry place, until ready for use in the work.

4. Packaged materials shall be stored in their original unbroken package or container.

## PART 8 - MATERIALS

A. Steel Shapes, Bars and Plates:

1. ASTM A 36-69.

B. Structural steel, fabrication and erection shall comply with the American Institute of Steel Construction, Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.

C. Anchor Bolts: Conform to Section IC of ASTM A 307-68

D. High-Strength Threaded Fasteners: ASTM A 325-74.

E. Filler Metals for Welding:

1. Shielded metal-arc welding: AWS A5.1-69 or A5.5-69.

2. Submerged arc welding: AWS A5.17-69.

F. Shop Paint Primer:

1. Standard Primer: SSPC Paint 14-64T.

G. All bolted connections shall be of high strength bolts conforming to ASTM A 325 and shall be bearing type with threads excluded from shear plane.

H. All structural steel shall be accurately set and properly secured in place. Field connections of steel work shall be welded or bolted with high strength bolts, size as called for on the drawings. Connections shall be as detailed. All welding to be done by certified welders with at least five years experience in structural welding, and in a neat workmanlike manner.

**PART 9 - FABRICATION**

A. Fabricate Structural Steel in accordance with the AISC Specification with the modifications and additional requirements specified in this section:

1. Shop and field welding shall conform to AWS and AISC Standards and Specifications.

B. Shop connections shall be welded.

C. Field Connections:

1. Provide bolted, except where welded connections are indicated.

2. High strength threaded fasteners shall be used for bolted connections, except where standard threaded fasteners are permitted.

D. High-Strength Bolted Construction Assembly:

1. Tightening shall be done in accordance with Section 5 of Specifications for Structural Joints.

E. Welded Construction:

1. Welding process shall be limited to one or a combination of the following:

a. Manual shielded-arc.

b. Submerged arc.

F. Column Bases shall be milled and attached to columns.

G. Shop Painting:

1. Shop paint all steelwork.

2. Steelwork to be painted shall receive a one-coat shop paint system in accordance with

SSPC Paint System PS7.0l Paint l4-64T.

## PART 10 - ERECTION

A. Erect structural steel in accordance with the AISC Specifications with modifications and additional requirements of this section:

B. Column Bases and Bearing Plates:

1. Attached column bases and bearing plates for beams and similar structural members shall be aligned with wedges or shims.

2. Loose column bases and bearing plates which are too heavy to be placed without a derrick or crane shall be set and wedged or shimmed.

C. Erection Tolerances:

1. Individual pieces shall be erected so that the deviation from plumb, level and alignment shall not exceed l to 500.

D. Field Assembly:

1. The various members forming parts of a complete frame or structure after being assembled shall be aligned and adjusted accurately before being fastened.

2. Fastening of splices of compression members shall be done after the abutting surfaces have been brought completely into contact.

3. Bearing surfaces and surfaces which will be in permanent contact shall be cleaned before the members are assembled.

4. Splices shall be permitted only where indicated.

5. Field connections, field welds, and shear connectors shall be as specified in "Fabrication."

6. Erection bolts used in welded construction shall be tightened and left in place.

E. Gas Cutting: Field correcting of fabrication by gas cutting shall not be permitted on any major member in the structural framing without prior approval of the Architect.

## PART 11 - TOUCH-UP PAINTING

A. Immediately after erection, clean field welds, bolted connections, and abraded areas of the shop paint, and paint all exposed areas with the same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

End of Section

## SECTION 05500 - MISCELLANEOUS METALS

### PART 1 - SCOPE

A. This Section includes the furnishing and installation of all miscellaneous metal items required for the project as shown on the Drawings and specified herein.

### PART 2 - COORDINATION

A. Coordinate furnishing of items specified hereunder with work of other trades so that progress of related work is not delayed.

B. Take field measurements at the job as necessary to insure fit.

### PART 3 - MATERIALS

A. Stock or manufacturer's standard items shall be as described under individual item specifications hereunder.

B. Fabricated items, made especially for this project, shall meet general materials specifications as listed hereunder. Materials shall be of the type, class, temper, etc., which best suit intended uses.

1. Steel shall conform to ASTM Specification A-7 or A-36 for structural steel. Architectural and miscellaneous steel not otherwise indicated or specified shall be mild steel.

   Shop Drawings and Data: Show complete details and instructions for fabrication, assembly, and installation. Locate anchor bolts required for installation in other work.

   Inserts and Anchorages: Furnish inserts and anchoring devices to be built into other work for installation of miscellaneous metal items.

   Steel Plates, Shapes, Bars: ASTM A 36

   Tubular Steel Items: Square and rectangular, ASTM A 501; pipe, ASTM A 120.

   Cold-Rolled Steel Sheets: ASTM A 366.

   Galvanized Steel Sheets: ASTM A 526, with ASTM A 525 G90 zinc coating.

   Concrete Inserts: Malleable iron (ASTM A 47) or cast steel (ASTM A 27) inserts, with steel bolts, washers and shims; hot dip galvanized.

Shop Paint: FS TT-P-86, Type 2; or, SSPC-Paint 14. Apply to prepared steel surfaces at rate to provide a 2.0-mil dry film thickness.

Galvanizing: ASTM A 386 for assembled products; A 153 for iron and steel hardware.

Fabrication, General: Use materials of size and thickness shown. Shop-paint all items not specified to be galvanized after fabrication.

Curb Edge Bars: Fabricate of shapes as shown; miter corners and weld joints. Provide anchors 6" from ends of corners and 24" o.c.

Loose Bearing Plates: Provide for steel items bearing on masonry or concrete, as shown. Drill plates to receive anchor bolts.

Miscellaneous Framing and Supports: Provide as required to complete work and not included with structural steel framework.

Steel Pipe Railings: Fabricate to dimensions shown, with smooth bends and welded joints. Use 1-1/2" steel pipe unless otherwise shown.

Installation: Perform cutting, drilling, and fitting required for installation; set work accurately in location, alignment and elevation, measured from established lines and levels. Provide anchorage devices and fasteners where necessary for installation to other work.

## PART 4 - SHOP PAINTING AND PROTECTIVE COATING

A. All ferrous metal shall be properly cleaned and given one shop coat of red lead, zinc chromate, or other approved rust resisting paint. Anchors that are built into masonry or concrete shall be coated with asphalt paint unless specified to be galvanized. Where galvanized or zinc coated metal is required, it shall not be shop primed unless specifically called for, but all abraded places and welding shall be touched up with aluminum paint. No prime coat is required for non-ferrous metal.

B. Where hot-dip galvanized or hot zinc coating is specified, it shall be done in accordance with the Standard Specifications of the American Hot Dip Galvanizers Association.

## PART 5 - FASTENINGS

A. Welding. Perform all welding in accordance with American Welding Society publication AWS D1.0, latest edition with current supplements and addenda.

1. Welds shall be made only by operators experienced in performing the type work indicated.

2. Welds normally exposed to view in the finished work shall be uniformly made and ground smooth.

3. Where welding is done in proximity to glass or finished surfaces, such surfaces shall be protected from damage due to weld sparks or spatter.

B. Bolted Screwed, and Riveted Connections. In general, use bolts fro field connections only as directed. Provide washers under all heads and nuts bearing on wood. Draw all nuts tight and nick threads of permanent connections to prevent loosening. Use beveled washers where bearing is on sloped surfaces.

1. Where screws must be used for permanent connection in ferrous metal, use flat head type, countersunk.

2. Where rivets are used, they shall be machine driven, tight, heads centered, countersunk and finished flush and smooth.

## PART 6 - MISCELLANEOUS ITEMS

A. Anchoring Devices. Furnish all miscellaneous metal anchoring devices required to be built into concrete or masonry or welded to steel framing members for anchorage of collateral work which are not specified to be furnished under other sections of the Specifications. Items include, but are not necessarily limited to the following:

1. Anchor bolts for miscellaneous anchorage built into concrete or masonry not furnished under work of structural steel shall be hex-head steel machine bolts of sizes shown in the details, shall conform to ASTM A354, and shall be furnished with nuts and plate washers of size to suit the particular application.

B. Loose Lintels. Furnish all loose steel angle and/or plat lintels not furnished as part of structural steel under work of Section 05120 as required for support of masonry over openings. Members shall be of sizes shown, and, unless otherwise indicated, shall have minimum bearing at each end of 8".

End of Section

# DIVISION VI - WOOD AND PLASTIC

## SECTION 06400 - PLASTIC LAMINATE CASEWORK AND COUNTERTOPS

### PART 1 - DESCRIPTION

A. Furnish and install plastic laminate casework and countertops as shown on the drawings and specified herein.

B. Work included:

1. Casework - plastic laminate faced.
2. Plastic laminate covered countertops for wood and laminate casework.
3. Plastic laminate covered shelves.
4. Standard hardware and accessories.
5. Plastic laminate window stools throughout building at exterior windows as detailed.

C. Related work specified elsewhere:

1. Rough carpentry: Section 6100
2. Finish carpentry: Section 6200
3. Gypsum Drywall: Section 9250
4. Resilient base: Section 9650
5. Mechanical work: Division 15
6. Electrical work: Division 16
7. Metal casework: Section 11600

### PART 2 - QUALITY ASSURANCE

A. Custom plastic laminate faced casework shall match in design, material, finish and detail the stock plastic laminated casework. The materials, workmanship and installation of all casework provided under this section shall be the responsibility of this contractor.

1. The contractor providing the work described herein, may be a custom casework contractor with a casework manufacturer as a subcontractor/supplier; or a stock casework with a custom casework manufacturer as a subcontractor/supplier.

B. Any casework manufacturers requesting approval shall provide to architect, all information and specifications of the products they wish to use in bidding, ten days prior to bid date. Approval will be contingent upon whether the products meet the required specifications.

C. The architect reserves the right to disapprove any subcontracting fabricator proposed for this project. The casework contractor shall submit to the architect, prior to fabrication, a letter signed by a responsible officer of the fabricator indicating satisfactory evidence of having completed comparable work for the past five years on similar projects utilizing equipment, methods and workmanship meeting the standards specified in this section.

D. If requested by the architect, manufacturers requesting approval shall submit full size production line samples of the following units at least ten days prior to bid opening.

1. One cabinet base unit, 36" wide with door and drawer, complete with laminate top to fit.

E. Reference standards:

1. Architectural Woodworking Institute (AWI) "Quality Standards".
2. National Electrical Manufacturers Association (NEMA) "LD 1 thru LD3" High Pressure Decorative Laminates.
3. Federal Specifications (FS) "LLL-H-00810: Building Board (Hardboard), Hard Pressed, Vegetable Fiber".
4. American National Standard (ANSI) A208.1-79 "Mat-Formed Wood Particleboard".
5. Commercial Standards (CS) "C.S. 35: Adhesives".

## PART 3 - SUBMITTALS

A. Certifications: Letter of subcontractors qualifications and experience within the past five years and references of work completed.

B. Color Selection: Complete range of color, textures and patterns of the proposed plastic laminate manufacturer, based upon the preliminary color selections listed hereinafter, with architect's approval. Final approval shall be contingent upon providing colors, textures and patterns matching preliminary selections.

C. Shop Drawings: Submit shop drawings of items specified herein. Indicate: plan views, elevations, sections and details of each item; location in the building of each item; conditions in relation to adjacent materials and construction; methods of assembling sections; location and installation requirement size(s); shape and thickness of materials, joints and notations of special features; sink locations; and drawings required to illustrate deviations from the contract requirements.

D. Rough in drawings: submit separate utility rough in drawings which indicate points of connection to each utility involved. Reference dimensions from building components.

## PART 4 - PRODUCTS DELIVERY, HANDLING AND STORAGE

A. Schedule casework for fabrication and delivery to avoid delay in work progress. Delivery to job site shall not be earlier than one month before casework can be installed. Verify delivery date with general trades contractor.

B. Receive, unload, check, store, protect and distribute materials specified in this section.

C. Store materials to maintain the moisture content of the wood members between 6% and 15%. Store in areas or rooms with temperatures at 70°F ± 10°F.

D. Store under cover in a ventilated building not exposed to extreme temperature and humidity changes. Do not store or install casework until concrete, masonry and plaster work is dry.

## PART 5 - JOB CONDITIONS

A. Prior to fabrications of items of casework which are dependent upon building dimensions, take accurate field measurements of location of walls, drop soffits, columns, piers and other applicable building elements. Major discrepancies between dimensions given on the drawings and field dimensions shall be brought to the attention of the general trades contractor. Compensate for minor dimensional changes so that fabricated items can be delivered to the job, and can be scribed to fit properly.

B. In no instance shall any casework be stored or installed in any area unless the area is broom clean, closed in and possessing a relative humidity below 50% at 70°F.

## PART 6 - WARRANTY

A. Warranty in writing that defects due to use of improper materials or workmanship in casework provided under this contract for the period of one year from the date of substantial completion of the work, shall be rectified promptly by the casework contractor at his own expense upon notification of condition.

## PART 7 - GENERAL

A. Casework, both stock and custom shall be plastic laminate construction consisting of high pressure decorative laminate bonded to 3/4" thick particle board.

1. Fabrication shall comply with applicable requirements for "Custom grade" as indicated in Section 400 of the AWI architectural woodwork quality standards and guide specifications.

B. Cabinet units shall be assembled at the mill, insofar as access openings to installation location will permit. Where items must be built into sections, design the units so they can be assembled at the site into one integral item, with exposed joints flush, tight and uniform. Similar adjoining doors and drawers shall be in alignment and each door and drawer shall operate smoothly, without bind or excessive play.

C. Casework units shall be complete with bases, shelves, counter and work tops, finish and operating hardware, drawer accessories and miscellaneous accessories as indicated on the drawings and specified herein.

D. Coordination work:

1. Division 9: Provide physical openings for recessed casework.

2. Section 6100: Provide grounds and blocking necessary for attachment and support of wallmounted casework.

3. Plumbing Prime Contractor: provide lay-in sinks, faucets and fittings; templates for cutouts for installation; provide supply and waste lines including traps to rough in points based on information supplied by the casework contractor; and provide final connections.

   a. Division 15: Provide stainless steel sinks with integral with tops and backsplashes, include tailpieces, drains and strainers.

4. Electrical prime contractor: provide electrical fixtures and equipment noted on drawings including related boxes, conduit and conductors. Provide electrical components complete, terminating through the back of the casework unit either with a junction box or a 2" conduit stub. Allow conductors to protrude 8" to permit final connection by Division 16.

5. Division 16: Locate rough-ins based on information given on casework rough-in drawings and be responsible for work necessary to make final connections.

6. Division 9650: Apply resilient base to casework after casework has been installed.

7. Division 5500: Provide steel support braces.

E. Definitions shall conform to the following:

1. Exposed portions are those visible from a normal point of view when doors and drawers are closed. Interiors of open cabinets, and open shelving are considered exposed.

2. Semi-exposed portions are those areas not considered exposed, but which are visible from a normal point of view when solid doors and drawers are open. Backs of hinged doors, drawer parts except the exposed exterior front, and shelving in the storage areas are considered semiexposed.

3. Concealed portions include sleepers, web frames, dust panels and other surfaces not visible after installation.

## PART 8 - MATERIALS

A. Particle board: 45 lbs. Minimum density and of balance construction, with moisture content less than 8%. Particle board shall conform to ANSI A208.1 and meet or exceed CS-236-66, FS LLL-B-800A and ASTM D1037-78.

1. Surfaces shall be smooth with all chips, shavings or flakes well scoured so that there shall be no visible telegraphing of the core face through the plastic laminate.

2. Square and rectangular cutouts shall have radiused corners not less than ½".

3. At cut edges, exposed or not and where cutouts occur, the edges shall be completely sealed to prevent moisture absorption. Cutouts for pipes shall be round.

4. Meet the following performance requirements: Submit compliance date from the manufacturer prior to fabrication.

   a. Screw holding face: 371 lbs.
   b. Modulus of rupture: 2400 psi
   c. Modulus of elasticity: 450,000 psi
   d. Internal bond: 90 psi
   e. Surface hardware: 90 psi

B. Edging: Flat edge design for cabinet body in color matched laminate or PVC. Color as selected by architect.

C. Plastic Laminate: High pressure decorative laminate surfacing material meeting the minimum NEMA Standards for abrasion resistance, heat resistance, stain resistance, moisture resistance, dimensional stability and general rules for fabrication and installation.

1. Plastic laminate materials shall be as selected by the Architect from full product line of national manufacturers such as Formica, Wilsonart, Pionite, Nevamar and Arborite.

2. Exposed horizontal work surfaces: NEMA GP50, PF (Post-forming) satin surface.

3. Exposed vertical work surfaces: NEMA GP 28 laminate.

4. Semiexposed surfaces: 10 mil polyester laminate in conformance to ASTM D1300, factory bonded at 200 psi at 300°F, minimum. Color shall be manufacturers white.

5. Backing sheet: NEMA BK20 and shall be used where laminate covered work is not restrained from warping or twisting by the method of attachment or by supports. Minimum standard of AWI Custom work shall apply.

6. Bonding adhesive: Water resistant type and as recommended by the approved plastic laminate manufacturer. Plastic laminate shall be applied to the core in the shop, using commercial methods, application and presses.

7. Sealant used for sealing particle board or plywood edges shall be HYBOND 80 by Pierce Stevens Corporation.

D. Assembly adhesives used in assembly, installation and other applications, shall be one of the following:

1. HYBOND 80
2. HYBOND WHITE
3. CANPLAST 100

E. Provide hardware as follows: This is not intended to be a complete listing, but as a guide to establish quality:

1. Hinges shall be cast steel cup and hinge concealed hinges #75M5550 by BLUM

   a. Hinges shall have independent three way adjustment of doors.

   b. One pair of hinges per door of 30" or less, one and one half pair of hinges per door of 48" and one hinge for every 12" of door over 48".

c. Each hinge shall be removable by means of a clip mechanism lever attached to the hinge.

d. Hinges shall be mounted into corresponding hinge plates.

e. Hinges shall have 125 ° free movement of swing and be self closing within two inches of close.

f. Hinges shall have a lifetime warranty against defects from workmanship and materials.

g. Hinges shall be installed into door panels by means of a pre-drilled hole and press fitted into panel substrate.

2. Pulls for all doors and drawer fronts shall be manufacturers standard bent wire pull, brushed chrome finish, three inch centers. Nomenclature for this ABP865-26D by AMEROCK.

