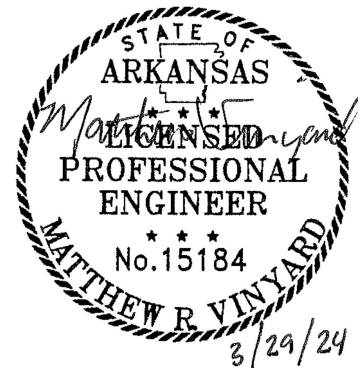


PROJECT MANUAL

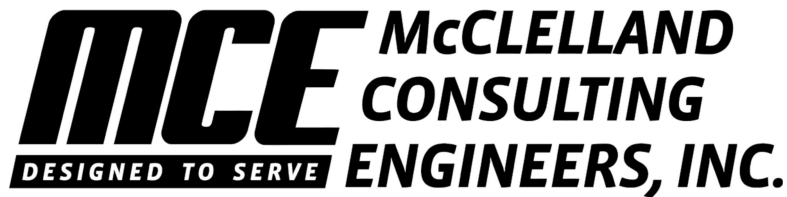
CORNING MUNICIPAL AIRPORT (4M9) CONSTRUCT TERMINAL BUILDING



MARCH, 2024



MCE PROJECT NO. 23-5837



PROJECT MANUAL

**CORNING MUNICIPAL AIRPORT (4M9)
CONSTRUCT TERMINAL BUILDING**

MARCH, 2024

MCE PROJECT NO. 23-5837

Prepared By:
McClelland Consulting Engineers, Inc.
7302 Kanis Road
Little Rock, Arkansas 72204
Phone 501/371-0272
Fax 501/371-9932

**CORNING MUNICIPAL AIRPORT (4M9)
CONSTRUCT TERMINAL BUILDING
23-5837**

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BIDDING REQUIREMENTS

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ADVERTISEMENT FOR BIDS

The City of Corning will receive sealed bids on a General Contract for construction of a new terminal building, access road, parking lot, and sidewalks at the Corning Municipal Airport.

Bids will be received until 11:00 a.m. on April 18, 2024 at Woolard Flying Service, Inc., 11 Airport Hwy 980, Corning, Arkansas. Bids received after this time will not be accepted. Bids will be opened and publicly read aloud immediately after specified closing time. Project to be awarded dependent upon receiving funds from the Federal Aviation Administration.

Bids shall be on a unit price basis.

Digital copies of the bid documents are available at <http://www.mce.us.com> for a fee of \$22. These documents may be downloaded by selecting this project from the "Current Bids" link, and be entering Quest Project Number 9052644 on the "Browse Projects" page. For assistance and free membership registration, contact QuestCDN at (952) 233-1632 or info@questcdn.com. Addendums to the bid package will be issued through the online MCE Plan Holders List; therefore, all prime bidders shall be responsible for downloading the bid documents from the MCE online plan room in order to be included in the Plan Holders List and submit a bid. Bidders must enter the addenda numbers in the Proposal to verify receipt.

Policy. It is the policy of the Department of Transportation (DOT) that disadvantaged business enterprises as defined in 49 CFR Part 23 shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal funds.

Disadvantaged Business Enterprise (DBE). As defined by Appendix A of 49 CFR Part 26, Regulations of the Office of the Secretary of Transportation, all bidders shall make good faith efforts, to subcontract a minimum of four and five hundredths percent (4.05%) of the dollar value of the prime contract to small business concerns owned and controlled by socially and economically disadvantaged individuals (DBE).

Buy American Provision. The proposed contract is subject to the Buy American provision under Section 9129 of the Aviation Safety and Capacity Expansion Act of 1990. Details of such requirements are contained in the Specifications.

The proposed contract is under the subject Executive Order 11246 of September 24, 1965, and to the Equal Opportunity clause. The Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth in the specifications.

The Bidder must supply all the information required on the bid or proposal form.

The successful Bidder will be required to submit a Certification of Nonsegregated Facilities prior to award of the contract, and to notify prospective subcontractors of the requirement for such a Certification where the amount of the subcontract exceeds \$10,000. Samples of the Certification and Notice to Subcontractors appear in the Specifications.

Women will be afforded equal opportunity in all areas of employment. However, the employment of women shall not diminish the standards or requirements for the employment of minorities.

For contracts of \$50,000 or more, a contractor having 50 or more employees, and his subcontractors having 50 or more employees and who may be awarded a subcontract of \$50,000 or more, will be required to maintain an affirmative action program within 120 days of the commencement of the contract.

Bid Security. A 5% Bid Security is required with the Bid. The Owner reserves the right to reject bids and waive formalities. Bidder must have a current general license from the Arkansas Contractor's Licensing Board before the bid proposal will be considered. The bid proposal and work of the proposed contract shall be in accordance with all applicable federal, state, county, and local laws, ordinances and regulations.

Submit as a prerequisite to award of a contract AIA Document A305, Contractor's Qualification Statement, unless such statement has been submitted for review to the Engineer's office within the past six months.

Federal Davis-Bacon wages rates shall apply.

Work will be completed within 120 calendar days from Notice to Proceed.

Contact Jarrett Elliott at (501) 371-0272 at the office of McClelland Consulting Engineers, Inc. for other pertinent facts or information about bidding and contract requirements.

CITY OF CORNING, ARKANSAS

DOCUMENT 00 20 00

INFORMATION AVAILABLE TO BIDDERS

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1.1 SECTION INCLUDES

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- B. Federally Issued Davis-Bacon Wage Determination Number **AR20240021** and **AR20240157**.

PART 2. PRODUCTS

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PART 3. EXECUTION

Not Used.

END OF SECTION

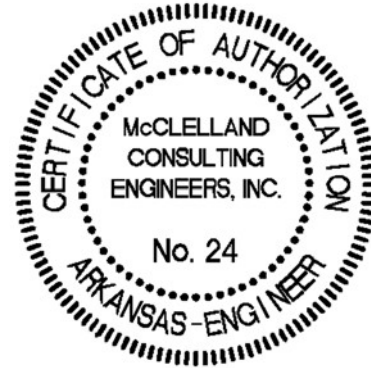
March 6, 2024

Corning Municipal Airport

PO Box 538
Corning, Arkansas 72422

ATTN: Mr. Matt Woolard
Airport Manager

RE: Geotechnical Report for
Corning Municipal Airport (4M9)
Terminal Building in
Corning, Arkansas
MCE Project Number: **23-5837**



Dear Mr. Woolard:

We are submitting herewith the report for the Geotechnical Report on the above-referenced project. We appreciate the opportunity to provide this service to you. If there are any questions regarding the Geotechnical Investigation, please contact us.