3. Drawer slides shall be side mounted, bottom supported, 4 point suspension slides with nylon roller bearing and epoxy coating.

4. All file drawers shall have either Pendaflex or file followers.

5. All shelf clips shall be BLUM nylon covered steel pin (5mm) that will mount into pre-drilled end panels for a support of at least 250 lbs.

6. Locks, noted on drawings, shall be cam tumbler by NATIONAL LOCK.

7. Clothes rods and mounting flanges shall be Knape-Voght #770 and #734.

8. Optional sliding doors are mounted on steel tracks and use ball bearing sheaves mounted in the doors.

9. Grommets shall be spring loaded closure type in assorted sizes.

## PART 9 - CONSTRUCTION

A. All cabinets shall be of 3/4" thick MCP by Domtar, finished ends and dowel pinned to tops, bottoms or backs, shall be laminated with plastic laminate and edged with matching PVC.

1. End panels shall consist of a single panel of MCP drilled and dowel pinned to tops, bottoms or braces by way of fluted hardwood dowel pins nested in white glue.

2. All cabinet boxes shall be case clamped for a minimum of seven minutes in a Holzer case clamp to insure squareness.

3. End panels shall be drilled for shelves, bottoms, tops and braces using the 32mm drilling system. All components will be drilled in corresponding patterns.

4. End panels shall be rabbited at the rear for acceptance of 3/8" thick MCP back. The back will be mounted using mechanical fasteners. The back shall be removable.

5. End panels shall have integral toe kicks and shall have a front of 3/4" MCP mechanically fastened to the end panels.

B. Doors shall be of 11/16" thick laminated panel products with the front face laminated in the architects color selection. The semi-exposed side shall be covered by white HPL plastic laminate. The edges shall be covered by PVC or self-edged.

C. Drawers shall be constructed of 1/2" thick MCP, rabbited, glued and mechanically fastened for a strong bond. Bottoms shall be of 3/8" thick MCP mechanically fastened to the drawer box frame. Top edges shall be covered in white PVC edging. Drawer fronts are same construction as doors. Drawer fronts shall be removable from drawer box for easy alignment. Drawers shall have epoxy coated, nylon roller bearing, side mounted, bottom supported slides by BLUM.

D. Shelves shall be of 3/4" thick MCP and edged with matching PVC edging. Shelves shall not be constructed over 42" in length.

E. Braces shall be of 3/4" thick MCP and shall span the width of the cabinet box. Braces shall be edged on visible sides with PVC edging. On sink or range base cabinets the front brace shall be mounted vertically and shall be laminated to match the cabinet exterior.

F. Backs shall be of 3/8" thick MCP and be rabbited in and mechanically fastened to the end panels.

G. Wall cabinets shall be of 3/4" thick MCP and shall be dowel pinned in the same manner as the bases. Wall backs are 3/8" thick rabbited and mechanically fastened to end panels.

H. Finished backs shall be of 3/4" MCP laminated with plastic laminate on face and edged with PVC.

I. Top supports shall be of 3/4" MCP laminated on both sides and edged with PVC or plastic laminate.

## PART 10 - COUNTERTOPS

A. Countertops and backsplash shall be custom made with square, self-edge and shall be constructed of 3/4" thick medium density fiberboard (MDF) or 45# density particleboard (CS 236-66: Type 1, Grade B, Class 2) covered on all exposed surfaces with horizontal grade 10/HGS, .050" thickness, high pressure laminate as manufactured by a nationally known laminate company.

1. Colors and patterns of plastic laminate shall be as selected by the Architect from full product line of national manufacturers such as Formica, Wilsonart, Pionite, Nevamar and Arborite.
2. Provide cutouts properly sized and located in tops for sinks and rims by others.
3. Provide end splash, flush with all edges of countertop, where countertop abuts wall surfaces.

## PART 11 - BRACING

Where countertops have no casework below for support, bracing or "cleats" shall be constructed 1½" x 1½" x length and covered by GP 28 plastic laminate on all exposed sides. These cleats shall be mounted at walls with mechanical fasteners to support the weight of the countertop.

## PART 12 - WINDOW STOOLS

Plastic laminated window stools shall be 22mm moisture-resistant chipboard, Class E1, according to DIN EN 312/5, finished on top, bottom and sides with horizontal grade (HP) high pressure laminate as manufactured by a nationally known laminate company, using moisture-resistant adhesives. Provide sealant to back exposed edge of window stools, and caulk continuously between window and the laminate stool.

Colors and patterns of plastic laminate shall be as selected by the Architect from full product line of national manufacturers such as Formica, Wilsonart, Pionite, Nevamar and Arborite.

## PART 13 - COORDINATION

B. Coordinate work of this section with related work of other sections as necessary to obtain proper installation of all items.

C. Verify site dimensions of cabinet location in buildings prior to fabrication.

D. Do not install casework until all concrete, masonry and plaster work is dry.

## PART 14 - INSTALLATION

A. Installation shall consist of assembling to form complete units, placing, leveling, scribing, trimming and anchoring.
   1. Filler between wall and casework shall not exceed 1" unless noted otherwise and shall be recessed 1/16" + from the face of casework.
   2. Plastic-laminate covered ceiling enclosures shall be flush with the face of the doors and 1/8" proud on the sides of exposed ends or backs.

B. Fasten items to building construction as detailed or as otherwise required to provide a secure, permanent installation.

C. Where fastening spacings or sizes are not shown, use spacings and sizes of bolts, screws, etc., which will develop the full strength of the members being fastened. Thus failure due to over stress must occur in the members before occurring in the fastenings.

   1. Fastening to concrete shall be by anchor bolts embedded in masonry or by self drilling masonry anchor.
   2. Fastening to masonry shall be of similar manner.
   3. Fastening to plaster or drywall construction shall be into wood studs or blocking placed there early in the construction. Toggle bolts may be used only in such cases where no blocking can be found, but fasteners must still penetrate solid wall supports for a secure installation.

## PART 15 - PROTECTION

Upon installation of casework and countertops, all installed materials shall be covered with appropriate protection from further construction. The General Contractor will be responsible for repairing or replacing any product damaged by subsequent construction and finish work, with no additional cost to the Owner.

End of Section

# DIVISION VII - THERMAL AND MOISTURE PROTECTION

## SECTION 07200 - BUILDING INSULATION

### PART 1 - SCOPE

A. This Section includes all labor, materials, equipment and related items required to complete the work of building insulation as shown on the drawings and as specified.

### PART 2 - SUBMITTALS

A. Certificates of Compliance with applicable Federal Specifications shall be submitted to the architect for approval prior to delivery of any building insulation to the project. "R" values of insulation proposed to be furnished shall be included in certifications.

B. Samples in duplicate of each type of building insulation shall be submitted to the architect for approval if requested.

### PART 3 - MATERIALS

A. Batt insulation shall be semi-rigid, spun glass fiber blankets, R-19.
   1. Non-exposed blankets shall be enclosed on one side with strong asphalted paper vapor barrier. Blankets shall be as wide as required to fit into stud, by longest available lengths.

   2. Exposed blankets for installation in exterior wall space shall be nominal 6" thick, Fiberglass batt faced (FSK-25)(Class A), having minimum material thermal resistance (R) of 19.

B. Sound attenuation blankets for areas where noted shall comply with requirements of ASTM C665-84, Type I. Same shall be 3" "Thermofiber", as manufactured by United States Gypsum; 3" "Thermal-Acoustical Batts", as manufactured by Johns-Manville; 3½" "Noise Barrier Batt Insulation", as manufactured by Owens/Corning; or an approved equal.

## PART 4 - INSTALLATION

A. Batt insulation shall be installed in stud, in strict accordance with manufacturer's installation instructions, securely fastened to framing members by nailing or stapling, with paper vapor barriers to inside face of stud. Insulation shall have full coverage in spaces involved, with tightly fitted butt joints where necessary and free from voids.

1. Install insulation to the outside of any water piping occurring in exterior walls. In these cases, no insulation shall occur between water piping and wall finish.

B. Install Vapor Retarder (DuPont Tyvek® stucco wrap water-resistant barrier or approved equal) on the outside face of the exterior gypsum sheathing.

END OF SECTION

# SECTION 07212 - BOARD INSULATION

## PART 1 - GENERAL

1.01 Work Included

A. Board insulation at foundation wall.

1.02 Related Work

A. Section 04330 - Reinforcement Unit Masonry System

1.03 References

A. FS HH-I-524 - Insulation Board, Thermal (Polystyrene).

1.04 System Description

A. Materials of this Section shall provide a continuous thermal barrier at building exterior wall.

## PART 2 - PRODUCTS

2.01 Acceptable Insulation Manufacturers

A. Styrofoam Brand

B. AMOCO

C. Foamular - R

D. Substitutions: Under provisions of Section 01600, 01630.

2.02 Insulation Materials

A. Insulation Extruded Cellular Polystyrene; thermal resistance "R" per inch of 5.0; minimum compressive strength of 30 psi water absorption by volume in accordance with ANSI/ASTM D2842 0.3 percent square.

2.03 Acceptable Adhesive Manufacturers

A. Max Bond, by H.B. Fuller Company
B. Liquid Nails, LN 601, Macco Adhesives
C. Foam Adhesive by Franklin Int.

2.04 Adhesive Materials

A. Adhesive Type recommended by insulation manufacturer for application.

## PART 3 - EXECUTION

3.01 Preparation

A. Verify substrate and adjacent materials and insulation boards are dry and ready to receive insulation and adhesive.

B. Verify substrate surface is flat, free of honeycomb, fins, irregularities, materials that will impede adhesive bond.

C. Verify insulation boards are unbroken, free of damage.

3.02 Installation - Perimeter Insulation

End of Section

# SECTION 07270 - FIRESTOPPING

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. Provide all material, labor, equipment and services necessary to provide firestopping as follows:

1. Through-penetration firestopping in fire rated construction.

2. Construction-gas firestopping at connections in the same or different materials in fire rated construction.

3. Construction-gap firestopping occurring within fire rated wall, floor or floor-ceiling assemblies.

4. Construction-gap firestopping occurring at the top of fire rated walls.

5. Through-penetration smoke-stopping in smoke partitions.

6. Construction-gap smoke-stopping in smoke partitions.

B. Firestopping specified in other Sections of these specifications:

1. Plumbing Penetrations: Section 15

2. Fire dampers and manufactured devices: Section 15

3. Raceway seals and manufactured electrical devices: Section 16

C. Alternates: Refer to "Description of Alternates" pages for description of alternates affecting work of this Section.

### 1.02 REFERENCES

A. Underwriters Laboratories

1. U.L. Fire Resistant Directory

a. Through-penetration firestop devices (XHCR)
b. Fire resistance ratings (BXUV)
c. Through-penetration firestop systems (XHEZ)
d. Fill, void or cavity material (XHHW)

B. American Society for Testing and Materials Standards:

1. ASTM E814-88: Standard Test Method for Fire Tests of Through-Penetration Firestops.

1.03 DEFINITIONS

A. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.

B. Barriers: Time rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and structural floors.

C. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit spread of heat, fire, gasses and smoke.

D. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is not obtained.

E. Construction Gaps: Gaps between adjacent sections of walls, exterior walls, at wall tops between top of wall and ceiling, and structural floors or roof decks; and gaps between adjacent sections of structural floors.

F. System: Specific products and applications, classified and numbered by Underwriters Laboratories, Inc., to close specific barrier penetrations.

G. Sleeve: Metal fabrication or pipe section extending through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other sections and may or may not be required.

1.04 SYSTEM DESCRIPTION

A. Design Requirements:

1. Fire-rated construction: Maintain barrier and structural floor fire resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces or types of -construction, at separations required to permit building movement and sound or vibration absorption, and at other construction gaps.

2. Smoke barrier construction: Maintain barrier and structural floor resistance to cold smoke at all penetrations, connections with other surfaces and types of construction and at all separations required to permit building movement and sound or vibration absorption, and at other construction gaps.

1.05 SUBMITTALS

A. Comply with all requirement of Section 01300, Submittals.

1.06 QUALITY ASSURANCE

A. Installer's qualifications: Firm experienced in installation or application of systems similar in complexity to those required for this Project, plus the following:

1. Acceptable to or licensed by manufacturer, State or local authority where applicable.

2. At least two (2) years experience with systems.

3. Successfully completed at least five (5) comparable scale projects using this system.

B. Local and State regulatory requirements: Submit forms or acceptance for proposed assemblies not conforming to specific UL Firestop System numbers, or UL classified devices.

C. Materials shall have been tested to provide fire rating at least equal to that of the construction.

1.07 DELIVERY, STORAGE AND HANDLING

A. Packing and shipping:

1. Deliver products in original unopened packaging with legible manufacturer's identification.

2. Coordinate delivery with scheduled installation date, allow minimum storage at site.

B. Storage and protection: Store materials in a clean, dry, ventilated location. Protect from soiling, abuse, moisture and freezing when required. Follow manufacturer's instructions.

1.08 PROJECT CONDITIONS

A. Existing conditions:

1. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

2. Proceed with installation only after penetrations of the substrate and supporting brackets have been installed.

B. Environmental requirements:

1. Furnish adequate ventilation if using solvent.

2. Furnish forced air ventilation during installation if required by manufacturer.

3. Keep flammable materials away from sparks or flame.

4. Provide masking and drop cloths to prevent contamination of adjacent surfaces by firestopping materials.

5. Comply with manufacturing recommendations for temperature and humidity conditions before, during and after installation of firestopping.

1.09 GUARANTEE

A. Submit copies of written guarantee agreeing to repair or replace joint sealers which fail in joint adhesions, co-adhesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated. The guarantee period shall be one (1) year from date of substantial completion.

**PART 2 - PRODUCTS**

2.01 THROUGH-PENETRATION STOPPING OF FIRE-RATED CONSTRUCTION

A. Systems or devices listed in the U.L. Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetrant type, annual space requirements and fire rating involved in each separate instance, and that the system is symmetrical for wall applications. Systems or devices must be asbestos-free.

1. Additional requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the U.L. system or device, and designed to perform this function.

2. Acceptable manufacturers and products: Those listed in the U.L. Fire Resistance directory for the U.L. System involved and as further defined in the Systems And Applications Schedule.

3. All firestopping products must be from a single manufacturer. All Trades shall use products from the same manufacturer.

2.02 CONSTRUCTION-GAP FIRESTOPPING OF FIRE-RATED CONSTRUCTION

A. Firestopping at construction gaps between edges of floor slabs and exterior wall construction.

B. Firestopping at construction gaps between tops of partitions and underside of structural systems.

C. Firestopping at construction gaps between tops of partitions and underside of ceiling or ceiling assembly.

D. Firestopping of control joints in fire-rated masonry partitions.

E. Firestopping expansion joints.

F. Acceptable manufacturers and products: Those listed in the U.L. Fire Resistance Directory for the U.L. System involved and as further defined in the Systems and Applications Schedule.

2.03 SMOKE-STOPPING AT SMOKE PARTITIONS

A. Through-penetration smoke-stopping: Any system complying with the requirements for through-penetration Firestopping in fire-rated construction, as specified in The Systems and Applications Schedule is acceptable, provided that the system includes the specified smoke seal or will provide a smoke seal. The length of time of the fire resistance may be disregarded.

B. Construction-gap smoke-stopping: Any system complying with the requirements for construction-gap Firestopping in fire-rated construction, as specified in the Systems and Applications Schedule is acceptable, provided that the system includes the specified smoke seal or will provide a smoke seal. The length of time of the fire resistance may be disregarded.

2.04 ACCESSORIES

A. Fill, void or cavity materials: As classified under category XHHW in the U.L. Fire Resistance Directory.

B. Forming materials: As classified under category XHKU in the U.L. Fire Resistance Directory.

**PART 3 - EXECUTION**

3.01 EXAMINATION

A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify barrier penetrations are properly sized and in suitable condition for application of materials.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.02 CLEANING SURFACES

A. Clean surfaces to be in contact with penetration seal materials, of dirt, grease, oil, loose materials, rust or other substances that may affect proper fitting, adhesion or the required fire resistance.

3.03 INSTALLATION

A. Install penetration seal materials in accordance with printed instructions of the U.L. Fire Resistance Directory and in accordance with manufacturer's instructions.

B. Seal holes or voids made by penetrations to ensure an effective smoke barrier.

C. Where floor openings without penetrating items are more than 4" in width and subject to traffic or loading, install firestopping materials capable of supporting same loading as floor.

D. Protect materials from damage on surfaces subject top traffic.

E. Place firestopping in annular space around fire dampers before installation of damper's anchoring flanges which are installed in accordance with fire damper manufacturer's recommendations.

F. Where large openings are created in walls or floors to permit installation of pipes, ducts, cable tray, bus duct or other items, close unused portions of opening with firestopping material tested for the application. See U.L. Fire Resistance Directory.

G. Install smoke stopping as specified for firestopping.

H. Where rated walls are constructed with horizontally continuous air space, double width masonry, or double stud frame construction, provide vertical, 12" wide fiber dams for full thickness and height of air cavity at maximum 15' intervals.

3.04 FIELD QUALITY CONTROL

A. Examine penetration sealed areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Perform under this Section, patching and repairing of firestopping cause by cutting or penetration by other Trades.

3.05 ADJUSTING AND CLEANING

A. Clean up spills of liquid components.

B. Neatly cut and trim materials as required.

C. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

END OF SECTION

## SECTION 07900 - JOINT SEALERS

### PART 1 - SCOPE

A. This Section includes all labor, materials, equipment, and related items required for the work of caulking as shown on the Drawings and as specified herein. Work under this Section includes but is not necessarily restricted to the following:

1. Caulking of exterior or interior expansion or control joints in concrete or masonry.

2. Other joints, exterior or interior, in the building construction shown, specified, or required to be caulked.

### PART 2 - SUBMITTAL

A. Contractor shall submit to the Architect, in duplicate, for approval the following items prior to furnishing any materials at the job site.

1. Sample cards of all exposed caulking and sealant for color approval. Unless otherwise directed, apply samples in minimum 3" runs on cards.

2. One lineal foot of each type of backer material proposed.

### PART 3 - PRODUCT HANDLING

A. Deliver caulking, and related accessories to the job site in factory sealed, unopened containers bearing manufacturer's name and product designation.

B. Store materials in unopened containers, following manufacturer's recommendations for storage temperature and shelf life.

C. Follow manufacturer's recommendation for handling products containing toxic substances. Keep flammable materials away from heat, sparks, and open flames. Use recommended solvents and cleaning agents for cleaning tools and equipment.

### PART 4 - ENVIRONMENTAL CONDITIONS

A. Schedule caulking operations so that working joints are most likely to be normal size. Apply materials within manufacturer's recommended surface and ambient temperature range.

### PART 5 - PROTECTION

A. Use masking tape where practicable to control lap of materials onto adjacent surfaces or to facilitate tooling. Remove tape immediately after caulking operation.

## PART 6 - MATERIALS

A. General. All caulking, primers, and accessories shall be non-staining to adjacent exposed materials. Products having similar application and usage shall be of the same manufacturer and type. Unless otherwise specified, colors shall be selected from approved manufacturer's standard color sections. Use gun consistency compounds unless otherwise required by job conditions.

B. Exterior caulking shall be a one or two-component polysulfide base, elastic, synthetic rubber compound, conforming to Federal Spec. TT-S-00230, and shall be "Sonolastic" as manufactured by the Sonneborn Building Products, Inc., "Synthacalk" as manufactured by the Pecora Chemical Corp., or "Rubber Calk 500" as manufactured by the Products Research & Chemical Corp or an approved equal.

1. Colors shall be from manufacturer's standards as selected by the Architect.

C. Interior caulking for general use shall be a one-component acrylic latex compound, and shall be "Sonolac" as manufactured by the Sonneborn Building Products, Inc. "AC-20" as manufactured by the Pecora Chemical Corp., or "Latex Caulk" as manufactured by DAP, Inc.

D. Primers shall be as manufactured and recommended for each substrate by the manufacturer of each caulking compound used in the work.

E. Backer materials shall be as recommended for and compatible with each caulking used, and shall be as follows unless otherwise required to meet specific job conditions.

1. Backer rod for use in all joints requiring backer for caulking shall be a soft, closed cell polyethylene foam meeting requirements of AASHO Specifications M153-54, Type I and III, and shall be as manufactured by the Dow Corning Corp., Sonneborn Building Products, Inc., or Williams Products, Inc.

F. Release material, where required, shall be polyethylene film.

## PART 7 - MIXING

A. Job mix multi-component sealants with suitable power operated equipment, following specific directions of sealant manufacturer.

B. Base and accelerator components of multi-part sealants shall have batch control numbers clearly indicated on containers. Control numbers for mixed components shall be identical.

## PART 8 - CONDITION OF SURFACES

A. Inspect all surfaces to receive caulking materials, and report all defects. Starting work implies acceptance of surfaces as satisfactory. Verify that joints and spaces to be caulked are of proper width.

B. Concrete surfaces shall be thoroughly cured.

C. Apply no caulking materials in contact with surfaces contaminated with oil, grease, bituminous materials, form release agents, bond breakers, deleterious curing compounds, water repellents, and other special surface treatments. Aluminum surfaces shall be free of lacquer. Costs incurred by removal of such contaminants shall be borne by the trades responsible for their presence.

**PART 9 - PREPARATION**

A. Thoroughly clean all joints, removing all foreign matter such as dirt, dust, moisture, frost, rust, paint, lacquer, and protective coatings. Blow all joints free of loose particles.

B. Use no cleaning solvents which leave residue. Wipe joints free of solvent using clean, dry white cloths or white lintless paper. Do not permit solvent to air dry.

C. Follow manufacturer's directions for products and surfaces.

**PART 10 - INSTALLATION**

A. Unless otherwise required by these specifications, install materials in strict accordance with manufacturer's specifications and recommendations, using approved equipment.

B. Usage of various materials shall be as specified under Article 6 above.

C. Prime surfaces as recommended by the manufacturer's immediately prior to caulking or sealing. Make preliminary tests to ensure that primers will not stain exposed materials or deteriorate backer materials.

D. Unless otherwise required by caulking manufacturer's specifications and recommendations, use backer material to control caulking and sealant depth as follows (depths measured at bond face).

1. Polysulfide and Polyurethane Sealants. For joints up to 1/2" wide and less, make depth equal to width but not less than 1/4". Joints over 1/2" wide shall be 3/8" deep.

2. Acrylic Sealant. For joints 1/2" wide and less, make depth equal to width but not less than 1/4". Joints over 1/2" wide shall be 3/8" deep.

3. Do not twist or stretch preformed backer materials during installation.

E. At joints subject to movement, where required by nature of backer material used or where sealant contacts back of joint, use release material between backer material or back or joint and sealer to confine adhesion to surfaces of materials being joined. Follow manufacturer's recommendation exactly.

F. Neatly tool joints to slightly concave surface using tooling agent recommended by sealant manufacturers. Repair any air pockets exposed by tooling. Tool so as to compress material and improve adhesion to surfaces joined.

## PART 11 - PATCHING

A. Patch or replace defective or damaged sealants as directed by the Architect. Be responsible for damage to adjacent surfaces caused by caulking and sealing operations.

## PART 12 - CLEANING

A. Clean adjacent surfaces soiled by caulking and sealing operations. Remove wet material before it "sets". Follow manufacturer's recommendations for cleaning procedures. Cleaning agents shall not stain or be injurious to exposed surfaces nor shall they be potentially dangerous to glass and metal surfaces due to wash-off by rain.

END OF SECTION

# DIVISION VIII - DOORS AND WINDOWS

## SECTION 08100 - METAL DOORS AND FRAMES

### PART 1 - RELATED DOCUMENTS

A. General provisions of Contract, General and Special Conditions, and General Requirements apply to this Section.

### PART 2 - DESCRIPTION OF WORK

A. Provide labor, materials, equipment, and services necessary for proper and complete installation of all hollow metal work.

B. Include all view windows and side lights indicated on Drawings.

C. Work Specified in Other Sections.

1. Finish Hardware is specified in another Division 8 Section.

### PART 3 - LABEL CONSTRUCTION

Where Label Construction is indicated in Door and Frame Schedule, materials and construction of doors and frames shall be in accordance with and bear indicated resistive rating label of Underwriters' Laboratories, Inc.

### PART 4 - SUBMITTALS

Submit Shop Drawings for all work, indicating materials, uses, gauges, details of construction, connections to other work, fastenings, and anchors, to Architect for his review. Do not start fabrication until these Drawings are approved.

### PART 5 - MATERIALS

A. Manufacturers offering products complying with requirements include:
Steelcraft Mfg. Co.
Republic Steel Corporation

B. Materials used shall be of best quality of their respective kinds.

C. Steel in general shall be cold rolled stretcher level, prime quality steel, of U.S. Standard gauge as specified under the various headings.

D. Doors, frames and framed openings exposed to the exterior shall be fabricated of zinc coated steel in the gauges scheduled. The steel shall be hot dipped so as to provide a ductile coating, tightly adherent to the base steel. The zinc coating shall be an A60 coating in accordance with ASTM specification A525 (.6 oz. of zinc per sq. ft. of steel total coverage.)

## PART 6 - HOLLOW METAL STEEL DOORS, POLYURETHANE CORE

A. Physical Properties:
"R" Factor: 11.1
"U" Factor: .09
Compression Strength: 3600 P.S.F.

B. Doors shall be equal to those manufactured by The Steelcraft Manufacturing Company, Cincinnati, Ohio, and designated as:
LF-18 (1-3/4", 18 gauge steel)

C. Doors shall be fabricated of:

1. Cold rolled steel, interior.
2. Galvanized steel with a zinc coating of .6 ozs. per square foot total, exterior.

D. Door shall be flush with edge seams filled and ground smooth.

E. Doors shall have 1/8" bevel in 2" on hinge and ground smooth.

F. Doors shall have vertical mechanical interlocking seams on hinge and lock edges.

G. Doors shall be provided with top and bottom inverted 14 gage steel channels spot welded within the door.

H. Doors shall be mortised and adequately reinforced for all hardware.

1. Mortised hardware reinforcements shall be drilled and tapped at the factory.

2. Surface applied hardware shall be field drilled by others.

I. Doors shall be reinforced internally with a 14 gage steel reinforcement for surface closers when specified.

J. Out swinging exterior doors shall be provided with top caps for protection against weather and with a polyurethane core.

K. Doors shall be phosphatized and receive one coat of baked on prime paint.

## PART 7 - FRAMES

A. Fabricate frames of 16 ga. steel. Manufacturers offering products complying with the requirements include:
Steelcraft Mfg. Co.
Republic Steel Corp.
Fenestra, Inc.

B. All solid frames shall have welded and mitered corners, equivalent to Steelcraft Type D-16. (Issue A).

C. Frames in stud walls can be KD frames.

D. Provide suitable anchors for jambs as required by wall construction. Provide a minimum of six (6) jamb anchors and two (2) base anchors per frame. Provide anchors as required for labeled frames.

E. Reinforcing channels, where called for, shall be 12 gauge reinforcing channel in head.

## PART 8 - HARDWARE REINFORCEMENTS

A. Accurately mortise, reinforce, drill, and tap at factory all work to receive hardware, except do drilling and tapping for door checks and brackets at building.

B. Reinforcements shall be of ample size and thickness to stiffen work against strain of service required. Reinforcements for locks and escutcheons shall be box type with spring lead contacts for lock cases.

C. Provide cover boxes in back of all hardware cutouts in combination type frames.

## PART 9 - FINISH

A. All steel hollow metal work shall be phosphatized and receive one coat baked on prime coat.

B. Each coat shall be baked on and sanded smooth.

## PART 10 - INSTALLATION

A. Set frames in their proper locations, plumb and true and securely braced in position.

B. Receive, store and protect and be responsible for all doors to be installed hereunder. Report immediately to Contractor shortages, damage, improper preparation, defective finishes and warped doors. Do not install any material not perfect in every respect.

C. Inspect openings and frames to receive doors. Report damage or discrepancy affecting proper installation of units to Contractor, and have corrective work done in a suitable and satisfactory manner.

D. Install doors in openings as indicated on Drawings in conformance with shop drawings and hardware schedule. Install doors so they hang plumb and true, with proper clearances using items of hardware scheduled for openings.

E. Accurately set all frames and thoroughly and rigidly anchor and fasten in place in building construction. Weld drywall anchors to frames.

F. Check frames before and after walls are constructed to see that they are properly erected.

End of Section

# SECTION 08211 - FLUSH WOOD DOORS

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including the General and supplementary Conditions and Division 1 Specification Sections, apply to this Section.

### 1.02 SUMMARY

A. This Section includes the following:

1. Solid core doors with wood veneer faces.
2. Factory fitting flush wood doors to frames and factory matching for hardware.
3. Glazing stops and preparation of flush doors to receive glazing; glazing specified elsewhere.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Architectural Woodwork: Division 6.
2. Metal Door Frames: Elsewhere in Division 8.
3. Door Hardware: Elsewhere in Division 8.
4. Glass and Glazing: Elsewhere in Division 8.
5. Field Finishing of Wood Doors: Section 09900 - Painting.

### 1.03 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each type of door, including details of core and edge construction, trim for openings and louvers, and factory-finishing specifications.

C. Shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for veneer matching and factory finishing and other pertinent data.

1. For factory-machined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light and louver openings.

D. Samples for verification in the form and size indicated below:

1. Corner sections of doors approximately 12 inches (300 mm) square with door faces and edging representing the typical range of color and grain for each species of veneer and solid lumber required.

2. Louvers consisting of blade and frame, 6 inches (150 mm) long, for each material and finish specified.

3. Frames for light openings, 6 inches (150 mm) long, for each materials, type, and finish required.

1.04 QUALITY ASSURANCE

A. Quality Standard: Comply with the following standard:

1. AWI Quality Standard: "Architectural Woodwork Quality Standards: of the Architectural Woodwork Institute for grade of door, core, construction, finish, and other requirements.

B. Fire-Rated Wood Doors: Provide wood doors that comply with NFPA 80; are identical in materials and construction to units tested in door and frame assemblies per ASTM E 152; and are labeled and listed by UL, Warnock Hersey, or another testing and inspection agency acceptable to authorities having jurisdiction.

1. Oversized, Fire-Rated Wood Doors: For door assemblies exceeding sizes of tested assemblies, provide manufacturer's certificate stating that doors conform to all standard construction requirements of tested and labeled fire-door assemblies except for size.

2. Temperature Rise Rating: At stairwell enclosures, provide doors that have a temperature rise rating of 450 deg F (250 deg C) maximum in 30 minutes of fire exposure.

C. Single-Source Responsibility: Obtain doors from one source and by a single manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's instructions.

B. Identify each door with individual opening numbers as designated on shop drawings, using temporary, removable, or concealed markings.

1.06 PROJECT CONDITIONS

A. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during the remainder of the construction period to comply with the following requirements applicable to Project's geographical location:

1. AWI quality standard Section 100-S-11 "Relative Humidity and Moisture Content."

1.07 WARRANTY

A. General Warranty: Door manufacturer's warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch (6.35 mm) in a 42-by-84-inch (1067-by-2134-mm) section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75-mm) span, or do not conform to tolerance limitations of referenced quality standards.

1. Warranty shall be in effect during the following period of time after date of Substantial Completion.

    a. Solid Core Interior Doors: Life of installation.

## PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide doors by one of the following:

1. Solid Core Doors:
    a. Algoma Hardwoods, Inc.
    b. Eggers Industries, Architectural Door Division
    c. Fenestra Corporation
    d. Graham Manufacturing Corp.
    e. Mohawk Flush Doors, Inc.
    f. V-T Industries, Inc.
    g. Weyerhauser Co.

2.02 INTERIOR FLUSH WOOD DOORS

A. Solid Core Doors for Transparent Finish: Comply with the following requirements:

1. Faces: See Finish Schedule
2. Grade: Premium
3. Construction: 5 or 7 plies
4. Core: Particleboard core
5. Bonding: Stiles and rails bonded to core, then entire unit abrasive planed before veneering.

B. Fire-Rated Solid Core Doors: Comply with the following requirements:

1. Faces and Grade: Provide faces and grade to match non-fire-rated doors in same area of building, unless otherwise indicated.

2. Construction: Manufacturer's standard core construction as required to provide fire-resistance rating indicated.

3. Blocking: Provide composite blocking designed to maintain fire resistance of door but with improved screw-holding capability of same thickness as core and with minimum dimensions as follows:
   a. 5-inch (125-mm) top rail blocking
   b. 5-inch (125-mm) bottom rail blocking
   c. 5-by-18-inch (125-by-450-mm) lock blocks
   d. 5-inch (125-mm) midrail blocking.

4. Edge Construction: Provide manufacturer's standard laminated-edge construction for improved screw-holding capability and split resistance as compared to edges composed of a single layer of treated lumber.

5. Pairs: Provide fire-rated pairs with fire-retardant stiles that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals.

2.03 LIGHT FRAMES

A. Wood-Veneered Beads for Light Openings in Fire Doors.

2.04 FABRICATION

A. Fabricate flush wood doors to comply with following requirements:

1. In sizes indicated for job-site fitting:

   a. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements of NFPA 80 for fire-resistance-rated doors.

   b. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory machining.

   c. Metal Astragals: Pre-matching astragals and formed-steel edges for hardware for pairs of fire-rated doors.

B. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.

1. Light Openings: Trim openings with moldings of material and profile indicated.

**PART 3 - EXECUTION**

3.01 EXAMINATION

A. Examine installed door frames prior to hanging door:

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
2. Reject doors with defects.

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

3.02 INSTALLATION

A. Hardware: For installation see Division 8 Section "Finish Hardware."

B. Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions and referenced quality standard and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to requirements of NFPA 80.

C. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

1. Fitting Clearances for Non-Fire-Rated Doors: Provide 1/8 inch (3.2 mm) at jambs and heads, 1/16 inch (1.6 mm) per leaf at meeting stiles for pairs of doors, and 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4-inch (6.4 mm) clearance from bottom of door to top of threshold.

2. Fitting Clearances for Fire-Rated Doors: Comply with NFPA 80.

3. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.

4. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) on lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Field-Finished Doors: Refer to Division 9, Section 09900 - Painting, for finishing requirements.

3.03 ADJUSTING AND PROTECTION

A. Operation: Rehang or replace doors damaged during installation.

B. Finished Doors: Refinish or replace doors damaged during installation.

C. Protect doors as recommended by door manufacturer to ensure that wood doors will be without damage or deterioration at the time of Substantial Completion.

End of Section

# SECTION 08350 - ACCORDION FOLDING PARTITIONS

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

### 1.02 SUMMARY

A. This Section includes the following:

1. Furnish and install accordion folding partitions as indicated in drawings.

B. Related Sections include the following:

1. Division 3 Sections for concrete tolerances required.

2. Division 5 Sections for primary structural support, including pre-punching of support members by structural steel supplier per partition supplier's template.

3. Division 6 Sections for wood framing and supports, and all blocking at head and jambs as required.

4. Division 9 Sections for wall and ceiling framing at head and jambs.

### 1.03 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified in writing by the partition manufacturer, as qualified to install the manufacturer's partition systems for work similar in material, design, and extent to that indicated for this Project.

B. Preparation of the opening shall conform to the dimensions specified, plumb, level, and in accordance to building practices.

C. Acoustical Performance: Test partitions in an independent acoustical laboratory in accordance with ASTM E90 to attain no less than the STC rating specified. Provide a complete and unedited written test report by the testing laboratory upon request.

### 1.04 SUBMITTALS

A. Product Data: Material descriptions, construction details, finishes, installation details, and operating instructions for each type of partition, component, and accessory specified.

B. Shop Drawings: Show location and extent of partitions. Include plans, elevations, sections, details, attachments to other construction, and accessories. Indicate dimensions, weights, conditions at openings, and at storage areas, and required installation, storage, and operating clearances. Indicate location and installation requirements for hardware and track, including floor tolerances required and direction of travel. Indicate blocking to be provided by others.

C. Setting Drawings: Show imbedded items and cutouts required in other work, including support beam punching template.

D. Samples: Color samples demonstrating full range of finishes available by architect. Verification samples will be available in same thickness and material indicated for the work.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Clearly mark packages and partitions with numbering systems used on Shop Drawings. Do not use permanent markings on partitions.

B. Protect partitions during delivery, storage, and handling to comply with manufacturer's direction and as required to prevent damage.

1.06 WARRANTY

A. Provide written warranty by manufacturer of partitions agreeing to repair or replace any components with manufacturing defects.

B. Warranty period: Two (2) years from date of shipment.

**PART 2 – PRODUCTS**

2.01 MANUFACTURERS, PRODUCTS, AND OPERATION

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Modernfold, Inc., or approved equal.