Sincerely yours,



Steven J. Head, PE
Principal | Geotechnical Department Head



Dustin Lawrence
Geotechnical | CMT Specialist

Michael Scott
Project Designer | CMT Supervisor

Enclosure: Geotechnical Report



GEOTECHNICAL REPORT

**Corning Municipal Airport (4M9)
Terminal Building**
Corning Arkansas

MCE Project No. 23-5837
March, 2024

Prepared For:
Mr. Matt Woolard
Airport Manager

Corning Municipal Airport
PO Box 538
Corning, AR 72422
woolard@hotmail.com

GEOTECHNICAL REPORT

Corning Municipal Airport (4M9)

Terminal Building

MCE Project Number: 23-5837

Corning, Arkansas

FOR

Corning Municipal Airport (4M9)

PO Box 538

Corning, Arkansas 72422

Executive Summary

This is a report of the findings of the Geotechnical Investigation relevant to the planned development of the Corning Municipal Airport (4M9) Terminal Building located in Corning, Arkansas. This report includes information on surface materials and subsurface conditions in addition to providing recommendations for site preparation, grading, structure foundations, and the planned pavement areas. The significant findings listed below should not be used separately from the further discussion provided in the body of this report.

- This Geotechnical Investigation consisted of a total of three (3) project borings; the project borings were positioned in an effort to capture an adequate amount of subsurface data across the development area. The table below provides details on the locations of the borings, their planned target depths, and how the borings relate to the planned development features.

Borings	Target Depth (ft)	General Location in the Development Area
B-01 and B-02	6.5	Parking and Access Drive Areas
B-03	15.0	Proposed Structure Footprint

- Due to the absence of previous development on the understood project site, a majority of the site was observed as having silty topsoil with grass at the surface (Stratum I), with an average topsoil thickness of approximately six (6) inches.
- The materials that make up Stratum II consist of Sandy Lean Clay (CL), Lean Clay (CL), Lean Clay with Sand (CL), Lean Clay with Gravel (CL), and Fat Clay (CH). While the underlying Stratum III materials were generally composed of Poorly-Graded Sand with Silt (SP-SM).
- Following stripping and initial site grading, the subgrade should be initially evaluated by the Geotechnical Engineer or his/her representative. All subgrade materials should be proof-rolled with a tandem-axle fully-loaded dump truck weighing approximately 60,000 pounds, or equivalent construction equipment.
- Based on the data collected from the borings, MCE anticipates that stable materials generally exist within the upper four (4) feet across the planned development area. MCE recommends the structure footprint and pavement areas be cut to expose stable soils, proof-rolled, and then backfilled with select fill materials as needed to achieve the planned finish subgrade (FSG) elevations.
- Subgrade stabilization methods could be employed to mitigate the potential for excessive undercutting and subsequently provide adequate stability, such as the utilization of geosynthetics.

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- Appendix A: Boring Layout
- Appendix B: Boring Logs
- Appendix C: Laboratory Testing Results

1.0 Introduction

McClelland Consulting Engineers, Inc. (MCE) conducted a subsurface investigation for the Corning Municipal Airport (4M9) Terminal Building in Corning Arkansas. The investigation was requested by Ms. Bailey Carr, P.E. with MCE, and authorized by Mr. Matt Woolard, Airport Manager of the Corning Municipal Airport. The investigation was intended to explore the subsurface soil conditions within the planned development area to provide recommendations for site preparation, grading, structure foundations, and recommendations pertaining to the planned pavement areas.

2.0 Existing Site Description

The proposed project site is located south of East Highway 67 approximately three (3) miles west of the city of Corning, Arkansas. Specifically, the project site is located on Airport Road 980, between the existing structures of Ag Air Aircraft, Inc. to the north and the Corning Farming Supply to the south. On-site vegetation consisted of low to medium-cut grass with underlying topsoil materials. Topographically, the project site is relatively flat with estimated maximum grade differentials to be on the order of one (1) foot from the north to the south, and two (2) feet from the east to the west towards Airport Road 980. Figure 1 below provides an image showing the project site in relation to the surrounding area.



Figure 1: Approximate Project Site Location

3.0 Project Scope

Currently, we understand the project scope consists of the development of a new Terminal Building with an approximate footprint on the order of 650 square feet (SF). Based on a discussion with the Design Team, we understand the planned structure will be framed utilizing light-gauge steel, supported on a shallow foundation system with slab-on-grade elements. At the time of preparing this report, Structural drawings were not available. However, we anticipate the planned structure will be lightly loaded with anticipated maximum column and wall loads will not exceed 50 kips and 1.5 kips per linear foot (klf), respectively. Below grade levels were not anticipated at the time of preparing this report.

In addition to the planned development of the new Terminal Building, we understand that parking, access drives, and concrete sidewalks are included in the current project scope. We understand the parking and access drives will likely be constructed utilizing an asphalt pavement section. The provided Site Layout (23-5837 – Site Layout – produced by MCE - dated 1/2024) is presented as Figure 2 on the following page.

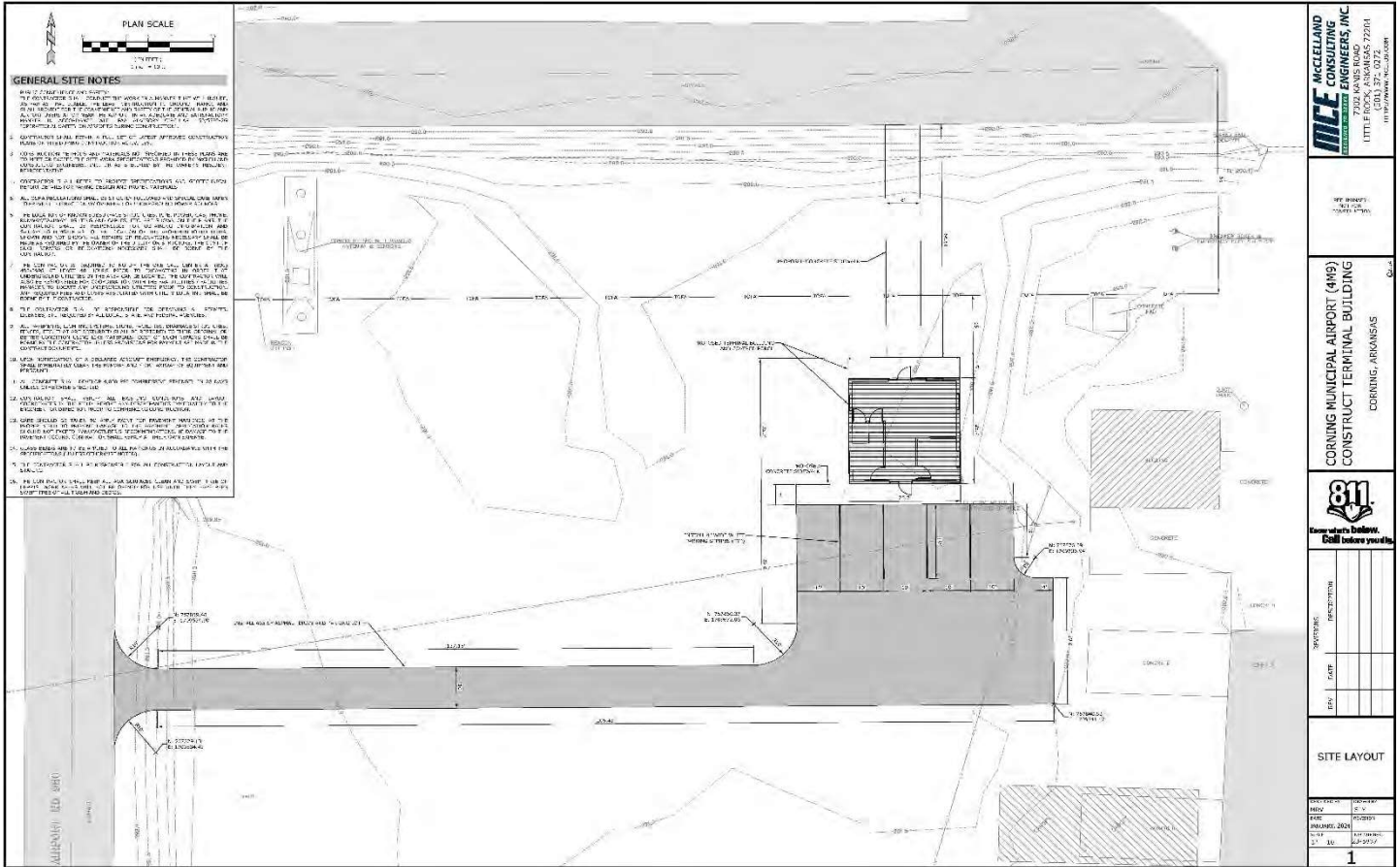


Figure 2: Proposed Site Layout
 (23-5837 – Site Layout – produced by MCE – dated 1/2024)

4.0 Field Investigation

Based on the provided information, our understanding of the project scope, as well as our discussions with the Design Team, MCE conducted a Geotechnical Investigation consisting of three (3) total project borings. The project borings were conducted using a CME 45-B Truck Mounted Drill Rig which utilized four (4) diameter solid stem augers. Soil samples were obtained at the depths indicated on the boring logs with the use of a two (2) inch diameter split-spoon sampler.

The split-spoon sampler was driven by blows from a 140-pound automatic hammer dropped from a fixed height of 30 inches. The number of blows required to drive the split-spoon sampler the final 12 inches of an 18-inch drive, or portion thereof, is referred to as the Standard Penetration value, N, and is recorded on the boring logs in units of blows-per-foot. Final drilled depths are shown as the depths achieved by the split-spoon sampler. The approximate locations of the project borings may be referenced in Appendix A on Plate 1.

In addition to Standard Penetration Testing (SPT), the field tests performed included visual soil classifications and groundwater observations. The visual soil classifications are given on the boring logs, which can be referenced in Appendix B on Plates 2 through 4; a key to the symbols on the boring logs is provided on Plate 5.

Table 1 on the following page provides details on the project borings and how the borings relate to the planned development features.

Table 1: Project Boring Details

Boring ID	Approximate Location	Existing Surface Elevations (ft)	Topsoil Thickness (in)	Planned Target Depth (ft)	Auger Refusal Depth (ft)	End of Boring Elevation (ft)
B-01	Access Drive	292.0	6	6.5	-	285.5
B-02	Parking Area	292.0	6	6.5	-	285.5
B-03	Planned Structure	291.0	6	15.0	-	276.0

NOTES: Elevations shown in Table 1 are rounded to the nearest 0.5 foot, and are based on the current Site Layout (23-5837 – Site Layout – dated 1/2024). Reported thicknesses of the surface materials are rounded to the nearest one (1) inch.

4.1 Encountered Groundwater Conditions

At the time of the investigation, groundwater was not encountered by any of the project borings. The installation and periodic measurement of monitoring wells would be required to establish seasonal piezometric surfaces below the project site. Project grading should be properly designed to discharge any surface water that may develop following precipitation events. Although true groundwater was not encountered; the borings did encounter some very stiff clayey soils.

As a result of the low permeability that may be created by these materials, groundwater has the potential to collect above these materials in a “perched” condition during and after precipitation events. This could cause significant issues during undercutting and utility installation operations if not properly mitigated; particularly if expansive soils are exposed for prolonged periods.

Any groundwater must be removed, if encountered during construction, prior to the placement of fill or paving elements. To help reduce these potential issues, it is recommended that earthwork operations take place during historically dry portions of the calendar year (June through September). Earthwork operations conducted outside of this recommended timeframe should expect general dewatering measures to be required to maintain a desirable construction schedule.

4.2 Encountered Auger Refusal Materials

Auger refusal materials are generally defined as those that, when encountered, the boring can no longer be advanced using traditional auger drilling techniques. Refusal is somewhat subjective and is dependent on the type of drilling equipment used and the down pressures exerted by the drill rig operator.

During this investigation, materials resulting in auger refusal were not encountered by any of the three (3) project borings. Based on the subsurface materials encountered and the local geologic formation, MCE does not expect that rock removal techniques will be required during construction. More information on the local geology and how it may affect the project site can be found in the *Local Geology of the Project Site* section of this report (Section 7.0). Additional guidance regarding these materials and the potential for difficult excavation conditions are provided in the *Rock Excavation Considerations* section of this report (Section 10.4).