B. Products: Subject to compliance with the requirements, provide the following product:
   1. Soundmaster #8 Accordion Folding Partition.

2.02 OPERATION

A. Soundmaster #8: Manually operated, top supported, recessed track, accordion folding.

2.03 CONSTRUCTION

A. Shall consist of steel hinge plates welded to .18- inch (5mm) diameter vertical steel rods, with a single row of plates at the bottom and top with intermediate rows at approximately 42-inch (1067mm) on center. Partitions 10'-0" (3048mm) high or over have a double row of hinge plates at the top. A high tensile alloy steel trolley yoke, functioning as a hinge pin at required intervals, supports the frame assembly.

2.04 PARTITION FINISHES

A. Finish: Factory applied, Class "A" rated material. Finish shall be reinforced heavy duty vinyl with woven backing weighing not less than 27 ounces per lineal yard.

B. Partition trim: Exposed trim of one consistent color (Smoke Gray).

2.05 SOUND SEALS

A. Shall be pairs of three-layer flexible sweep strips at top and bottom. Vertical Female sound channel shall be polyurethane foam lined.

B. Sound Insulation: 24 gauge, V-grooved steel panels and heavy duty flame resistant acoustical membrane. Each panel attaches to the frame with steel leaf fasteners.

2.06 HARDWARE

A. Grip type hand pulls shall be die cast zinc, satin chrome finish. Extruded aluminum or plastic hand pulls will not be accepted.

2.07 SUSPENSION SYSTEM

A. #5, #6, or #7 Suspension System, track and trolley sizes matched to the size of the partition.
   1. Suspension Tracks: Shall be of a continuous "C" channel shaped track, connected to the structural support.
   2. Carriers: The accordion folding partition shall be suspended from the track by two-wheel intermediate and four wheel lead trolley assemblies.

**PART 3 – EXECUTION**

3.01 INSTALLATION

A. General: Comply with partition manufacturer's written installation instructions, Drawings and approved Shop Drawings.

B. Install partitions and accessories after other finishing operations, including painting have been completed.

C. Defective partitions are not acceptable.

3.02 CLEANING AND PROTECTION

A. Clean partition surfaces upon completing installation of partitions to remove dust, dirt, adhesives, and other foreign materials according to manufacturer's written instructions.

B. Provide final protection and maintain conditions in a manner acceptable to the manufacturer and installer that insure partitions are without damage or deterioration at time of Substantial Completion.

3.03 ADJUSTING

A. Adjust partitions to operate smoothly, easily, and quietly throughout entire operational range. Lubricate hardware and other moving parts.

3.04 EXAMINATION

A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of partitions. Proceed with installation only after unsatisfactory conditions have been corrected.

3.05 DEMONSTRATION

A. Demonstrate proper operation and maintenance procedures to Owner's representative.

B. Provide Operation and Maintenance Manual to Owner's representative.

End of Section

# SECTION 08360 - SECTIONAL OVERHEAD DOORS
# 424 SERIES SECTIONAL STEEL DOORS

## PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Steel Sectional Overhead Doors.

B. Electric Operators and Controls.

C. Operating Hardware, tracks, and support.

1.02 RELATED SECTIONS

A. Section 05500 - Metal Fabrications: Steel frame and supports.

B. Section 08710 - Door Hardware:

C. Section 09900 - Paints and Coatings: Field painting.

D. Section 16130 - Raceway and Boxes: Empty conduit from control station to door operator.

E. Section 16150 - Wiring Connections: Electrical service to door operator.

1.03 REFERENCES

A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

1.04 DESIGN / PERFORMANCE REQUIREMENTS

A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
   1. Design pressure of 22/-22 PSF.

B. Wiring Connections: Requirements for electrical characteristics.
   1. 115 volts, single phase, 60 Hz.

C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

## 1.05 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Operation and Maintenance Data.

## 1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

## 1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened labeled packaging until ready for installation.

B. Protect materials from exposure to moisture until ready for installation.

C. Store materials in a dry, ventilated weathertight location.

## 1.08 PROJECT CONDITIONS

A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

A. Acceptable Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: .

B. Substitutions: Reviewed equal.

### 2.02 SECTIONAL STEEL OVERHEAD DOORS

A. Sectional Overhead Steel Doors: 424 Series Steel Doors by Overhead Door Corporation. Units shall have the following characteristics:
   1. Door Assembly: Steel door assembly with rabbeted meeting rails to form weathertight joints and provide full-width interlocking structural rigidity.
      a. Panel Thickness: 2 inches (51 mm).
      b. Exterior Surface: Ribbed.
      c. Section Material: 24 gauge, galvanized steel.
      d. Center and End Stiles: 16 gauge steel.
      e. Springs:
         1) 25,000 cycles.
   2. Finish and Color: Two coat baked-on polyester, white color.
   3. Windload Design: Provide to meet the Design/Performance requirements specified.
   4. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
   5. Weatherstripping:
      a. Flexible bulb-type strip at bottom section.
      b. Flexible Jamb seals.
      c. Flexible Header seal.
   6. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
      a. Size:
         1) 2 inch (51 mm).
      b. Type:
         1) High lift.
   7. Electric Motor Operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.
      a. Entrapment Protection: Required for momentary contact, includes radio control operation.
         1) Photoelectric sensors monitored to meet UL 325/2010.
      b. Operator Controls:
         1) Push-button operated control stations with open, close, and stop buttons on interior.
         2) Key switch on exterior.
         3) Surface mounting.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Do not begin installation until openings have been properly prepared.

B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

C. Verify electric power is available and of correct characteristics.

D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### 3.03 INSTALLATION

A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.

B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.

C. Anchor assembly to wall construction and building framing without distortion or stress.

D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

E. Fit and align door assembly including hardware.

F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

### 3.04 CLEANING AND ADJUSTING

A. Adjust door assembly to smooth operation and in full contact with weatherstripping.

B. Clean doors, frames and glass.

C. Remove temporary labels and visible markings.

3.05 PROTECTION

A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

B. Protect installed products until completion of project.

C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

END OF SECTION

# SECTION 08370 - SECTIONAL OVERHEAD DOORS
# 599 SERIES THERMACORE® INSULATED STEEL DOORS

## PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Insulated Sectional Overhead Doors.

B. Electric Operators and Controls.

C. Operating Hardware, tracks, and support.

1.02 RELATED SECTIONS

A. Section 05500 - Metal Fabrications: Steel frame and supports.

B. Section 08710 - Door Hardware:

C. Section 09900 - Paints and Coatings: Field painting.

D. Section 16130 - Raceway and Boxes: Empty conduit from control station to door operator.

E. Section 16150 - Wiring Connections: Electrical service to door operator.

1.03 REFERENCES

A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

1.04 DESIGN / PERFORMANCE REQUIREMENTS

A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
   1. Design pressure of 20.9/-23.8 PSF.

B. Wiring Connections: Requirements for electrical characteristics.
   1. 115 volts, single phase, 60 Hz.

C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

## 1.05 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Operation and Maintenance Data.

## 1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

## 1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened labeled packaging until ready for installation.

B. Protect materials from exposure to moisture until ready for installation.

C. Store materials in a dry, ventilated weathertight location.

## 1.08 PROJECT CONDITIONS

A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1.09 WARRANTY

A. Warranty: Manufacturer's limited door and operators System warranty for 10 year against delamination of polyurethane foam from steel face and all other components for 3 years or 20,000 cycles, whichever comes first.

**PART 2 - PRODUCTS**

2.01 MANUFACTURERS

A. Acceptable Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: .

B. Substitutions: As reviewed equal.

2.02 INSULATED SECTIONAL OVERHEAD DOORS

A. Insulated Steel Sectional Overhead Doors: 599 Series Thermacore Insulated Steel Doors by Overhead Door Corporation. Units shall have the following characteristics:
   1. Door Assembly: Metal/foam/metal sandwich panel construction, with PVC thermal break and weather-tight ship-lap design meeting joints.
      a. Panel Thickness: 2 inches (51 mm).
      b. Exterior Surface: Flush, textured.
      c. Exterior Steel: .015 inch (.38 mm), hot-dipped galvanized.
      d. End Stiles: 16 gauge with thermal break.
      e. Spring Counterbalance: Sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of diecast aluminum with high strength galvanized aircraft cable. Sized with a minimum 7 to 1 safety factor.
         1) High cycle spring: 25,000 cycles.
      f. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.
      g. Thermal Values: R-value of 17.50; U-value of 0.057.
      h. Air Infiltration: 0.08 cfm at 15 mph; 0.08 cfm at 25 mph.
      i. High-Usage Package: Provide with optional high-usage package.
   2. Finish and Color: Two coat baked-on polyester.
      a. Interior color, white.
      b. Exterior color, white.
   3. Windload Design: Provide to meet the Design/Performance requirements specified.
   4. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
   5. Weatherstripping:
      a. EPDM bulb-type strip at bottom section.
      b. Flexible Jamb seals.
      c. Flexible Header seal.

6. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
   a. Size:
      1) 2 inch (51 mm) on 9' x 10' Door.
      2) 3 inch (76 mm) on 16' x 16' Doors.
   b. Type:
      1) High lift.
7. Electric Motor Operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.
   a. Entrapment Protection: Required for momentary contact, includes radio control operation.
      1) Photoelectric sensors monitored to meet UL 325/2010.
   b. Operator Controls:
      1) Push-button operated control stations with open, close, and stop buttons on interior.
      2) Key switch on exterior.
      3) Surface mounting.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Do not begin installation until openings have been properly prepared.

B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

C. Verify electric power is available and of correct characteristics.

D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### 3.03 INSTALLATION

A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.

B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.

C. Anchor assembly to wall construction and building framing without distortion or stress.

D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

E. Fit and align door assembly including hardware.

F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.04 CLEANING AND ADJUSTING

A. Adjust door assembly to smooth operation and in full contact with weatherstripping.

B. Clean doors, frames and glass.

C. Remove temporary labels and visible markings.

3.05 PROTECTION

A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

B. Protect installed products until completion of project.

C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

END OF SECTION

## SECTION 08410 - ALUMINUM ENTRANCES AND WINDOWS

### PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division - 1 specification sections, apply to Work of this Section.

1.02 DESCRIPTION OF WORK

A. Extent of aluminum entrances and windows is shown on drawings and schedules.

B. Types of aluminum entrances and windows required include the following:

1. Exterior entrance doors.
2. Curtain Wall type framing system.

C. Glazing: Refer to "Glass and Glazing" section of Division 8 for glazing requirements for aluminum entrances and windows, including doors.

D. Finish hardware for aluminum doors is included as Work of this Section.

1. Cylinders for locks are specified with "Finish Hardware" in another Division 8 section.

E. Sealant around perimeter of aluminum frames is specified elsewhere in Division 7 section.

F. Comply with provisions of Section 01028 - Modification Requirements.

1.03 SYSTEM PERFORMANCES

A. General: Provide exterior entrance and curtain wall and windows assemblies that have been designed and fabricated to comply with requirements for system performance characteristics listed below as demonstrated by testing manufacturer's corresponding stock systems according to test methods designated.

B. Thermal Movement: Allow for expansion and contraction resulting from ambient temperature range of 120°F (49°C).

C. Wind Loading: Provide capacity to withstand loading indicated below, tested per ASTM E 330.

1. Uniform pressure of 30 psf inward and 30 psf outward.

D. Transmission Characteristics of Fixed Framing: Comply with requirements indicated below for transmission characteristics and test methods.

1. Air and Water Leakages: Air infiltration of not more than 0.06 CFM per sq. ft. of fixed area per ASTM E 283 and no uncontrolled water penetration per ASTM E 331 at pressure differential of 8.0 psf (excluding operable door edges).

E. Transmission Characteristics of Entrances: Provide entrance doors with jamb and head frames which comply with requirements indicated below for transmission characteristics and test methods.

1. Air Leakage: Air infiltration per linear foot of perimeter crack of not more than 0.50 CFM for single doors and 1.0 CFM for pairs of doors per ASTM E 283 at pressure differential of 1.567 psf.

1.04 QUALITY ASSURANCE

A. Drawings are based on one manufacturer's standard aluminum entrance and windows system. Another standard system of a similar and equivalent nature will be acceptable when differences do not materially detract from design concept or intended performances, as judged solely by Architect.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, standard details, and installation recommendations for components of aluminum entrances and curtain wall and windows required for Project, including test reports certifying that products have been tested and comply with performance requirements.

B. Shop Drawings: Submit shop drawings for fabrication and installation of aluminum entrances and curtain wall and windows, including elevations, detail sections of typical composite members, hardware mounting heights, anchorages, reinforcement, expansion provisions, and glazing.

C. Samples: Submit samples of color of aluminum finish, on 12" long sections of extrusions or formed shapes and on 6" square sheets.

1.06 SPECIAL PROJECT WARRANTY

A. Provide written warranty signed by Manufacturer, Installer, and Contractor agreeing to replace aluminum entrancess and windows which fail in materials or workmanship within 3 years of acceptance. Failure of materials or workmanship includes excessive leakage or air infiltration, excessive deflections, faulty operation of entrances, deterioration of finish or construction in excess of normal weathering, and defects in hardware, weatherstripping, and other components of the work.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. YKK AP America
2. Kawneer Company, Inc.
3. PPG Industries, Inc.
4. Tubelite Div., Indal Inc.
5. Amarlite/Arco Metals Co.

### 2.02 MATERIALS AND ACCESSORIES

A. Aluminum Members: Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish; ASTM B 221 for extrusions, ASTM B 209 for sheet/plate.

B. Fasteners: Aluminum, non-magnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components.
1. Do not use exposed fasteners except where unavoidable for application of hardware. Match finish of adjoining metal.
2. Provide Phillips flat-head machine screws for exposed fasteners.

C. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible; otherwise, nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.

D. Concrete/Masonry Inserts: Cast iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.

E. Bituminous Coatings: Cold-applied asphalt mastic complying with SSPC-PS 12, compounded for 30-mil thickness per coat.

F. Compression Weatherstripping: Manufacturer's standard replaceable stripping of either molded neoprene gaskets complying with ASTM D 2000 or molded PVC gaskets complying with ASTM D 2287. Weatherstripping shall be equal to Kawneer Sealair Weathering System which shall include head and jamb, astragal, and bottom weatherstripping.

G. Glazing Materials: Provide manufacturers standard EDPM glazing gaskets.

H. Sealant: Provide all sealant necessary within aluminum assemblies. Perimeter sealant around frames shall be included under Section 07900.

## 2.03 HARDWARE

A. General: Refer to hardware section of Division 8 for requirements for hardware items other than those indicated herein to be provided by manufacturer of aluminum entrances.

B. Thresholds: Extruded aluminum in mill finish, ADA compliance, complete with anchors, coordinated with pivots of size indicated or manufacturer's standard if not indicated. Set thresholds in full bed of sealant.

## 2.04 FABRICATION

A. General - Sizes and Profiles: Required sizes for door and frame units, including profile requirements, are indicated on drawings.

1. Details shown are based upon standard details by manufacturer indicated. Similar details by other manufacturers listed will be acceptable, provided they comply with other requirements, including profile limitations.

B. Prefabrication: To greatest extent possible, complete fabrication, assembly, finishing, hardware application, and other work before shipment to project site. Disassemble components only as necessary for shipment and installation.

1. Do not drill and tap for surface-mounted hardware items until time of installation at project site.
2. Perform fabrication operations, including cutting, fitting, forming, drilling, and grinding of metal work in manner which prevents damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.

C. Reinforcing: Install reinforcing as necessary for performance requirements; separate dissimilar metals with bituminous paint or other separator which will prevent corrosion.

D. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.

E. Fasteners: Conceal fasteners wherever possible.

F. Weatherstripping: For exterior doors, provide compression weatherstripping against fixed stops; at other edges, provide sliding weatherstripping retained in adjustable strip mortised into door edge.

1. Provide EPDM/vinyl blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.

2. At interior doors and other locations without-weatherstripping, provide neoprene silencers on stops to prevent metal-to-metal contact.

2.05 STOREFRONT FRAMING SYSTEM

A. General: Provide inside-outside matched resilient flush-glazed system fabricated for stick-type erection procedure, with provisions for glass replacement.

1. Drawings are based on:
   a. All aluminum doors, medium style.
   b. All exterior windows and storefront: YKK Model YES 45TU System (2" x 4½") for 1" glazing. Aluminum door, single glazed.
   c. Interior windows: YKK Model YES 40FS, shall be 1¾" x 4" center glazed for non-insulated glass.

2. Provide thermal-break frame members.

2.06 STILE-AND-RAIL TYPE ALUMINUM DOORS

A. Frame: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts, or fabricate with structurally welded joints, at manufacturer's option.

B. Glazing: Fabricate doors to facilitate replacement of glass, without disassembly of door stiles and rails. Provide square snap-on extruded aluminum glazing stops, with exterior stops anchored for non-removal.

2.07 FINISH

A. All exposed aluminum surfaces shall be free of scratches and other serious blemishes.
   1. Finish shall be YKK standard Dark Bronze.
   2. Hardware to match door.

**PART 3 - EXECUTION**

3.01 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of aluminum entrances and windows.

B. Set units plumb, level, and true to line, without warp or rack of framing members, doors. Anchor securely in place, separating aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

C. Drill and tap frames and doors and apply surface-mounted hardware items, complying with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.

D. Set sill members and other members in bed of sealant to provide weathertight construction.

E. Refer to "Glass and Glazing" section of Division 8 for their installation of glass shown to be glazed into doors and framing.

3.02 ADJUST AND CLEAN

A. Adjust operating hardware to function properly, without binding, and to provide tight fit at contact points and weatherstripping.

B. Clean completed system, inside and out, promptly after erection and installation of glass and sealants. Remove excess glazing and sealants, dirt, and other substances from aluminum surfaces.

C. Institute protective measures and other precautions required to assure that aluminum entrances and curtain wall and windows will be without damage or deterioration other than normal weathering at time of acceptance.

END OF SECTION

**SECTION 08710**

## PART 1 – GENERAL

### 1.01 Related Documents

Drawings and general provisions of contract and Division 1 specification sections, apply to work of this section

### 1.02 SUMMARY

Work under this heading includes furnishing all hardware to respective trades. The hardware supplier shall promptly furnish templates to all manufacturers furnishing materials necessary for completion of this part.
Extent of finish hardware is indicated on drawing and in schedules.
The following specifications are a guide and a description of the quality materials required. No material of quality or weight less than outlined in this specification will be accepted. The contractor will be responsible for supplying the correct quantity of all materials, whether or not specifically mentioned in this specification. Any additional items that may be required shall be furnished and be of type, quality, and utility consistent with other hardware specified.