5.0 Laboratory Analysis

Laboratory tests were performed on soil samples recovered from the borings. The laboratory tests were conducted to determine the engineering properties of the project soil strata. The laboratory tests were conducted following the American Society for Testing and Materials (ASTM) designations. The tests performed on samples from the borings included moisture content, Atterberg Limits, and sieve analyses.

The natural soil moisture content was determined on all soil samples to provide a moisture profile for each boring, however, the moisture contents provided on the boring logs and the testing summary reflect the effects of a recent wet-weather pattern in the area. The Atterberg Limits tests (liquid and plastic limits) were performed on selected samples to aid in the soil classification and to help evaluate the volume-change characteristics of each soil stratum. Sieve analyses were performed on representative soil samples to aid in the soil classification of the selected soil strata.

Results of laboratory testing for the project borings are provided on the boring logs and the Laboratory Test Results Summary in Appendix C. Table 2 below shows the relevant test method specifications utilized on the project.

Table 2: Laboratory Test Method Specifications

Test Designation	Test Method
ASTM D2488	Standard Practice for Description and Identification of Soils (Visual)
ASTM D 2487	Standard Practice for Classification of Soils for Engineering Purpose (USCS)
ASTM D2216	Standard Test Method for Lab Determination of Water Content of Soil
ASTM D6913	Standard Test Method for Particle-Size Distribution of Soils Using Sieve Analysis
ASTM D4318	Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

6.0 On-Site Soil Conditions

The following sections of the project report contain comprehensive information pertaining to the onsite conditions at the project location. This information encompasses detailed descriptions of the existing soil types, visual representations denoting the approximate locations of the said soil types, and a brief summary of the local geology. The primary objective of this section is to provide an illustrative representation of the physical characteristics of the project site, with a particular focus on the soil and geological conditions.

6.1 United States Department of Agriculture (USDA) Soil Types and Map

According to the current USDA soil maps, there are various soil types in the project area. The Natural Resources Conservation Service (NRCS) has provided descriptions for each of these soil types. The project site is located in Northeast Arkansas, specifically in Clay County. Table 3 below provides detailed information on the soil types that exist within the project area, as per the current USDA Soil Maps.

Table 3: USDA Local Soil Types

USDA Soil Type	USDA Symbol	USDA Descriptions
Crowley Silt Loam	22	The Crowley series consists of very deep, somewhat poorly drained, very slowly permeable soils that formed in clayey fluvio-marine deposits of the Pleistocene age. These nearly level to very gently sloping soils occur on flat coastal plains terraces. The slope is dominantly less than one (1) percent but ranges to three (3) percent.
Dundee Silt Loam	25	The Dundee series consists of very deep, somewhat poorly drained soils that formed in loamy alluvium. These soils are level to gently sloping soils on natural levees and low terraces along former channels of the Mississippi River and its tributaries in the Southern Mississippi Valley Alluvium Major Land Resource Area; MLRA 131. Slopes range from 0 to eight (8) percent.
Dexter Silt Loam	23	The Dexter series consists of very deep, well-drained, moderately permeable soils that formed in thin loess and underlying loamy and sandy sediments on terraces of the Late Pleistocene Age. These soils are on elongated, narrow convex ridges. Slopes range from 0 to eight (8) percent.

The soils in the project area mentioned above have a moderate-to-high potential for causing corrosion of concrete and steel materials used in construction. It is important to understand that certain types of soil can cause chemical corrosion which can be a major threat to metals and concrete structures buried underground. The presence of chloride solutions in the soil can cause severe damage to metals, while high levels of sulfate can lead to corrosion of the concrete. Figure 3 on the following page provides imagery of the approximate site location and how it relates to the existing soil type.



Figure 3: USDA Soil Survey Report Image
The image was produced by the United States Department of Agriculture.
The green shaded area represents the approximate project extent.

7.0 Local Geology of the Project Site

According to maps and literature published by the United States Geological Survey (USGS) and the Arkansas Geological Survey (AGS), the project site is underlain by the Quaternary Period (2.6 million years old) Terrace Deposits. A brief description from the Stratigraphic Summary of Arkansas – Information Circular 36 (IC36) of the local geologic formation is provided below, as well as how these materials may impact the project site.

7.1 Terrace Deposits

The Terrace Deposits in Arkansas are composed of a complex sequence of unconsolidated materials that include gravels, sandy gravels, sands, silty sands, silts, clayey silts, and clays. These deposits are often lenticular and discontinuous, and they exhibit a range of thicknesses. At least three levels of terraces are recognized, with the youngest being the lowest. Fossils are rare in these deposits, which makes them challenging to date. The lower contact of these deposits is unconformable, which suggests that there was a significant time gap between the formation of the deposits and the underlying bedrock.

Figure 2 on the following page provides a visual of the local geologic formation in relation to the project site.