### 1.03 SUBMITTALS

**ARCHITECT'S HARDWARE SCHEDULE:**
Architect's hardware schedule is by hardware set number. Refer to drawings for designation of hardware set number applicable to each opening. Certain additional items of hardware and/or hardware accessories specified herein shall be finished and noted on the hardware schedule.

**SUPPLIER'S HARDWARE SCHEDULE**
A complete hardware schedule, indicating type, number, location, and finish shall be submitted to architect for approval, together with such samples as may be required for review. Opening numbers shall be same as used in contract documents. Schedule shall be prepared according to Door and Hardware Institute recommendations (schedule and sequence format) and shall include degree of door closer installation.
Supplier's hardware schedule will be reviewed by architect for type, quality, finish, and for function (other than hand). Contractor shall be responsible for checking schedule for correct hand of locksets and for supplying quantity of items required by contract documents.
Provide supplementary or revised hardware schedules if deemed necessary by architect.
Do not ship or deliver hardware to job prior to review of hardware schedules by architect.
Hardware schedule shall be submitted in the following format. Hardware schedules submitted to architect for review not in this format will be rejected:

**HARDWARE HEADING 1**

| | | | |
|---|---|---|---|
| 1 Sgl Door #001 | Exterior from Corridor<br>Each leaf 3'0 x 7'0 x HMF x NLWD | RHR | 90 deg |

Item, quantity, manufacturer's #, size, product type, finish, and product information

| | | | | |
|---|---|---|---|---|
| 3 ea | Hinge | 5BB1NRP 4.5 x 4.5 | 630 | IV |
| 1 ea | Cylinder | 951 x GGMK | 626 | FA |
| 1 ea | Exit Device | 25R L Dane x 3070 x RHR | 626 | FA |
| Etc. | | | | |

## 1.04 QUALITY ASSURANCE

All hardware shall be furnished by an established Builders Hardware firm who maintains and operates an office, display, and stock in this area, and who is a regular authorized distributor of the lock he proposes to furnish. All hardware schedules submitted for approval shall carry the signature and seal of a certified Architectural Hardware Consultant who is employed by the hardware firm supplying material.

## 1.05 PROJECT CONDITIONS

Delivery storage and handling: Hardware supplier shall receive and check all hardware at his warehouse. Drop shipments to the jobsite from various manufacturers will not be permitted. All hardware shall be in its original packaging and plainly labeled and numbered to agree with the numbers and as listed in the hardware schedule. The contractor shall submit his schedules for approval to the architect before proceeding with any work. When required, hardware supplier shall deliver hardware and/or hardware templates to the various door manufacturers. The general contractor shall provide storage facilities for the finish hardware after delivery to the job site.

## 1.06 ITEMS NOT INCLUDED

Hardware for metal windows, toilet partitions, cabinets, access panels, etc. is not included in this section. See other sections for hardware to be furnished by others. Reference Division 16 for electrical requirements.

## PART 2 – PRODUCTS

### 2.01 MANUFACTURERS

Numbers given in this schedule are of the following manufacturers.

| PRODUCTS | MFG. SPECIFIED | APPROVED EQUAL |
|---|---|---|
| Hinge | Ives | Hager, Bommer |
| Exit Device | Von Duprin | Precision |
| Locks | Falcon Lock | Schlage, Sargent |
| Closers | LCN | Ryobi, Sargent |
| Trim/Auxiliary | Ives | Rockwood, Hager |

### 2.02 HARDWARE FINISHES

The designations used to indicate hardware finishes are those listed in ANSI /BHMA A156.18, "Materials and Finishes", including coordination with the traditional U.S. finishes, shown by certain manufacturers for their products.

| | | |
|---|---|---|
| 1. | Butt Hinges | US26D (652) Satin Chromium<br>US32D (630) Satin Stainless Steel |
| 2. | Mortise Cylinders, Rim Cylinders, and "Permanent" Interchangeable Cores | US26D (626) Satin Chromium |
| 3. | Cylindrical Latch sets and Locksets | US26D (626) Satin Chromium |
| 4. | Exit Devices | US26D (626) Satin Chromium |
| 5. | Door Closers | ALUM (689) Powder Coated Aluminum |
| 6. | Wall and Floor Stops | US32D (626) Satin Stainless Steel |
| 7. | Mop, Kick, and Armor Plates | US32D (630) Satin Stainless Steel |
| 8. | Door Silencers | Gray Gray (Rubber) |

## 2.03 HINGES

Characteristics:

a. Tested to be in accordance with ANSI / BHMA A156.1.
b. Templates: Provide only template-produced units.
c. Fasteners: Provide Phillips flat-head screws complying with the following requirements.
    (1) For metal doors and frames, install machine screws into drilled and tapped holes.
    (2) For wood doors and frames, install threaded-to-the-head wood screws.
    (3) For fire-rated wood doors, install #12 x 1-1/4 inch, threaded-to-the-head steel wood screws.
    (4) Finish screw heads to match surface of hinges or pivots.
d. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
    (1) Out-Swing Exterior Doors: Non-removable pins.
    (2) Out-Swing Interior Doors: Non-rising pins and Non-removable pins; as indicated in the Door Hardware Sets.
    (3) In-Swing Exterior / Interior Doors: Non-rising pins.
    (4) Tips: Flat button and matching plug. Finished to match hinge leaves.
e. Size: Size hinges in accordance with the specified manufacturer's published recommendations.
f. Quantity: Furnish one pair of hinges for all doors up to 5'-0" high.

Furnish one additional hinge for each additional 2-1/2 feet or fraction thereof.

## 2.04 CYLINDERS and KEYS

Characteristics:

a. Tested to be in accordance with ANSI / BHMA A156.28.
b. Equip all cylinders and locksets with, a minimum of, 7-pin interchangeable core, tumbler cylinders. FALCON SFIC "A" keyway
c. "Interior" Door Openings: Except as otherwise indicated, provide a NEW Key System for this Project.
d. Equip all cylinders and locksets with, a minimum of, 7-pin, interchangeable core where specified, tumbler cylinders. FALCON SFIC "A" keyway
e. Furnish cylinders and locksets with temporary, brass / keyed, "Construction" interchangeable cores for the duration of the time of construction. Construction cores, master keys, and control keys shall not be part of the Owner's Permanent Key System or furnished on the same keyway (or key section) as the Owner's Permanent Key System. Construction cores, master keys, and control keys are the property of the manufacturer and shall be returned when the Permanent cores and keys are installed. Remove these "Construction" interchangeable cores ONLY when directed by the Architect and / or Owner.

g. Furnish final "Permanent" interchangeable cores and keys, for installation by the Owner.

h. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.

i. Comply with the Owner's instructions for keying requirements and, except as otherwise indicated, provide individual change keys for each lock that is not designated to be keyed alike with a group of related locks.

(1) Permanently inscribe each key with number of lock that identifies the cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE".

j. A key meeting between the Owner and a representative of the successful finish hardware distributor shall be arranged subsequent to the return of the Approved Finish Hardware Schedule. A keying schedule will be established by the finish hardware distributor's representative and submitted to the Owner, for approval. After the Owner's review, the keying schedule shall be returned to the distributor's representative such that the Permanent cores and keys can be prepared on a timely basis.

k. Permanent cores and keys will be transmitted directly to the Owner by the Finish Hardware Distributor. The Owner shall be responsible for the installation of the Permanent cores and the return of the Construction cores and keys.

l. Key Material: Provide keys of nickel silver only.

m. Key Quantities: Furnish the following quantities of keys for the entire project.

(1) Ten (10) Each - Construction Master Keys
(2) Two (2) Each - Construction Control Keys
(3) Five (5) Each - Permanent Master Keys
(4) Two (2) Each - Permanent Control Keys
(5) Three (3) Each - Permanent Change Keys
(For Each Keyed Door Opening)

Deliver all Construction interchangeable cores and keys to the General Contractor.
Deliver all Permanent interchangeable cores and keys to the Owner, via Registered Mail.

## 2.05 CYLINDRICAL LATCHSETS AND LOCKSETS:

Characteristics:

a. Tested to be in accordance with or exceed ANSI / BHMA A156.2, Series 4000, Grade 1 Strength and Operational requirements, including, a minimum of, 3,000,000 cycle testing.

b. U.L. Listed for 3-hour doors.

c. Locksets shall be non-handed.

d. Chassis: Cylindrical housing design, heavy gauge, cold rolled steel mechanisms, corrosion treated for normal atmosphere conditions.

e. Locksets shall have separate anti-rotational through-bolts for positive mounting / interlocking to the door, without any exposed mounting screws.

f. Locksets shall have solid cast levers, plated to match the specified finish symbols. Levers shall operate independently, and shall have separate, heavy duty, lever return springs or spring cages, allowing for a smooth operation of the lockset, for effective lever support, which shall prevent lever sag. Outside lever handles shall be a minimum of 4-5/8" in length and shall provide a minimum of 2" clearance from the surface of the door to the inside of the lever, at the midpoint. Outside lever handles shall return to within, a maximum, of 1/2" of the door surface.

g. Outside lever handles, on keyed locksets, shall be removable only when the designated key is in the cylinder.

h. When the outside lever handle is locked, the lever shall rotate freely and shall return to its horizontal position when released. The locked outside lever handle shall freely rotate up and down while remaining securely locked.

i. Roses: Wrought brass, bronze or stainless steel, plated to match the specified finish symbols. Roses shall be a minimum 3-7/16" in diameter, for coverage of the ANSI / DHI A115.18 - 1994 door preparation.

j. All locksets shall be furnished with a 1/2" throw latch bolt and shall be listed by Underwriters Laboratories, Inc. for A label and lesser class 4'-0" x 10'-0" single doors.

k. Backset: 2-3/4".

l. Strike: Brass, bronze or stainless steel, plated to match the specified finish symbols. Conform to ANSI A115.2 (4-7/8" x 1-1/4"), with lips of a sufficient length to clear trim and protect clothing.

m. Provide "Knurled" or "Tactile" Outside Levers; as indicated in the Door Hardware Sets.

"Abrasive" Outside Levers shall not be acceptable.

## 2.06 EXIT DEVICES:

Characteristics:

a. Tested to be in accordance with ANSI A156.3, 1994, Grade 1. All exit devices to be heavy duty, with one-piece removable covers. The housing shall be manufactured from extruded aluminum without exposed screws or rivets.

b. Exit Devices shall be "UL" listed for Life Safety. All exit devices for fire-rated door openings shall have "UL" labels for "Fire Exit Hardware".
All exit devices shall conform to NFPA 80 and NFPA 101 requirements.

c. All series exit devices shall be "touchpad" (modern) types, incorporating a hydraulic fluid damper, which decelerates the touchpad on its return stroke and eliminates noise associated with the exit device operation.
All exit devices shall be non-handed. The touchpad shall extend a minimum of 1/2 of the door width and shall be a minimum of 2-3/16" in height. Plastic touch pads shall not be acceptable. The touchpad height shall exceed height of mechanism case or rail assembly to eliminate "Pinch Points".
If the touchpad height does not exceed the height of the mechanism case or rail assembly, provide a factory installed insert / filler on the top and bottom of the touchpad along the mechanism case and rail assembly; to prevent "Pinch Points".

d. All latch bolts to be the deadlocking type. Latch bolts shall have a self-lubricating coating to reduce wear. Plated or plastic coated latch bolts shall not be acceptable.
e. All metal end caps to be standard with all exit devices.
f. Exit device strikes, where surface applied, shall be a roller type and have an anti-slip mounting plate.
g. All outside exit device trim shall be forged brass, full escutcheon. The lever trim shall be a "breakaway type" with substantial resistance to rotation when locked but allowing the vandalized lever to drop to a vertical, 90 degrees, position when more than 35 pounds of torque is applied.
h. The exit device end caps shall be secured with three (3) screws to a truss bracket.
i. The "touchpad" exit devices shall be patterned punched to designate code requirements; where required.
j. All exit devices shall be made of brass, bronze, stainless steel, or aluminum material, plated to the standard architectural finishes to match the balance of the door hardware.

## 2.07 CLOSERS

Characteristics:

a. Door closers shall have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder; which have been tested and certified under ANSI / BHMA Standard A156.4, Grade 1.
b. Hydraulic fluid shall be of a type requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F (49 degrees C) to -30 degrees F (-35 degrees C).
c. Spring power shall be continuously adjustable over the full range of closer sizes, and allowing for reduced opening force for the physically handicapped. Hydraulic regulations shall be by tamper-proof, non-critical valves. Closers shall have separate adjustment for latch speed, general speed and back check.
d. All closers shall have solid forged steel main arms (and forearms for parallel arm closers).
e. All closers shall have non-metallic full, plastic, covers, which provides complete enclosure.
f. All closers shall be certified to exceed Ten Million (10,000,000) full load cycles by a recognized independent testing laboratory. All closers shall be of one manufacturer and shall maintain the manufacturer's ten year warranty.
g. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ADA and ANSI A117.1 provisions for door opening force.
h. All closers shall be attached utilizing Through Bolts with Wood and Machine Screws ("TBWMS").
i. Closers to be installed to allow door swing as shown on plans. Doors swinging into exit corridors shall provide for corridor clear width as required by code. Where possible, mount closers inside rooms.

j. Powder coating finish to be certified to exceed 100 hours salt spray testing by ETL, an independent testing laboratory used by BHMA for ANSI certification. **Lacquer or painted finish on metal components shall not be acceptable**.

## 2.08 PROTECTIVE PLATES

Characteristics:

a. Tested to be in accordance with ANSI / BHMA A156.6, Grade 1.
b. All mop, kick, and armor plates shall be US18 gauge (.050") thick of stainless steel material.
c. Fabricate mop plates not more than 1 inch less than door width, on the "PULL" side, kick plates not more than 1-1/2 or 2 inches less than door width, on the "PUSH" side, and armor plates not more than 1-1/2 inches less than door width, on the "PUSH" side.

d. Heights:
   (1) Mop Plates shall be 4 inches in height.
   (2) Kick Plates shall be 8 inches in height.
   (3) Armor Plates shall be 36 inches in height.
e. Where detailed bevel all four (4) edges ("B4E").
f. Provide mop, kick, and armor plates with #6 x 5/8" Oval Head, Stainless Steel, Sheet Metal Screws.

## 2.09 DOOR STOP

Characteristics:

a. Tested to be in accordance with ANSI / BHMA A156.16, Grade 1.
b. Wall Bumpers shall have a solid forged brass housing with a concealed, in the concave bumper, attachment. Provide with wood screw and plastic anchors.
c. Floor Stops shall be made from solid cast brass or bronze. Provide with machine screws and lead expansion shield anchors.
d. Install floor stops in such a position that they permit maximum door swing, but do not present a hazard or obstruction.

## 2.10 SILENCERS

Provide GJ-64 silencers for all hollow metal frames. Single doors shall have three (3) silencers. Double doors shall have two (2) silencers.

## PART 3 – EXECUTION

### 3.01 APPLICATION

INSTALLATION: Work shall be done by a craftsman skilled and experienced in installation of finish hardware. Mortised items shall be neatly set in and made flush with door or frame surface. Manufacturer's instructions and recommendations shall be strictly followed.

FASTENERS: Hinges, pivots, locks, and exit devices shall be installed with proper sex bolts, wood or machine screws as supplied by the manufacturer. Surface closers shall be mounted to door with sex bolts. Door pulls shall be installed on doors with thru-bolts as supplied by manufacturer.

### 3.02 ADJUSTING, CLEANING, AND DEMONSTRATING

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.