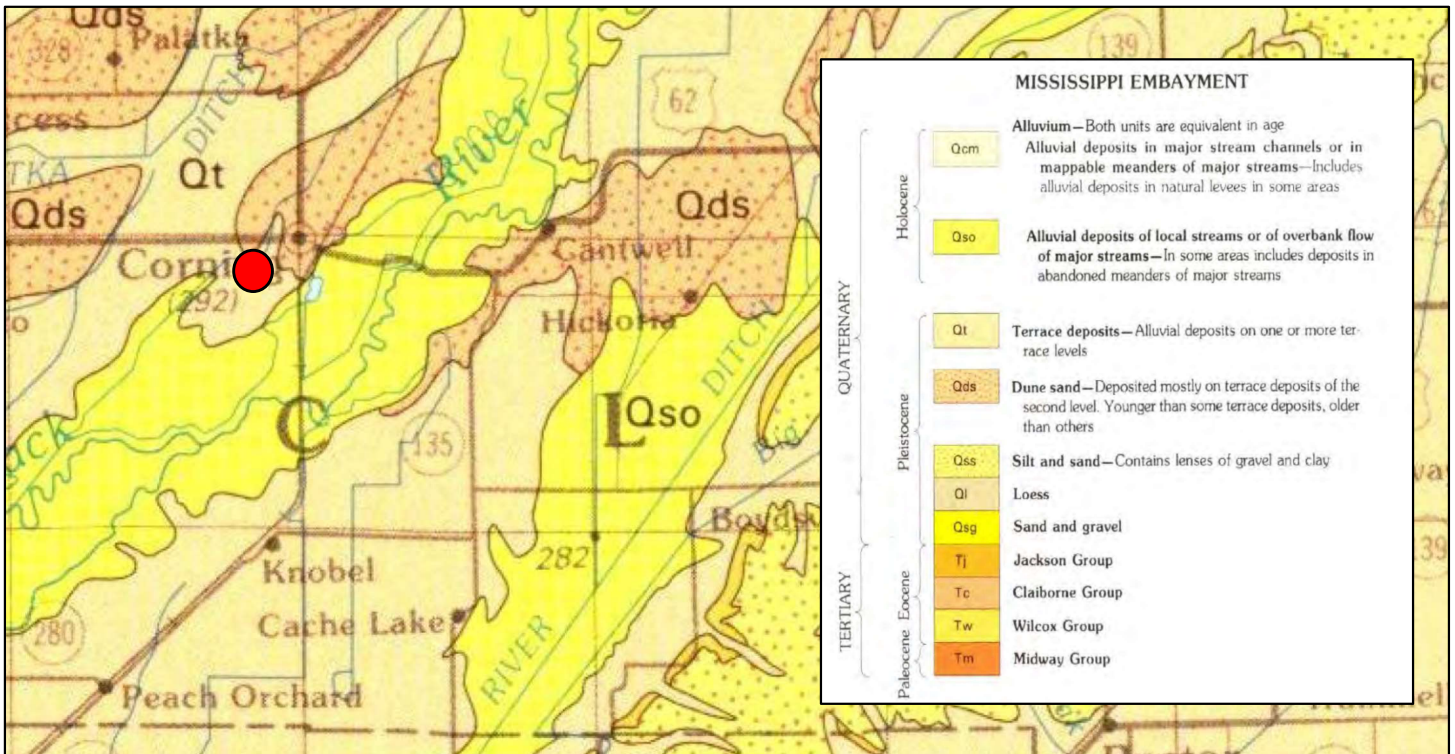


Figure 2: Image from the Geologic Map of Arkansas (1993)
The red dot represents the approximate location of the project site.

8.0 IBC Site Classification

The planned development is recommended to be assigned as a Risk Category II according to Table 1604.5 of the 2021 International Building Code (IBC). The site seismic classification determination may utilize spectral response accelerations S_{DS} and S_{D1} of 0.678 and 0.409, respectively, with reference to Section 1613 of the 2021 IBC and based on a recommended Site Class D for the soil profile within the project area.

9.0 On-Site Soil Stratum Summary

This summary presents a comprehensive overview of the subsurface soil conditions that were encountered during the investigation. The information provided here is based on a collection of detailed field notes and testing values that were recorded during the investigation. The encountered subsurface soil conditions are summarized below.

9.1 Stratum I – Surface Materials

During the site investigation, it was found that all three (3) project borings encountered a layer of silty topsoil which was six (6) inches thick on average. Additionally, there was visible grass present at the surface in each of the borehole locations.

9.2 Stratum II – Fine-Grained Subgrade Materials

The materials that make up Stratum II consist of Sandy Lean Clay (CL), Lean Clay (CL), Lean Clay with Sand (CL), Lean Clay with Gravel (CL), and Fat Clay (CH), containing varying amounts and gradations of sand and gravel.

Consistency values for the Stratum II CL materials ranged from very soft to very stiff, with corresponding N-values ranging from 0 to 20. The natural soil moisture content for these materials ranged from 21.8 to 34.6 percent. The Liquid Limit (LL) of these materials ranged from 44 to 45, with Plasticity Index (PI) values that ranged from 24 to 26. The fine fraction of these materials exhibited low to medium plasticity characteristics and low potential for volumetric change due to alterations in the soil's moisture content. The fine fraction of these soils makes up between 80.0 and 85.0 percent of the overall soil mass, as indicated by the results of gradation analysis from the borings.

Consistency values for the Stratum II CH materials were determined to be very stiff, with a corresponding N-value of 20. The natural soil moisture content for these materials was determined to be 27.0 percent. The LL of these materials was determined to be 74, with a PI value of 52. The fine fraction of these materials exhibited medium to high plasticity characteristics and high potential for volumetric change due to alterations in the soil's moisture content. The fine fraction of these soils makes up approximately 96.0 percent of the overall soil mass, as indicated by the results of gradation analysis from the borings.

9.3 Stratum III – Coarse-Grained Subgrade Materials

The materials that makeup Stratum III contain sandy materials indicative of the local geologic formation; these materials consist of Poorly-Graded Sand with Silt (SP-SM). These materials were observed to contain varying amounts and gradations of sand and gravel.

Consistency values for the Stratum III SP-SM materials were determined to be medium-dense, with corresponding N-values ranging from nine (9) to 15. The natural soil moisture content for these materials was determined to range between 5.0 and 13.5 percent. The fine fraction of these materials exhibited negligible plasticity or non-plastic (NP) characteristics and negligible to low potential for volumetric change due to alterations in the soil's moisture content. The fine fraction of these soils makes up approximately 16.0 percent of the overall soil mass, as indicated by the results of gradation analysis from the borings.

10.0 Engineer's Analysis and Recommendations

The current project scope involves the development of a new Terminal Building, which is anticipated to have an approximate footprint of 650 SF. According to the Design Team, the building will be framed using light-gauge steel, supported on a shallow foundation system with slab-on-grade elements.

Based on the provided drawings (23-5837 – *Grading and Drainage Plan – produced by MCE – dated 3/2024*), we understand the planned structure will have a finished floor elevation (FFE) of 293.0 feet, with an estimated bottom of footing (BOF) elevation of 291.0 feet. While the structural drawings are not yet available, we anticipate that the planned structure will not be heavily loaded, and the maximum column load will not exceed 50 kips. Additionally, we expect that the maximum wall loads will not exceed 1.5 kips per linear foot (klf).

In addition to the Terminal Building, the project scope also includes the construction of parking and access drives, as well as concrete sidewalks. We understand the planned access drive will be approximately 150 linear feet from Airport Road 980 to the planned parking area on the south side of the new Terminal Building. The pavement improvements are expected to have finished grades at or near the existing surface elevations across the site and be constructed using an asphalt pavement section.

The purpose of this investigation was to obtain adequate subsurface information from which to provide recommendations and considerations for the planned structures and associated site developments. Those recommendations and considerations are presented in the following sub-sections of this report.

10.1 Initial Site Preparation – Stripping/Grubbing

As stated in the *Stratum I – Surface Materials* section (Section 9.1), after conducting a thorough investigation of the project site, it was observed that the majority of the surface comprised silty topsoil covered with grass. The average thickness of the topsoil was found to be six (6) inches at each location. Based on the comprehensive data collected during the investigation and on-site observations, MCE recommends that the Contractor budget to remove a minimum of six (6) inches of Stratum I materials within the majority of the planned project site. This will ensure that the project site is well-prepared for the subsequent construction activities.

10.2 Site Grading Considerations

Site grading is a crucial process that involves shaping the land to create a level surface suitable for construction. However, many site grading considerations must be taken into account to ensure that the process is carried out effectively. Additional care should be taken by the Contractor to prevent excessive saturation of exposed subgrade soils, as these materials may potentially lose significant strength upon saturation. This can be achieved by providing positive drainage during construction and covering with select fill material soon after excavation, where applicable.

The on-site subgrade soils will be especially susceptible to reduced shear strengths if construction occurs during historically wet portions of the calendar year. As mentioned above, it is recommended that the Geotechnical Engineer or his/her representative be on-site during the earthwork operations to help mitigate excessive undercutting. The following subsections detail the grading considerations for both the Terminal Building and the planned pavement improvement areas.

10.2.1 Site Grading Considerations – Terminal Building

MCE understands the planned structure has an FFE of 293.0 feet. Based on the data from this investigation, stable subgrade materials relative to the project scope were frequently encountered at depth of four (4) feet below the existing surface elevations.

MCE recommends that stable Stratum II soils be exposed within the structure footprints and paving dimensions prior to the placement of structural elements or select fill material needed to achieve the planned finished subgrade (FSG) elevation(s). In this case, “stable” Stratum III materials are considered to be stiff to very stiff soils encountered at depths ranging from five (5) to seven (7) feet below the existing surface elevations.

Based on the data obtained from relevant borings conducted within the planned structure dimensions, MCE recommends the shallow foundations should bear on a minimum of two (2) feet of newly placed, properly compacted, and moisture-conditioned select fill material meeting the criteria outlined in the *Select Fill Material* section (Section 10.11) of this report. However, highly expansive soils (*Stratum II – CH – Fat Clay*) were encountered in the location of project boring B-03. These materials are known to be unstable and problematic and could require additional undercut to uncover stable materials. ***Immediately following initial stripping operations within the building footprint, MCE recommends that the Geotechnical Engineer or his/her representative be on-site during the earthwork operations to help mitigate the potential for any excessive undercutting. Thickened lifts or “bridging” lifts should not be utilized within the structure footprint.***

Subgrade stabilization methods could be employed to mitigate the potential for excessive undercutting and subsequently provide adequate stability, such as the utilization of geosynthetics. Geosynthetics are synthetic products used to stabilize terrain. They are generally polymeric products used to solve subgrade problems. Recommendations pertaining to this application are presented in the *Subgrade Stabilization Recommendations (Geosynthetics)* section (Section 10.7) of this report.

10.2.2 Site Grading Considerations – Pavement Improvement Areas

As mentioned above, MCE anticipates that stable materials will generally be encountered at depths ranging from five (5) to seven (7) feet below the existing surface elevations across the planned development area. MCE recommends the parking and access drive dimensions be excavated to allow for the placement of a minimum of two (2) feet of newly placed, properly compacted, and moisture-conditioned select fill materials prior to pavement construction.

As with the structure dimensions, immediately following initial stripping/excavation operations within the pavement improvement dimensions, the Geotechnical Engineer or his/her representative should evaluate the exposed subgrade materials through proof-rolling, as described in the Subgrade Verification Method section below (Section 10.3), prior to the commencement of fill placement and/or pavement construction.

Based on the results of the recommended proof-rolling, thickened or “bridging” lifts may be an adequate method of subgrade improvement within the pavement dimensions that mitigates the need for excessive undercutting. ***“Bridging” lifts should only be implemented within the pavement improvement areas under the direction of the Geotechnical Engineer.*** The top eight (8) inches of any thickened lift should be compacted and tested per project specifications. A minimum of one (1) standard lift should be placed above any thickened lift utilized beneath pavement areas.

As mentioned in the previous section, subgrade stabilization methods could be employed to mitigate the potential for excessive undercutting. Recommendations pertaining to this application are presented in the *Subgrade Stabilization Recommendations (Geosynthetics)* section (Section 10.7) of this report.

Excavated slopes during construction should be benched or sloped to provide a minimum two-to-one horizontal-to-vertical (2H:1V) ratio. Construction slopes steeper than recommended may be unstable, particularly when introduced to moisture

increases during precipitation events. Although not anticipated, if excavation efforts require deep vertical trenching (deeper than five (5) feet), and the minimum 2H:1V ratio is not achievable then the Contractor must establish a comprehensive Shoring Plan. That Shoring Plan should be reviewed and stamped by a licensed Professional Engineer (PE) prior to excavation.

10.3 Subgrade Verification Method

Following stripping and initial grading in the building and pavement areas, the subgrade should be initially evaluated by the Geotechnical Engineer or his/her representative. All subgrade materials should be proof-rolled with a tandem-axle fully-loaded dump truck weighing approximately 60,000 pounds, or equivalent construction equipment. The proof-rolling should be observed by the Geotechnical Engineer or his/her representative to verify and document stable subgrade conditions. Alternate means of subgrade verification may be conducted should proof-rolling not be feasible within excavation dimensions. The implemented means of verification should be under the direction of the Geotechnical Engineer.

Any soft and/or yielding subgrade areas encountered should be repaired by undercutting and backfilling with select fill material and then subsequently evaluated by the Geotechnical Engineer or his/her representative for approval. Recommendations for undercut in building and pavement areas should only occur following the subgrade evaluation process. As mentioned previously, isolated areas may require additional undercutting depending on site conditions at the time of construction. The frequency of these areas and the total depth of required undercut may increase based on site conditions at the time of earthwork operations, particularly if construction occurs during a wet weather pattern.

10.4 Rock Excavation Considerations

As outlined in the *Encountered Auger Refusal Materials* section (Section 4.3) of this report, it was noted that none of the three (3) project borings encountered any refusal materials within their planned target depths during the course of this investigation. Following a review of the provided Site Grading Plan (23-5837 – *Grading and Drainage Plan – produced by MCE – dated 3/2024*), MCE has concluded that there should be no need for the Contractor to budget for rock removal or the use of rock removal equipment. It is important to note, however, that deeper utility excavations (deeper than the target depths of this investigation) may encounter more competent materials. Despite this possibility, we anticipate that such materials may still be excavated using typical excavation equipment.