   1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy to execute final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

B. Clean adjacent surfaces soiled by hardware installation.

### 3.03 HARDWARE SETS

**Hardware Set 1 Tag # 01**

| | | |
|---|---|---|
| 2 ea | Cont. Hinge | 112 HD 83" |
| 1 ea | Rim Exit | CD 35A-NL-OP |
| 1 ea | Rim Exit | CD 35A-EO |
| 1 ea | Rim Cylinder | C953 |
| 2 ea | Mortise Cylinder | C987 |
| 1 ea | Mullion | 5754 |
| 2 ea | Offset Pull | 12J |
| 2 ea | Parallel Arm Closer | 1461 H-Cush-18PA-30-60 |

NOTE: Threshold and Weather Strip by Aluminum Door Supplier

**Hardware Set 2 Tag # 02, 26**

| | | | | | |
|---|---|---|---|---|---|
| 1 set | BB Hinges | 5BB1 | NRP | 4 ½ x 4 ½ | 630 |
| 1 ea | Office Lock | T511 | GD | | |
| 1 ea | Dead Lock | D141 | GD | | |
| 1 ea | Parallel Arm Closer | 1461 | R w/PA | | |
| 1 ea | Bumper Threshold | 520S-S | | | |
| 1 ea | Door Sweep | 759S-V | | | |
| 1 roll | Weather Strip | 736S | | | |
| 1 ea | Drip Cap | 810S | | | |

**Hardware Set 3 Tag # 3, 13, 16, 25, 2-1, 2-4, 2-5, 2-6, 3-2, 3-3**

| | | | | | |
|---|---|---|---|---|---|
| 3 ea | Ball Bearing Hinges | 5BB1 | 4 ½ x 4 ½ | NRP | 630 |
| 1 ea | Rim Exit | CD99R | NL-OP | | |
| 1 ea | Mortise Cylinder | C987 | GD | | |
| 1 ea | Rim Cylinder | C953 | GD | | |
| 1 ea | Offset Pull | 12J | | | |
| 1 ea | Closer | 1461 | H Cush | | |
| 1 ea | Bumper Threshold | 520S-S | | | |
| 1 ea | Door Sweep | 759S-V | | | |
| 1 set | Weather Strip | 736S | | | |
| 1 ea | Drip Cap | 810S | | | |

**Hardware Set 4 Tag # 33**

| | | | | |
|---|---|---|---|---|
| 3 ea | Ball Bearing Hinges | 5BB1 | 4 ½ x 4 ½ | 652 |
| 1 ea | Privacy Latchset | T301S | Dane | |
| 1 ea | Closer | 1461 | Cush | |
| 1 ea | Kick Plate | 8400 | 8" x 2" LTDW | |
| 1 ea | Convex Wall Stop | WS407CVX | | |

**Hardware Set 5 Tag # 32**

| | | | |
|---|---|---|---|
| 3 ea | Ball Bearing Hinges | 5BB1 | 4 ½ x 4 ½ |
| 1 ea | Push Plate | 110S | |
| 1 ea | Offset Pull | 12J | |
| 1 ea | Cush Closer | 1461 | H Cush |
| 1 ea | Kick Plate | 8400 | 8" x 2" LTDW |
| 1 ea | Convex Wall Stop | WS407CVX | |

**Hardware Set 6 Tag # 36, 42**

| | | | |
|---|---|---|---|
| 3 ea | Ball Bearing Hinges | 5BB1 | 4 ½ x 4 ½ |
| 1 ea | Storeroom Lockset | T581 | GD Dane |
| 1 ea | Closer | 1461 | R w/PA |
| 1 ea | Convex Wall Stop | WS407CVX | |

**Hardware Set 7 Tag # 27, 49**

| | | | |
|---|---|---|---|
| 3 ea | Ball Bearing Hinges | 5BB1 | 4 ½ x 4 ½ |
| 1 ea | Office Lockset | T511 | GD Dane |
| 1 ea | Closer | 1461 | R w/PA |
| 1 ea | Auto Door Bottom | 747S | |
| 1 set | Sound Seal | 721B | |
| 1 ea | Convex Wall Stop | WS407CVX | |

**Hardware Set 8 Tag # 28, 29, 30, 34, 39, 41, 43, 44, 45, 46, 47, 48,**

| | | | |
|---|---|---|---|
| 3 ea | Ball Bearing Hinges | 5BB1 | 4 ½ x 4 ½ |
| 1 ea | Office Lockset | T511 | GD Dane |
| 1 ea | Convex Wall Stop | WS407CVX | |

**Hardware Set 9 Tag # 37, 40**

| | | | |
|---|---|---|---|
| 3 ea | Ball Bearing Hinges | 5BB1 | 4 ½ x 4 ½ |
| 1 ea | Storeroom Lockset | T581GD Dane | |
| 1 ea | Convex Wall Stop | WS407CVX | |

**Hardware Set 10 Tag # 35**

| | | | |
|---|---|---|---|
| 3 ea | Ball Bearing Hinges | 5BB1 | 4 ½ x 4 ½ |
| 1 ea | Storeroom Lockset | T581 | GD Dane |
| 1 ea | Closer | 1461 | Cush |
| 1 ea | Kick Plate | 8400 | 8" x 2" LTDW |

**Hardware Set 11 Tag # 31**

| | | | |
|---|---|---|---|
| 6 ea | Ball Bearing Hinges | 5BB1 | 4 ½ x 4 ½ |
| 1 set | Flush Bolts | FB458-12 | |
| 1 ea | Office Lockset | T511 | GD Dane |
| 2 ea | Surface OH Stop | 454H | |

**Hardware Set 12 Tag # 38**

| | | |
|---|---|---|
| 6 ea | Ball Bearing Hinges | 5BB1 4 ½ x 4 ½ |
| 1 ea | SVR Exit Device | CD9927-NL LBR |
| 1 ea | SVR Exit Device | CD9927-DT LBR |
| 2 ea | Mortise Cylinder | C987 |
| 1 ea | Rim Cylinder | C953 |
| 2 ea | Closer | 1461 R w/PA |
| 2 ea | Auto Door Bottom | 747S |
| 1 set | Sound Seal | 721B |

# SECTION 08734 - COMMERCIAL DOOR OPERATORS
# RSX® OVERHEAD SECTIONAL DOOR OPERATOR

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Overhead Sectional Door Openers.

### 1.02 RELATED SECTIONS

A. Section 05500 - Metal Fabrications: Support framing and framed opening.

B. Section 08360 - Sectional Overhead Doors.

C. Section 09900 - Painting: Field applied finish.

D. Section 16130 - Raceway and Boxes: Conduit from electric circuit to door operator and from door operator to control station.

E. Section 16150 - Wiring Connections: Power to disconnect.

### 1.03 REFERENCES

A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

B. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.

C. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

D. NEMA MG 1 - Motors and Generators.

### 1.04 DESIGN / PERFORMANCE REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

B. Wiring Connections: Requirements for electrical characteristics.
   1. 115 volts, 60 Hz single phase.

### 1.05 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Details of construction and fabrication.
   4. Installation methods.

C. Shop Drawings: Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent construction.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.

B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Install in areas designated by Architect.
   2. Do not proceed with remaining work until workmanship and installation is approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.08 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.09 WARRANTY

A. Provide operators with a 2 year or 20,000 cycle limited warranty on motor and parts.

**PART 2 - PRODUCTS**

2.01 MANUFACTURERS

A. Acceptable Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: .

B. Substitutions: As reviewed equal.

2.02 OVERHEAD SECTIONAL DOOR OPERATORS

A. Commercial Sectional Door Operator: Model RSX Commercial Door Operator:
   1. Application:
      a. Lift Clearance Sectional Door.
   2. Electric Motor: UL listed.
      a. Rating:
         1) 1/2 horsepower single phase or three.
      b. Reduction: Primary reduction is SuperBelt, an auto tension poly-V flex belt that does not require adjustment. Secondary reduction is by chain and sprocket.
      c. Duty cycle: Accommodate heavy usage, up to 60 cycles per hour during peak usage periods.
         1) Brake: DC Disc type with selectable Progressive Braking for smooth stopping.
         2) Clutch: Adjustable friction disc type.
         3) Limit System: LimitLock limit system, magnetic type providing absolute positioning with push to set and remote setting capabilities. Limit System shall remain synchronized with the door during manual operation and supply power interruptions.
   3. Control System: Microprocessor based with relay motor controls on a single board. System incorporates a 16 character Liquid Crystal Display (LCD) to display the system status. System shall include the following:
      a. Capable of monitoring and reporting on a variety of operating conditions, including: Current operating status, Current command status, Motor movement status, Current error status (if applicable), Hoist Interlock status (if applicable), External Interlock status, and 24VDC status.
      b. A delay-on-reverse operating protocol.
      c. Maximum run timers in both directions of travel that limit motor run time in the event a clutch slips or some other problem occurs.
      d. Provisions for the connection of a 2-wire monitored photocell system or a 2-wire monitored edge sensor, as well as standard 2-wire sensing edges, photocells or other entrapment protection devices.

e. Control action will be constant contact close until a monitored entrapment device is installed, allowing for selection of momentary contact.
f. Provisions for connection of single and/or 3-button control stations.
g. Provisions for connection of an external 3-wire radio controls and related control devices.
h. On board open, close and stop control keys for local operation.
i. Trolley operators with an inherent secondary reversal system.
j. CodeDodger radio receiver that is dual frequency cycling at 315 Mhz and 390 Mhz capable of storing 250 single button and/or 250 Open-Close-Stop transmitters with the ability to add and/or delete transmitters individually, identify and store activating transmitter IDs.

4. Mounting:
   a. Sectional doors shall be by Jackshaft that is side-mounted with:
      1) Direct shaft-to-shaft coupling.
5. Release:
   a. Release shall be a pull and hold type mechanism with single cable operation and an integrated interlock switch on hoist units.
6. Hoist: Chain hoist consists of chain pocket wheel, chain guard and smooth hand chain on hoist units.
7. Entrapment Protection:
   a. Jackshaft version designed to accept external entrapment device.
   b. Control system shall have provisions to connect entrapment protection devices such as electric sensing edge, pneumatic sensing edge or photoelectric sensor and to provide constant contact control operation in lieu of such devices.
8. Secondary Reversal:
   a. Hoist versions designed to accept an optional external reversing device.
9. Control accessories:
   a. Operator Controls:
      1) Push-button operated control stations with open, close, and stop buttons on interior.
      2) Key switch on exterior.
      3) Controls surface mounted.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Verify door sizes, configuration, tolerances and conditions are acceptable.

B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly without distortion or stress.

C. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

D. Coordinate installation of electrical service with Section 16150. Complete wiring from disconnect to unit components.

3.04 ADJUSTING

A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.05 CLEANING

A. Clean components using non-abrasive materials and methods recommended by manufacturer.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

## SECTION 08800 - GLASS AND GLAZING

### PART 1 - SCOPE

A. This Section includes all labor, materials, equipment and related items required for the work of glass and glazing as shown on the Drawings and specified herein.

### PART 2 - SUBMITTALS

A. The Contractor shall submit to the Architect for approval prior to furnishing materials at the job site, in five (5) copies, manufacturer's specifications, application and performance data, etc. for all glass and glazing materials, except miscellaneous accessories specified hereunder.

B. Samples. The Contractor shall submit if requested to the Architect for approval prior to furnishing materials at the job site, duplicate samples of the following:

1. Glass of each type, not less than 3" x 5".

2. Glazing compound, one (1) cartridge.

### PART 3 - CODES AND STANDARDS

A. All glazing compounds and methods of glazing shall be in accordance with applicable portions of the Flat Glass Marketing Association's "Glazing Manual", latest edition.

B. All safety glazing shall meet requirements of the Kentucky Department of Housing, Buildings, and Construction and appropriate Kentucky Revised Statutes.

### PART 4 - PRODUCT HANDLING

A. Glass shall be delivered to the job and shall be stored on end and under cover. Glass shall be properly crated, packaged, and protected from damage. Glazing compounds shall be delivered in manufacturer's sealed containers, with attached labels properly identifying the types.

### PART 5 - MATERIALS

A. Insulating glass for installation in aluminum windows shall be of sizes shown, composed of outer and inner panes of ¼" (for color, see elevations) /¼" clear .548, 1" O.A. , by LOF separated by a ½" dehydrated air space. Each unit shall be hermetically sealed and glass shall be separated by a spacer around the edges as standard with the manufacturer.

1. Warranty. Each unit shall be guaranteed by the manufacturer not to develop, under normal conditions, material obstruction of vision as a result of film formation on the internal glass surfaces caused by failure of the hermetic seal other than through glass breakage for a period of ten (10) years.

B. Compound for glazing in openings other than those which are dry-glazed shall be non-staining, one-part polysulfide base sealant, and shall be PRC "Rubber Caulk 5000", Pecora "Synthacalk GC-9", or DAP "Flexiseal". Color of compound shall be manufacturer's standard as selected by the Architect.

C. Miscellaneous Items. Provide neoprene spacers, setting blocks, clips, and all accessories required for the work of glazing.

D. Other material shall be as specified hereinafter.

## PART 6 - GLAZING

A. General Requirements:

1. Glazing shall be done in a weathertight and waterproof manner. No glazing work shall be done when the temperature is below 40 degree F.

2. Glazing surfaces shall be extremely clean, dry and completely dust free before commencing application of glazing materials.

3. Remove glazing beads completely, perform glazing operations and set back in correct location. Do not mar beads, screws and the like.

4. Glazing shall be done at the building after windows, frames, doors, etc. are installed.

5. Remove excess glazing compound from glass and other adjacent surfaces to prevent permanent stains or other damage.

B. Aluminum entrance doors and fixed window frames shall be glazed in strict accordance with entrance manufacturer's instructions and details for these operations.

## PART 7 - CLEANING

A. At completion, remove dirt, stains, etc. from glass. Wash and polish glass inside and outside surfaces. Exercise care so as not scratch or damage glass. Do not use acid solution or water containing caustic soaps. Leave work in perfect condition as approved by the Architect.

End of Section

# DIVISION X - SPECIALTIES

# SECTION 10155 - TOILET COMPARTMENTS

## PART 1 - GENERAL

### 1.01 WORK INCLUDED

A. Metal partitions for toilets.
B. Urinal Screens
C. Attachment hardware.

### 1.02 RELATED WORK

A. Section 10800 - Toilet and Bath Accessories: Toilet accessories.

### 1.03 REFERENCES

A. ASTM A424 - Steel Sheets for Porcelain Enameling.

B. FS RR-P-1352 - Partitions, Metal Toilet, Complete.

C. ASTM A526 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.

D. ASTM A167 - Stainless and Heat Resisting Chromium-Nickel Steel, Plate, Sheet and Strip.

### 1.04 SUBMITTALS

A. Submit shop drawings and product data, along with manufacturer's descriptive literature, installation instructions and appropriate color selection charts.

B. Clearly indicate partition layouts, swing of doors, elevations, anchorage and mounting details, panel construction, components hardware, finishes and all relevant dimensions.

## PART 2 - PRODUCTS

### 2.01 METAL TOILET COMPARTMENTS

A. Acceptable Manufacturers

1. Flush-Metal Partition Corp.
2. Metpar
3. Sanymetal
4. Approved Equal

B. Type

1. Provide floor-mounted, overhead-braced toilet partitions with anti-grip headrail.
2. Provide pilaster-type floor-supported urinal screens.
3. Provide end stalls to meet ADA requirements.

C. Materials

1. 1" thick, of two sheets galvanized steel, honeycomb core, welded edges and corners.

2. Finish: Baked enamel. Color to be selected by Architect.

3. Attachments, Screws and Bolts: Stainless steel, tamper-proof type, heavy duty extruded aluminum brackets.

4. Hardware: Chrome-plated non-ferrous cast pivot hinges, gravity type, adjustable for door closing positioning; nylon bearings; concealed, thumb-turn door latch; door strike and keeper with rubber bumper; chrome plated coat hook and bumper.

D. Fabrication

1. Fabricate partitions in accordance with FS RR-P-1352

2. Doors and Panels: 1" or 1-1/4" x 58" high, 24" wide doors at standard stalls, 34" wide doors at handicap stalls.

3. Provide internal reinforcement where necessary for attachment of hardware and fittings. Mark locations of reinforcement for partition-mounted washroom accessories.

**PART 3 - EXECUTION**

3.01 PREPARATION

A. Examine site conditions to which work is to be applied. Report discrepancies to Architect/ Engineer in writing.

B. Take site dimensions affecting this work.

C. Ensure correct spacing of plumbing fixtures.

D. Ensure correct location or built-in framing, anchorage, and bracing, where required.

3.02 INSTALLATION

A. Install partitions secure, plumb, level, and square.
B. Leave 1/2 inch space between wall and panels and between wall and end plasters.

C. Attach panel brackets securely to walls using anchor devices as required by manufacturer.

D. Attach panels and pilasters to bracket with through sleeve tamperproof bolts and nuts.

E. Anchor urinal screen panels to walls with two panel brackets and vertical upright to floor.

F. Provide for adjustment of floor variations.

G. Equip each door with hinges, one door latch, and one coat hook and bumper.

H. Install door strike keeper and door bumper on each pilaster in alignment with door latch.

I. Adjust and align hardware to uniform clearance at vertical edges of doors not exceeding ¼".

J. Adjust hinges to locate doors in partial open position when unlatched, except that out-swing doors shall return to closed position.

3.03 CLEANING

A. Damaged, scratched or marred defective materials will be rejected, and shall be replaced with new materials.

B. Remove protective maskings. Clean surfaces free of oil and imperfections.

End of Section

# SECTION 10426 - IDENTIFYING DEVICES

## PART 1 - GENERAL

### 1.01 DESCRIPTION

C. Furnish and install all signage and identifying devices and handicap parking signs where shown or scheduled on the Drawings and specified herein.

B. This section includes the installation of such devices in locations as indicated on plans, or where not shown, as required to meet requirements of the Americans with Disability Act of 1990 (ADA).

### 1.02 SUBMITTALS

D. Manufacturer's Data: Submit manufacturer's descriptive literature and specifications, including color samples of material for selection, as applicable for approval.

B. Submit shop drawings listing sign styles, lettering and locations, and overall dimensions of each sign.

### 1.03 REFERENCES

A. American National Standards Institute (ANSI): A117.1 - 1992 Accessible Signage Standards (4.28 Signage)

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

C. Americans with Disabilities Act Accessibility Guideline (ADAAG): 4.30 Signage

D. California Title 24 Accessible Signage Standards (3105)

### 1.04 DELIVERY, STORAGE & HANDLING

A. Deliver components correctly packaged to prevent damage.

B. Store in secure areas, out of weather and protected from work of other trades.

### 1.05 WARRANTY

A. Provide Manufacturer's standard one year limited warranty covering manufacturing defects.

## PART 2 - PRODUCTS

### 2.01 HANDICAP PARKING SIGNS

A. Furnished for installation under work of Section 02700, one (1) manufacturer's standard aluminum sign plate for identification of handicapped parking spaces. Plates shall be of size and layout shown on the Drawings and shall be similar to Model PHP75 as manufactured by the Supersine Company.

## 2.02 INTERIOR ROOM SIGNAGE

A. Style: Signs shall be single-faced, Lettering Specialists, Inc. - 11000 Series, radiused corners, beveled edge with decorative reveal around the perimeter; Optima semi-bold style, color as selected by Architect. Schedule shall be as furnished by the Architect/Owner. Composition shall be a design similar to manufacturers standards and meeting all requirements of Americans with Disabilities Act (ADA). Signs shall be mounted with double-faced tape as furnished by the manufacturer.

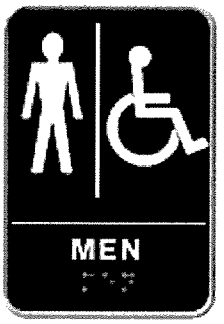
B. Pictograms: Pictograms (where required) shall be accompanied by the equivalent verbal description placed directly below the pictogram. The border dimensions of the pictogram shall be 6 inches minimum in height. Pictograms, like non-permanent text, may be recessed.

C. Mounting Location and Height: Signs shall be installed on the wall adjacent to the latch side of the door. Where there is no wall space to the latch side of the door, including at double leaf doors, signs shall be placed on the nearest adjacent wall. Mounting height shall be 60 inches above the finished floor to the centerline of the sign.

D. SCHEDULE:
Types:

| Room No. | Description | Qty. | Sign Type |
|---|---|---|---|
| 115 | Women (w/ADA Symbol) | 1 | A |
| 119 | Men (w/ADA Symbol) | 1 | B |


**A**




**B**

## PART 3 - EXECUTION

3.01 EXAMINATION

A. Before installing signs, verify that mounting surfaces are completely finished and ready for installation. Inspect surface to be sure it is clean and free from contaminants that may adversely affect mounting system adhesion.

B. Do not install signs until surfaces are acceptable. Notify Architect if there are any questions as to suitability of installation surfaces or installation locations.

3.02 INSTALLATION

A. Install signs in accordance with manufacturer's instructions and in accordance with ADA guidelines for location and as indicated in schedules.

B. Install after doors are installed and after doors and walls are finished.

C. Assure signs are installed level.

D. Mounting Location and Height: Signs shall be installed on the wall adjacent to the latch side of the door. Where there is no wall space to the latch side of the door, including at double leaf doors, signs shall be placed on the nearest adjacent wall. Mounting height shall be 60 inches above the finished floor to the centerline of the sign.

3.03 CLEANING AND PROTECTION

A. At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION

## SECTION 10522 - FIRE EXTINGUISHERS AND ACCESSORIES

### PART 1 - GENERAL

1.01 Work Included

D. Fire extinguishers

B. Cabinets and wall mounting brackets

1.02 References

A. NFPA 10 Portable Fire Extinguishers.

1.03 Quality Assurance

A. Conform to NFPA 10 requirements for extinguishers.

1.04 Submittals

A. Submit product data.

B. Submit manufacturer's installation instruction.

1.05 Operation and Maintenance Data

A. Submit manufacturer's operation and maintenance data.

B. Include test, refill or recharge schedules, procedures, and re-certification requirements.

1.06 Environmental Requirements

A. Do not install extinguishers when ambient temperatures may cause freezing.

### PART 2 - PRODUCTS

2.01 Acceptable Manufacturers

A. Larsen
B. J.L. Industries
C. Modern Metal Products.
D. Substitutions: Reviewed equal.

2.02 Extinguishers

A. Fire Extinguishers #1-#9 shall be Larsen Model MP10, 10 lbs., U.L. Rating 4A-60B:C.

B. For location of extinguishers, see Floor Plan.

2.03 Cabinets/Accessories

A. Fire Extinguishers #1 shall be mounted in a semi-recessed cabinet, Larsen Model 2409-6R, non fire-rated cabinet, clear anodized aluminum with Vertical Duo, partial glass door and 2½" rolled edge.

B. Fire Extinguishers #2 - #9 shall be wall-mounted with manufacturer's standard bracket.

**PART 3 - EXECUTION**

3.01 Installation

A. Install fire extinguishers 36" a.f.f. or as required by NFPA 10. Top of cabinet mounted at 60" a.f.f.

B. Secure rigidly in place in accordance with manufacturer's instructions.

End of Section

## SECTION 10800 - TOILET ROOM ACCESSORIES

### PART 1 - GENERAL

1.01 Work Included

A. Toilet room accessories.

1.02 Related Work

A. Wall blocking required to secure accessories
B. Glazing/caulking
C. Toilet compartments
D. Gypsum wallboard systems
E. Plumbing fixtures
F. Countertops

1.03 References (including but not limited to)

A. ANSI A117 - 1986 Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.

B. UBC - Chapters 5 and 33 Requirements for Handicapped.

C. Title 24, California Code of Regulations, Parts 2, 3, and 5.

D. ADA, Accessibility Guidelines for Buildings and Facilities, Federal Register Volume 56, Number 144, Rules and Regulations.

E. Fair Housing Amendments Act of 1988, Accessibility Guidelines, Federal Register Volume 56, Number 44.

F. Southern Building Code.

1.04 Quality Assurance

A. Manufacturer

1. Model numbers for toilet room accessories manufactured by Bradley Corp. Washroom accessories are listed to establish a standard of quality for design, function, materials, workmanship and appearance. Other manufacturers may be submitted for evaluation by the architect by following the conditions of the substitutions clause. Unless approval is obtained 10 days prior to the bid date, all bids shall be based on the standard of quality. The architect shall be the sole judge as to the acceptability of all products submitted for substitutions.

2. Accessories shall be the products of a single manufacturer. Accessories with tumbler

locks shall be keyed alike with the exception of coin boxes in vending equipment.

B. Regulatory requirements

1. Operation of accessories shall comply with guidelines set forth by the American Disabilities Act, Title III. Documentation and samples to be provided to the architect upon request.

1.05 Submittals

A. Comply with requirements of Section regarding submittals.

B. Manufacturer's Data

1. Provide required number copies of:
   a. Product data sheets.
   b. Installation instructions.
   c. Service and parts manual.

C. Samples

1. Upon request, submit one sample of each item specified. If more than one manufacturer is specified, submit one sample of each item for architect's review.

1.06 Product Delivery, Storage, and Handling

A. Deliver items in manufacturer's original unopened protective packaging.

B. Store materials in original protective packaging to prevent physical damage, or wetting.

C. Handle so as to prevent damage to accessories.

1.07 Warranty

A. Furnish one year guarantee against defects in material and workmanship on all accessories. In addition to the above the following shall apply:

1. Welded stainless steel framed mirrors shall have a fifteen year guarantee against silver spoilage.

**PART 2 - PRODUCTS**

2.01 Toilet Room Accessories Schedule:

A. Grab Bars of sizes as shown on plans, #812-001, heavy-duty stainless steel with sanitary safety grip finish, concealed mounting kits to be included.

B. Mirror 30" x 42", #7802-30 x 42, angle framed mirror, ¼" tempered glass.

C. Mirror 24" x 42", #7802-24 x 42, angle framed mirror, ¼" tempered glass.

D. Toilet Tissue Dispenser, #5084, surface mounted, single roll, stainless steel with satin finish.

E. Toilet Tissue Dispenser, #5234, surface mounted, double roll, satin stainless steel.

F. Paper Towel Dispenser, #2494-000000, surface mounted, roll towels, automatic/battery-operated, durable high-impact material.

G. Soap Dispenser, #6562, tank type - vertical, surface mounted, satin stainless steel.

2.02 Materials (if applicable to items in contract)

A. All cabinets shall be constructed of 18-8, type 304 stainless steel.

B. All waste receptacle shall be constructed of 18-8, type 304 stainless steel or rigid molded leak-proof plastic.

C. Waste receptacles or cabinets manufactured of type 400 stainless steel are not acceptable.

D. All tumbler locks to be fastened to accessories with lock nuts. Fastening locks to units with spring clip is not acceptable.

**PART 3 - EXECUTION**

3.01 Inspection

A. Check wall opening for dimensions, plumbness of blocking or frames that would affect installation of recessed accessories. For surface mounted accessories check condition of wall and confirm installation of backing within wall.

B. Verify spacing of plumbing fixtures and toilet compartments that affect installation of toilet room accessories.

End of Section

# DIVISION XI - EQUIPMENT

# SECTION 11160 - LOADING DOCK EQUIPMENT

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to work of this section.

### 1.02 DESCRIPTION OF WORK

A. Loading dock equipment is for four doors.

B. Types of loading dock equipment include the following:
   1 Air pressure dock levelers with dock bumpers, complete with steel frame frames.
   2. Truck dock seals.
   3. Hydraulic trailer restraining safety systems.
   4. Dock lights.

C. Concrete work for dock leveler pits is specified in Division 3.

D. Electrical rough-in wiring to adjacent junction box for loading dock equipment is by Electrical Contractor. Connection of equipment from junction box shall be by Loading Dock Equipment Contractor.

### 1.03 QUALITY ASSURANCE

A. Dock Leveler Standard: Comply with applicable requirements of ANSI MH14.1 for construction and operation of dock levelers (fixed dockboards) except as otherwise indicated.

B Provide dock levelers as complete units produced by a single manufacturer, including necessary accessories, fittings and anchorages.

### 1.04 SUBMITTALS

A Product Data: Submit manufacturer's product data and installation instructions for each type of loading dock equipment, including installation details.

B. Shop Drawings: Submit shop drawings for fabrication and erection of dock levelers and dock shelters. Include plans, elevations, and large scale details. Show anchorages and accessory items. Provide location template drawings for items supported or anchored to permanent construction.

   1. Furnish roughing-in drawings for electrical services well in advance of concrete work.

C. Maintenance Data: Submit manufacturer's maintenance and service data, including address and telephone number of nearest authorized service representative.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products of one of the following:

1. Manufacturers of Dock Levelers and Dock Bumpers:
   a. Kelley Company, Inc.
   b. Rite-Hite Corporation
   c. W.B. McGuire Co.
   d. Serco Engineering Corp.
   e. Flexon

2. Manufacturers of Dock Seals:
   a. Kelley Company
   b. Frommelt Industries, Inc.
   c. Langsenkamp
   d. Serco Engineering Corp.
   e. Flexon

3. Manufacturers of Truck Restraining Devices:
   a. Kelly Company, Inc.
   b. Rite-Hite Corporation
   c. Serco Engineering Corp.
   d. W.B. McGuire Co.
   e. Flexon

4. Manufacturers of Dock Lights:
   a. Kelley Company, Inc.

### 2.02 DOCK LEVELERS

A. General: Provide manufacturer's standard dock levelers of type, function, operation, capacity, size and construction indicated, complete with controls, safety devices, and accessories, except as otherwise indicated. Standard of quality for levelers shall be equal to Kelley Company Model FX 7x8, Dock Leveler, Duty Range I, 35,000 lb. capacity.

B. Function:

Automatic adjustable dockleveler(s) to be 7' width x 8' length (35,000 lbs. ). Capacity of dock leveler per ANSI MH 14.1-87. To be fully automatic, air operated with heavy-duty, shielded NEMA 4 Push Button control box as standard. Electrical requirements to be standard 115v single phase for ease of installation. Gravity Lip™ Automated Lip Extension ensures proper lip extension, with descent of dockleveler into trailer. Below Dock Control Chain supplied to retract dock level support legs for complete servicing of trailers below dock. Below Dock Control Chain also allows for lowering of leveler without

extending lip. Full operating range toe guards with OSHA required (per ANSIZ535.1) yellow markings. Dockleveler to be complete package including motor housing assembly, full operating range toe guards, integral maintenance strut for deck, and lip lock.

Minimum lip bend to reduce crown between deck and lip for use with mechanical handling equipment with low under clearance.

Curb angle sets.

Side and rear weatherseal.

2.03 LAMINATED TREAD BUMPERS

A. Laminated Tread Bumpers: Provide laminated tread dock bumper units required, fabricated from multiple plies cut from fabric-reinforced rubber truck tires to a uniform thickness of 6". Laminate plies under pressure on 3/4" diameter steel supporting roads which are welded and bolted to 1/4" thick structural steel angle closures with predrilled anchor holes. Size angles to provide not less than 1" of tread plies extending beyond the face of the closure angles.

1. Provide (2) laminated tread bumpers 6" thick x 10" wide x 14" long with each dock leveler. Supplier to verify bumper thickness requirement with recessed drive and building condition.

2. Anchorage Devices: Provide anchor bolts, nuts, washers, bolts, sleeves, cast-in-place and other anchorage devices as required to fasten bumpers securely in place and to suit installation type indicated. Furnish anchorage components that are galvanized, or cadmium plated unless otherwise indicated.

G. Finish and Color: Provide manufacturer's standard baked enamel finish system over steel surfaces which have been cleaned and pretreated to obtain optimum paint bond. Paint toe guards yellow to comply with ANSI Z 53.1 requirements and remainder of surfaces in manufacturer's standard color unless otherwise indicated.

H. Accessories: Equip units with manufacturer's standard accessories as follows:

1. Night Locks: Provide manufacturer's standard means to prevent extension of lip and lowering of ramp when overhead doors are locked.

2. Side and rear weatherseals.

2.04 DOCK SEALS

A. General: Provide Kelly D.S.H. 200, or approved equal from one of the manufacturers listed above, consisting of fabric covered foam pads designed to compress under pressure of the truck body to form an air tight seal at the jambs and head of the loading dock opening.

B. Size of Jamb Pads: Unless otherwise indicated, provide jamb pads not less than 12 inches wide and 12 inches deep, and sized to suit opening height.

C. Size and Type of Head Pad: Unless otherwise indicated, provide head pad of the same depth as jamb pads, sized to suit opening width, and as follows:

1. Type: Provide stationary head pads.
   a. Height: Not less than 24.

D. Construction: Provide manufacturer's standard construction consisting of single-or-double ply coated-fabric-covered urethane foam core with supporting frame.

1. Cover Fabric: Vinyl-coated nylon or polyester cover fabric with a total minimum weight of 40 oz. per sq. ft., color black.

2. Guide Strips: 3-1/2 inch wide vinyl, color yellow.

3. Wood Supporting Frame: Provide dimension lumber, select structural grade in accordance with PS 20, pressure treated with water-borne preservatives to comply with AWPB L-2, kiln dried and factory painted, with steel mounting hardware.

2.05 TRUCK RESTRAINING DEVICES (Four)

A. General: Provide Kelly Truck Stop Star 4 Truck Restraint device or equal from one of the manufacturers listed above; consisting of the manufacturer's standard hydraulic device to capture the truck's ICC bumper and hold the truck at the loading dock during loading and unloading. Unit to provide 30,000 lbs. of holding strength and operate in; range from 11" to 30" above drive.

1. Controls: Include a control panel and set of illuminated exterior an' interior signals (red/green) to indicate the device's status to both the controller and truck driver.

B. Electric connections to adjacent junction box shall be by Dock Equipment Contractor.

2.06 DOCK LIGHTS (For Four Doors)

A. Provide adjustable loading dock lights equal to Model K-1040 at manufactured by Kelley Company.

1. Arms shall be 1 ½" square tubing, 14 ga. steel, bulb basing shall be formed of 16 ga. steel. Provide PAR 38 150 watt flood bulbs.

2. Each fixture shall be equipped with an on-off switch and shall be prewired with three-conductor cable from socket through switch to junction box.

3. Finish shall be of baked on enamel in orange color.

## PART 3 - EXECUTION

3.01 PREPARATION

A. Coordinate and furnish anchorages with templates, diagrams, and instructions for their installations, and loading dock equipment indicated to be attached to or recessed into concrete or masonry construction. Coordinate delivery of these items in project site.

3.02 INSTALLATION

A. General: Comply with manufacturer's detailed instructions in installing loading dock equipment.

B. Dock Bumpers: Attach door bumpers to structure to comply with requirements indicated for spacing, arrangement, position relative to top of platform, and anchorage.

1. Bolted Attachment: Attach to preset anchor bolts embedded in concrete or to cast-e-place inserts or threaded studs welded to embedded steel plates or angles, or if none provided, attach by drilling and anchoring with expansion anchors and bolts.

C. Dock Levelers: Coordinate forming of pits to ensure that recess is adequate to accommodate leveler in proper relationship to loading platform. Attach leveler to platform construction to comply with manufacturer's directions.

D. Truck Shelters: Securely attach dock seal to building structure in proper relationship to openings, dock bumpers, and levelers to insure effective seal with sides and top of truck body when trucks are positioned against dock bumpers.

E. Truck Restraining Devices: Install truck restraining devices at each dock leveler in accordance with manufacturers' standards. Coordinate installation with adjacent equipment and materials.

F. Dock Lights: Install one dock light at each dock leveler in accordance with manufacturers' standards.

3.03 ADJUST AND CLEAN

A. Make necessary adjustments for safe, efficient operation of loading dock equipment.

B. After installation, restore marred abraded surfaces to original condition.

END OF SECTION

# DIVISION XIII - SPECIAL CONSTRUCTION

# SECTION 13120 - STEEL BUILDING SYSTEMS

## PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Pre-engineered building and components including the following:
   1. Structural steel frame.
   2. Roof covering system including exterior roof panels, panel attachments, sealants, mastics, trim and flashings.
   3. Exterior wall system including wall panels, panel attachments, sealants, mastics, trim and flashings.

B. Wall accessories including the following:
   1. Louvers.

C. Roof accessories including the following:
   1. Ridge ventilators; 12" x 10".

1.02 RELATED SECTIONS

A. Section - Cast-in-Place Concrete: Foundations and anchor bolts.

B. Section 09900 - Paints and Coatings: Finish painting of structural members, doors, roof curbs, and factory prime painted miscellaneous items.

1.03 REFERENCES

A. AWS D1.1 - Structural Welding Code; American Welding Society.

B. Factory Mutual (FM): Wind classification rating system.

C. IAS AC472 International Accreditation Services.

D. NAIMA 202 - Standard for Flexible Fiber Glass Insulation Used in Metal Buildings; North American Insulation Manufacturers Association.

E. UL 580 - Tests for Wind Uplift Resistance of Roof Assemblies; Underwriters Laboratories Inc.

F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.

G. Canadian Welding Bureau: A660 Certification.

1.04 DEFINITIONS

A. Building Width: Measured from outside to outside of sidewall girts. Typically edge to edge of concrete.

B. Building Length: Measured from outside to outside of end wall girts. Typically edge to edge of concrete

C. Building Line: Outside face of steel/girt.

D. Building Eave Height: Measured from the top of the eave member at the outside of the sidewall girt line to the bottom of the sidewall column base plate or to finished floor if columns are on grout or recessed below finished floor.

E. Bay Spacing: Measured from centerline to centerline of primary frames for interior bays and from centerline of the first interior frame to outside of end wall girts for end bays.

F. Roof Pitch: The ratio of the vertical rise to the horizontal run (i.e. 1:12 = 1 inch of rise for every foot of horizontal dimension).

1.05 SYSTEM DESCRIPTION

A. General:
   1. Provide metal building frame, metal wall panels, metal roof panels, accessories and miscellaneous materials for a complete enclosure including supports for building components specified in other sections.

   2. Design structural systems according to professionally recognized methods and standards and legally adopted building codes.

   3. Design under supervision of professional engineer licensed in the jurisdiction of the Project.

B. Design Requirements:
   1. Bay size: see drawings.
   2. Roof pitch: see drawings.
   3. Building location zip code: 40004
   4. Roof Live Load: 20 psf, reducible to 16 psf.
   5. Ground Snow Load: 15
   6. Collateral Loads: 8 psf at Office; 5 psf at Warehouse; and, 4 psf at Storage Unit
   7. Rainfall intensity per hour: 6
   8. Seismic Loads: Calculate in accordance with applicable code
   9. Building use/importance category III, Special Occupancy at Building #1, category II at Buildings #2 and #3, Effective Peak Velocity Related Acceleration Coefficient

(Ss/Sa) 25.4%, Effective Peak Acceleration Coefficient (S1/Sa) 10.6%, include 0% percent of the roof snow load in seismic load calculations at Building #1.