10.5 General Foundation Recommendations

The foundations relevant to the project structures should be sized to meet three (3) conditions. First, the maximum stresses imposed on the foundation strata should not exceed the allowable bearing pressures as determined by the shear strength properties of the bearing strata. Secondly, foundations should be designed to limit the maximum anticipated total and differential settlement to magnitudes that will neither damage nor impair the use of the structures.

Finally, the foundation systems must also be designed to resist the anticipated lateral or overturning forces during the most critical loading conditions, including earthquake loadings. These factors, as well as construction considerations related to the existing soil and ground conditions, were influential in the preparation of the recommendations presented hereinafter.

10.6 Shallow Foundation Recommendations

Based on the provided information, current project scope, and encountered subgrade materials, it is recommended that a shallow foundation system composed of continuous and/or individual (spread) footings will be suitable for the support of the planned structure. The shallow foundations should bear on a minimum of two (2) feet of newly placed, properly compacted, and moisture-conditioned select fill material meeting the criteria outlined in the *Select Fill Material* section (Section 10.11) of this report.

Based on the provided drawings, MCE understands the Terminal Building has a planned FFE of 293.0 feet, with an estimated BOF of 291.0 feet. MCE recommends that stable subgrade conditions should be exposed prior to placing any select fill or footing elements. In this case, “stable” subgrade conditions within the planned Terminal Building footprint

were encountered at an approximate depth of five (5) feet below the existing surface elevations. Additional undercut may be required to achieve this depth/condition, beyond the minimum two (2) feet below foundation elevation referenced on the previous page.

Subgrade materials within the structure dimensions should be proof-rolled following initial site grading and prior to additional undercut or the placement of select fill placement.

Footings bearing on newly placed, properly compacted, and moisture-conditioned select fill material can utilize safe allowable bearing pressures of 2,200 pounds per square foot (psf) for continuous foundations and 2,500 psf for spread or individual foundations. The allowable bearing pressures provide a minimum factor of safety of three (3) and were calculated using a minimum footing width of two (2) feet, a minimum footing thickness of one (1) foot, and a minimum footing depth of two (2) feet below exterior ground elevations, which is adequate to protect against frost heave in the project area. The total long-term foundation settlement for footings bearing on properly placed select fill material with the assumed dimensions and loading is anticipated to be approximately 3/4-inch. The maximum differential settlement between footings is anticipated to be on the order of 1/2-inch between individual footings or along a 40-foot span for continuous footings.

10.7 Structure Slab-on-Grade

Slab-on-grade construction may be utilized for the planned structures provided a minimum of four (4)-inch cushion of sand, crushed stone, or gravel is placed below the slab areas with a vapor barrier directly below the concrete. MCE recommends the planned Structure slab-on-grade (SOG) bear on a minimum of two (2) feet of newly placed, properly compacted, and moisture-conditioned select fill materials. This recommendation will likely be satisfied during the initial earthwork operations required to place select fill below the structure foundation.

As previously referenced, it is recommended that stable Stratum III material is exposed beneath the structure footprint and that select fill material is then placed and compacted in standard lifts until the FSG elevation is achieved. As previously noted, the entirety of the slab subgrade area is recommended to be verified during construction by proof-rolling.

10.8 Site Retaining Structures – Lateral Earth Pressures

At the time of this report, it is our understanding that below-grade retaining structures are currently anticipated in the current project scope. These retaining structures should be designed to resist the minimum equivalent fluid weights provided in Table 4 below. The recommended minimum factor of safety against sliding and overturning is 1.5 and 2.0 respectively. The lateral earth pressures provided in Table 4 assume a drained condition for the backfill material. To achieve a drained condition, the retaining structures should be backfilled using a free-draining granular material and be provided with thru-drains or a gravity trench drain system graded to daylight for the release of any hydrostatic pressure that may develop.

Table 4: Estimated Lateral Earth Pressures – Drained Condition

Soil/Backfill Type	Moist Unit Weight (lbs/ft ³)	Friction Angle ϕ (°)	Equivalent Fluid Pressure (lbs/ft ³)		
			Active	Passive	At-Rest
Onsite Soils Stratum II	120	20	59	245	79
Onsite Soils Stratum III	110	30	37	330	55
Select Fill Material (GC, GM, SC)	120	28	43	332	64
No. 57 or No. 67 Stone	95	35	25	350	41

The values provided in Table 4 for No. 57 or No. 67 crushed stone gravel assume a 1H:1V maximum backfill slope from the heel of the retaining wall foundation. If a vertical “chimney drain” is provided by the No. 57 or No. 67 stone, then the values for on-site soils should be used based on proximity and relevancy to the material behind the gravel.

A coefficient of friction of 0.40 may be used provided the retaining structure is supported on a minimum of four (4) inches of placed and compacted Class 7 Base Course material. A friction value of 0.35 may be used provided the retaining structures are supported directly on select fill material or onsite soils.

10.9 Project Pavement Recommendations

Site grading for the planned parking area and access drive should initially consist of removing all Stratum I materials, followed by proof-rolling as previously described. Subgrade preparation and proof-rolling should follow the same procedure as described in the *Subgrade Verification* section (Section 10.3) of this report. Based on the data obtained from this investigation, stable materials in the planned parking and access drives are generally anticipated to exist in the upper three (3) feet below the existing surface elevations.

MCE anticipates that finished grades in these areas will be at or near the existing surface elevations. MCE recommends the planned pavement improvements bear on a minimum of two (2) feet of newly placed, properly compacted, and moisture-conditioned select fill material meeting the criteria outlined in the *Select Fill Material* section (Section 10.11) of this report. Further, MCE recommends a budgeted allowance that provides a minimum of one (1) foot of additional undercut and replacement with select fill material. This is in addition to the minimum two (2) feet requirement referenced above and accounts for varying subsurface conditions depending on the time of year that construction occurs.

Thickened lifts should only be implemented under the direction of the Geotechnical Engineer. The top eight (8) inches of any thickened lift should be compacted and tested per project specifications. A minimum of one (1) standard lift should be placed above any thickened lift utilized beneath pavement areas. Select fill and base course material should be placed per the requirements provided in the *Select Fill Materials* of this report (Section 10.12).