10. Dead loads, including the weight of all indicated permanent construction:
    a. Elements required for support of lights and light battens, hanging fixtures, mechanical equipment, piping, ceiling hanger wires, and all other items required to provide a complete building and not specifically indicated on the drawings.
11. Wind Loads:
    a. Roof Wind Load: Calculate in accordance with applicable code, using 90 mph Basic Wind Speed, 3 second gust, Exposure Category C, and Importance Factor of 1.15. Wind Enclosure open @ Building #1, 1.0 @ Buildings #2 and #3.
    b. SSR Roof System tested and certified to meet Underwriters Laboratories UL 90 wind uplift rating.
        1. Panels tested in accordance with U.S. Corp of Engineers ASTM E 1592.
        2. Panel fastening meeting uplift requirements based on tested fastener values with appropriate Safety Factors.
        3. Purlin strength with SSR roof panel determined and tested in accordance with AISI procedures.
    c. Panel Rib panels are accepted for use by the Dade County Building Commission and are UL-60 and UL-90 certified.
    d. All load and code information must be obtained directly from the Authority Having Jurisdiction.

C. Performance Requirements:
    1. System to withstand gravity and lateral loads in compliance with contract documents.
    2. Refer to contract drawings for additional concentrated loads to pre-engineered building hanger beams and support jacks.
    3. Allowable Deflections: Deflection/drift criteria shall follow recommendations outlined in AISC Design Guide 3 and MBMA Serviceability recommendations.
    4. Metal wall panels (interior and exterior) shall not to be used as shear elements. Specify if metal wall and girt assembly require specific deflection constraints
    5. Construct assembly to permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of 100 degrees F (37 degrees C) in a 24 hour period.
    6. Design and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance. Some oil canning in rolled panels especially in the flats of the panel is normal and is not cause for rejection.

D. Serviceability Criteria: Deflection limits for major components based on VP Buildings standards unless otherwise noted. Deflection requirements on hangars with sliding or fabric doors need to be included for the door support frames both from dead load deflection in inches and uplift deflection in inches. This may differ from the building due to the specific door requirements and should be supplied to eliminate future deflection issues.

1.06 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Design Data: Provide detailed design criteria and calculations prepared by a licensed structural engineer.

C. Certification: Manufacturer certification that the building conforms to the contract documents and manufacturer's standard design procedures.

D. Shop Drawings: Show building layout, primary and secondary framing member sizes and locations, cross-sections, and product and connection details.
   1. Anchor Bolt Installation Drawings.

E. Information on manufactured products to be incorporated into the project.

F. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

G. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square, representing actual product, color, and patterns.

H. Certificates: Welder certifications

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Not less than 5 years experience in the actual production of specified products.
   1. Member of the Metal Building Manufacturer's Association (MBMA).
   2. Primary manufacturer of frames, secondary steel, roof and wall sheeting, and trim.

B. Installer Qualifications - Firm experienced in application or installation of systems similar in complexity to those required for this project, plus the following:
   1. Acceptable to or licensed by manufacturer.
   2. 3 years experience with systems.
   3. Successfully completed not less than 5 comparable scale projects using this system.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.09 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

A. Manufacturer shall warranty installed system for the periods described herein, starting from Date of Substantial Completion or ninety days from delivery, whichever comes first, against all the conditions indicated below. When notified in writing from Owner, manufacturer/installer shall, promptly and without inconvenience and cost to Owner, correct said deficiencies.
   1. Materials and Workmanship Warranty:
      a. Warranty Period: 3 years, standard.
   2. SSR/SLR Standard Weathertight Endorsement:
      a. Warranty Period: 20 years.
   3. Finish Warranty:
      a. Finish coating shall not peel, blister, chip, crack or check in finish, and shall not chalk in excess of 8 numerical ratings when measured in accordance with ASTM D 4214.
      b. Finish coating shall not change color or fade in excess of 5 NBS units as determined by ASTM D 2244.
         1. Panel finish: 25 years.
   4. Performance Warranty: Furnish written warranty, stating sheet metal roofing system and flashing (flashing under premium warranty only) under this Section will be maintained in watertight condition and defects resulting from the following items will be corrected without cost to Owner for a period of 20 years.
      a. Faulty workmanship.
      b. Defective materials including sealants and fasteners.
      c. Water infiltration.

**PART 2 - PRODUCTS**

2.01 MANUFACTURERS

A. Acceptable Manufacturers: Varco Pruden Buildings, which is located at: 3200 Players Club Circle ; Memphis, TN 38125; Toll Free Tel: 800-238-3246; Tel: 901-748-8000; Email: request info (vpsales@vp.com); Web: www.vp.com

B. Substitutions: Reviewed equal.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.02 STRUCTURAL STEEL FRAMING

A. Primary Framing: Rigid Frame (RF Series) solid web framing consisting of tapered or uniform depth rafters rigidly connected to tapered or uniform depth columns. Provide a clear span that supports the loads at bay spacing indicated. Roof pitch at 1:12; Lean-to @ Office, roof pitch 2:12.

B. Primary Framing: Continuous Beam (CB Series) solid web framing utilizing tapered or uniform depth beams or girders supported on tapered or uniform depth columns. Locate interior columns where indicated and designed to support loads at bay spacing indicated.

C. End Wall Framing: Corner posts, end posts and rake beams.

D. End Wall Framing: Half-loaded full frames.

E. Steel Surface Preparation: SSPC-SP 2.

2.03 SECONDARY FRAMING

A. Purlins: Zee-shaped; depth as required; with minimum yield strength of 60,000 psi (410 MPa); simple span or continuous span as required for design. G-30 galvanized standard material. Welded members are manufacturer's standard primer.
   1. As required.

B. Girts: Zee- or Cee-shaped; depth as required, with minimum yield strength of 60,000 psi (410 MPa); simple span or continuous span as required for design. G-30 galvanized standard material. Welded members are manufacturer's standard primer.
   1. As required.

C. Wind Bracing: Portal, torsional, diagonal bracing or diaphragm in accordance with manufacturer's standard design practices; utilizing rods, angles, and other members, with minimum yield strengths as required for design but in most cases, 50 ksi.

D. Primary Frame Flange Bracing: Attached from purlins or girts to the primary framing, minimum yield strength as required for design but in most cases 60 ksi.

2.04 MISCELLANEOUS FRAMING

A. Base Angles: 2 inch by 3 inch by 0.060 inch galvanized steel angles, with minimum yield strength of 55 ksi (380 MPa), anchored to the floor slab or grade beam with power driven fasteners or equivalent at a maximum spacing of 4 feet on center and not more than 6 inches from the end of any angle member. Anchors are not provided by the metal building

manufacturer.

B. Door Headers and Jambs: Zee- or Cee-shaped; depth as required; with minimum yield strength of 60 ksi (410 MPa).

## 2.05 ROOF COVERING SYSTEM

A. Roof Panels: SSR Standing Seam Roof Panels; 24 inches wide net coverage, with 3 inches high major ribs formed at the panel side laps, formed for field seaming using electrically operated seaming machine.
   1. Side joints: Factory applied sealant for field seaming.
   2. Material: Galvalume steel.
   3. Thickness: 24 gage.
   4. See drawings for roof slopes.
   5. Side laps: Two factory-formed interlocking ribs, with one weather sealed joint, field-seamed into place to form a double-fold 360 degree seam.
   6. Length: Continuous from eave to ridge up to 52 feet in length.
   7. End laps, where required: 4 inches wide, located at a support member.
   8. Panel-to-roof purlin structural attachments: SSR clips with movable tabs which interlock with seamed SSR panel ribs and provide for 1-5/8 inches of panel movement in either direction from center of clip to compensate for thermal effects.
   9. Ridge assembly for high end of slopes: SSR Ridge; draw-formed aluminum seam caps factory-attached to SSR ridge panels that are seamed together along the center of the ridge, utilizing only one weather sealed joint and providing a true expansion joint for panel movement.
   10. Rake edge of roof shall be attached to the building structure in a manner which will allow thermal expansion of the SSR roof panels along the gables and will provide the uplift resistance required by code.
   11. The KXL paint system is a PVDF finish applied to the galvalume surface to give a long life color that resists fading and chalking. KXL is a 1 mil nom. PVDF finish with 70 percent Kynar 500 or Hylar 5000 standard. Office roof to have painted KXL finish while the Warehouse roof @ Building #1 and Storage Buildings #2 & #3 will be galvalume (unpainted).
   12. Exposed fasteners are stainless steel capped painted to match the selected color from the VP color chart or special ordered if a special color roof is provided.

## 2.06 WALL COVERING SYSTEM

A. Wall Panels: Panel Rib; 36 inch wide net coverage, with 1-3/16 inch high major ribs at 12 inches on center with minor ribs spaced between the major ribs.
   1. Material: Galvanized steel, with G90/Z275 coating.
   2. Thickness: 26 gage; all buildings.
   3. Side laps: Two fully overlapping major ribs secured together with 1/4 inch diameter color-matched carbon steel fasteners.
   4. Length: Continuous from sill to eave up to 43 feet in length.
   5. End laps, where required: 4 inches wide, located at a support member.
   6. Crimp panels at the base to achieve no gaps against the foundation greater than 1/16

inch and notch to match roof panel configuration at the eave.
7. Cut panels square at each end.
8. Cut panels square at each end; provide base trim at sill and closure plugs.
9. The KXL paint system is a PVDF finish applied to the zinc or zinc aluminum coated steel to give a long life color that resists fading and chalking. KXL is a 1 mil nom. PVDF finish with 70 percent Kynar 500 or Hylar 5000 standard.
10. Certification includes IAS Miami-Dade County Florida product approval.

## 2.07 INSULATION

A. Schedule:
1. Roof insulation: Nominal values:
   a. Office - R-value: 30 – banded system double layer with Superblock.
   b. Warehouse - R-value: 19 – with Thermal Blocks @ Building #1.
2. Wall Insulation: Nominal values:
   a. Office – not applicable (by others)
   b. Warehouse – R-value: 13 @ Building #1

B. Blanket Insulation: Glass fiber, with factory laminated facing material
1. Glass fiber: Odorless, neutral colored, long filament, flexible resilient, produced in compliance with NAIMA 202-96.
2. Flame spread Index: The composite of fiberglass and facing shall have surface burning characteristics not to exceed 25 flame spread when tested in accordance with UL 723 or ÅSTM E 84 test methods.
3. Smoke Developed Index: not to exceed 50 smoke development when tested in accordance with UL 723 or ASTM E 84 test methods.
4. UL Classified.
5. WMP-30 (PSK-HD) Facing: White polypropylene film metallization fiberglass and polyester scrim, .0015 thick, 0.02 perms (1.15 ng/Ns). Kraft= natural 30#. Tri-directional fiberglass/polyester and facing meeting Flame Spread of 25 or less, Smoke Developed of 50 or less, when tested in accordance with UL 723.
6. Provide facing 3 inches wider than blanket on both edges as minimum. Provide long tabs for long tab banded system on Office roof.
7. Width: As required for installation.

C. Thermal Blocks required on Warehouse roof of Building #1: High density, 3/4 inch thick expanded polystyrene, for installation over the purlin.

D. Thermal Blocks: Superblock required on Office roof. 1 inch by 3-1/2 inch extruded polystyrene thermal spacer strips capped by 22 gage galvanized channels, with swaged end for interconnection along the purlin run, metal tabs at 2 feet on center at SSR clip locations, and pre-punched fastener holes.

## 2.08 WALL ACCESSORIES

A. Wall Openings: Cold-formed sheet metal framing concealed with manufacturer's standard

colored trim.

## 2.09 ROOF ACCESSORIES

A. Eave Gutters: Roll-formed 26 gage steel sheet, with gutter straps, fasteners and joint sealant; manufacturer's standard color.
   1. Downspouts: 29 gage 4 inches by 5 inches in 10 foot lengths, with downspout elbows and downspout straps; same color as wall panels unless specified otherwise.

B. Ridge Ventilators: 24 gage Galvalume, with damper with chain and worm gear operator and bird screen, and base configured to match roof panel.
   1. Throat opening: 12 inches.
   2. Connect individual vents to form continuous ridge vent.

## 2.10 MATERIALS

A. Structural Steel Plate, Bar, Sheet, and Strip for Use in Bolted and Welded Constructions: ÅSTM A 572/A 572M, A 529/A 529M, A 1011 or A 36/A 36M Modified 50, with minimum yield strength of 55,000 psi (380 MPa).

B. Galvanized Structural Steel Material for Use in Roll Formed or Press Broken Secondary Structural Members: ÅSTM A 563, with minimum yield strength of 60,000 psi (410 MPa).

C. Galvanized Steel Sheet for Roll Formed or Press Broken Roof and Wall Coverings, Trim and Flashing: ÅSTM A 653/A 653M, with minimum yield strength of 50,000 psi (345 MPa).

D. Galvalume Steel Sheet Used in Roll Formed or Press Broken Roof Covering: Aluminum-zinc alloy-coated steel sheet, ÅSTM A 792/A 792M, with minimum yield strength of 50,000 psi (345 MPa); nominal coating weight of 0.5 oz per sq ft (152 kg/sq m) both sides, equivalent to an approximate coating thickness of 0.0018 inch both sides.

E. Hot Rolled Steel Shapes: W, M and S shapes, angles, rods, channels and other shapes; ÅSTM A 500, ÅSTM A 572/A 572M or ÅSTM A 36/A 36M as applicable; with minimum yield strengths required for the design.

F. Structural Bolts and Nuts Used with Primary Framing: High strength, ASTM A 325 bolts and ASTM A563 Grade C nuts.

G. Bolts and Nuts Used with Secondary Framing Members: High Strength ÅSTM A 325 Bolts and ÅSTM A 563 Grade C nuts.

H. Panel Fasteners:
   1. For Galvalume and KXL finished roof panels: Stainless steel-capped carbon steel fasteners with integral sealing washer.
   2. For wall panels: Coated carbon steel.
   3. Color of exposed fastener heads to match the wall panel finish.

4. Concealed Fasteners: Self-drilling type, of size as required.
5. Provide fasteners in quantities and location as required by the manufacturer.

I. Flashing and Trim: Match material, finish, and color of adjacent components. Provide trim at rakes, including peak and corner assemblies, high and low eaves, corners, bases, framed openings and as required or specified to provide weathertightness and a finished appearance.

J. Plastic Parts:Glass fiber reinforced resin or thermoformed ABS (Acrylonitrile-Butadiene-Styrene).
1. ABS: Minimum 1/8 inch thick.
2. Color: Manufacturer's standard color.

K. Sealants, Mastics and Closures: Manufacturer's standard type.
1. Provide at roof panel end laps, side laps, rake, eave, transitions and accessories as required to provide a weather resistant roof system; use tape mastic or gun grade sealant at side laps and end laps.
2. Provide at wall panel rakes, eaves, transitions and accessories.
3. Closures: Formed to match panel profiles; closed cell elastic material, manufacturer's standard color.
4. Tape mastic: Pre-formed butyl rubber-based, non-hardening, non-corrosive to metal; white or light gray.
5. Gun grade sealant: Non-skinning synthetic Elastomeric based material; gray or bronze.

## 2.11 FABRICATION

A. Fabrication: Fabricate according to manufacturer's standard practice.
1. Fabricate structural members made of welded plate sections by jointing the flanges and webs by continuous automatic submerged arc welding process.
2. Welding operators and processes: Qualified in accordance with AWS D1.1.
3. Field connections: Prepare members for bolted field connection by making punched, drilled, or reamed holes in the shop.

B. Component Identification: Mark all fabricated parts, either individually or by lot or group, using an identification marking corresponding to the marking shown on the shop drawings, using a method that remains visible after shop painting.

## 2.12 FINISH

A. Schedule of Finishes:
See Architectural Plan Sheets.

B. Shop Coat: Manufacturer's standard rust inhibitive primer paint; manufacturer's standard color.
1. Finish all structural steel members using one coat of manufacturer's standard shop coat, after cleaning of oil, dirt, loose scale and foreign matter.

C. KXL Pre-Painted Finish: 1 mil 70 percent Kynar 500, Hylar 5000 coating on exterior surface.

**PART 3 - EXECUTION**

3.01 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper and or timely completion.
   1. Verify foundations are properly installed, to correct dimensions and within acceptable tolerances.
   2. Verify location of covered or built-in work.
   3. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Framing Erection: Erect framing in compliance with AIS Specification and the latest edition of the MBMA metal building systems manual.

B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as required by manufacturer.

3.03 ERECTION OF FRAME

A. Install in accordance with manufacturer's instructions.

B. Do not erect frames without complete installation of tie beams and anchorages.

C. Set column base plates with non-shrink grout to full plate bearing.

D. Do not field cut or alter structural members without written approval.

E. After erection, prime bolts, welds, abrasions, and surfaces not primed with primer used in shop painting.

3.04 INSTALLATION OF WALL AND ROOF SYSTEM

A. Install in compliance with manufacturer's instructions.

B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

C. Fasten cladding system to structural supports, aligned level and plumb.

D. Locate end laps over supports. End lap panels according to manufacturer's recommendations. Place sidelaps over adjacent panel and mechanically seam or stitch

fastener per erection guidelines.

E. Provide expansion joints where indicated.

F. Use concealed fasteners.

G. Install sealant and gaskets to prevent weather penetration.

H. Install system free of rattles, noise due to thermal movement, and wind whistles.

I. Install door frames, service doors, overhead doors, window and glass, and gutter system in compliance with manufacturer's instructions.

J. Seal wall and roof accessories watertight and weathertight with sealant in compliance with building manufacturer's standard procedures.

K. Rigidly support and secure gutters and downspouts. Joint lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.

L. Tolerances:
   1. Framing Members: 1/4 inch from level; 1/8 inch from plumb.
   2. Racking: 1/8 inch from true position. Provide shoring to maintain position prior to cladding installation.

## 3.05 FIELD QUALITY CONTROL

A. Testing by Contractor:
   1. Roof installation inspection by roof manufacturer's representative; as required as part of warranty provision.

B. Testing by Owner:
   1. High Strength Bolted Connections: Specification for Structural Joints Using ASTM A 325 or A 490 Bolts, with minimum testing of bolted connections per the arbitration inspection procedure.
   2. Welded Connections: AWS. Visual inspection of 100 percent of welds. Ultrasonic inspection of 50 percent of full and partial penetration welds. A rejection rate greater than 5 percent will increase the inspection to 100 percent.
   3. General Testing: For materials and installed tolerances.

END OF SECTION

Application

CONTAINS

LARGE OR OVERSIZED

MAP(S)

RECEIVED ON: September 18, 2013