10.10 Minimum Pavement Section Recommendations

The following pavement recommendations provided in this section are based on stable subgrade material and/or select fill material existing beneath the recommended pavement sections. This requirement would be provided by proper placement of approved select fill material and/or stable on-site material being verified by proof-rolling within the pavement dimensions. The recommended minimum pavement sections for both flexible asphalt (Table 5) and rigid concrete (Table 6) are provided in the tables below.

For the recommendations provided in Tables 5 and 6, light-duty pavements are considered to be those pavements with low-volume traffic areas such as pedestrian sidewalks, parking, and staging areas, and areas primarily subjected to passenger vehicles. The standard-duty pavements are recommended as performing similarly to a typical city street pavement section with a residential classification. Heavy-duty pavement recommendations are intended to apply to areas subjected to frequent heavy-truck traffic, like those anticipated near the storage area.

Table 5: Minimum Project Pavement Sections – Asphalt Materials

Pavement Type	Pavement Materials	Light Duty	Standard Duty	Heavy Duty
Asphalt Pavement	ACHM Surface Course (1/2")	2"	3"	2"
	ACHM Binder Course (1")	N/A	N/A	3"
	Class 7 Base Course (95% MPD)	6"	8"	8"

Table 6: Minimum Project Pavement Sections – Concrete Materials

Pavement Type	Pavement Materials	Light Duty	Standard Duty	Heavy Duty
Concrete Pavement	Portland Cement Concrete	4"	N/A	6"
	Class 7 Base Course (95% MPD)	6"	8"	8"

The pavement sections provided in Tables 5 and 6 should be viewed as minimums and can be increased through the design process by the project Civil Engineer if warranted.

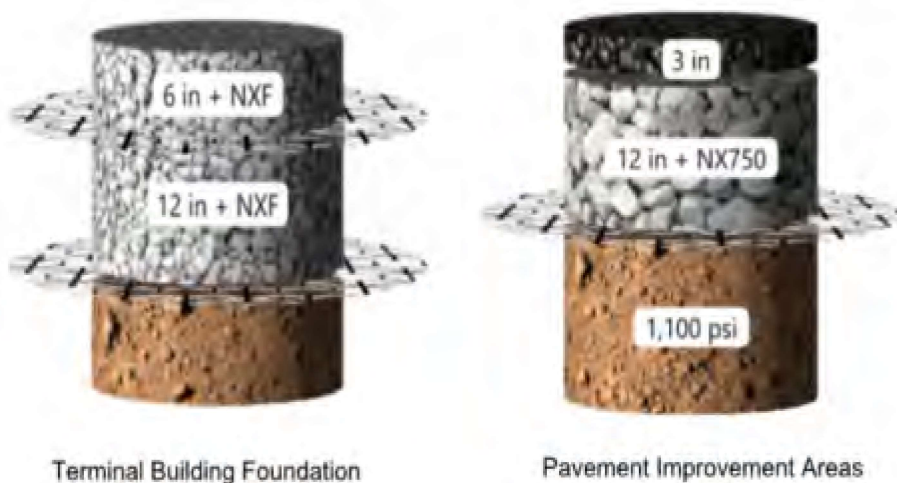
10.11 Subgrade Stabilization Recommendations (Geosynthetics)

As mentioned earlier, to ensure stable subgrade conditions for both the Terminal Building footprint and pavement improvement areas, deep earthwork operations may be necessary within the project dimensions. This could involve excavations up to four (4) feet below the existing surface elevations to expose stable in-situ subgrade materials. In such cases, using a Geogrid and coarse aggregate section can be a more cost-effective solution compared to traditional undercut and replacement methods. The coarse aggregate referred to in the preliminary recommendations is expected to be Class 7 base.

For preliminary consideration by the Design Team within the Terminal Building footprint, the Geogrid and aggregate section is anticipated to require the use of a “double-mat” system, utilizing (starting from bearing on in-situ subgrade material): one (1) layer of Tensar NXF Geogrid (or approved equivalent), followed by 12 inches of coarse aggregate, followed by an additional layer of Tensar NXF Geogrid (or approved equivalent), followed by six (6) inches of coarse aggregate. Select fill material would then be placed in standard lifts in accordance with the recommendations outlined in the *Select Fill Materials* section (Section 10.12) until FSG is achieved. At which point, the foundation elements should be excavated to the top of the coarse aggregate. This preliminary section recommendation is based on a five (5) foot wide by five (5) foot long spread footing, with a maximum bearing pressure of 2,500 psf, and a factor of safety of three (3).

It is expected that for the pavement improvement areas, a Geogrid and aggregate section will require the use of a “single-mat” system. This system will start from the bearing on in-situ subgrade material and will consist of one (1) layer of Tensar NX850 Geogrid (or approved equivalent), followed by 12 inches of coarse aggregate. ***It is important to note that this section of coarse aggregate above the Geogrid could be considered part of the pavement base course within the recommended minimum pavement sections.***

Figure 4 below provides an image showing the preliminary recommended stabilization section for both the Terminal Building foundation and the pavement improvement areas. ***These recommendations are preliminary and should be discussed further with the Design Team if it is to be considered for construction.***



As with the recommendations within the structure footprint, this section recommendation is preliminary, and further coordination should be had prior to the implementation on the project. The installation of the Geogrid should follow the manufacturer’s specified instructions. Final direction regarding the placement of the Geogrid sections should be provided by the Geotechnical Engineer based on site conditions at the time of construction.

If the use of geosynthetics as described above is the chosen subgrade stabilization method, MCE highly recommends the installation of the recommended NXF (or approved alternative) should be coordinated with MEP plans to avoid conflicts with planned utility improvements.

10.12 Select Fill Materials

Any select fill material planned or required for the project is recommended to be a locally available material meeting Unified Soils Classifications System (USCS) as a GC, SC, or GM material and having a PI of 35 or less, a LL of 55 or less, a minimum of 30% retained on the 3/4-inch sieve and a maximum of 35% passing the No. 200 sieve.

On-site Stratum III materials meeting the criteria stated above may be utilized as select fill on the project, provided a bulk sample is submitted to the Geotechnical Engineer for approval. Any material to be used as a select fill on the project should be reviewed and approved by the Geotechnical Engineer.

When placing fill next to existing slopes, the slope face should be stripped of all vegetation and the face “benched” to allow the placement of horizontal lifts and bonding to the slope face. A “standard lift” as referenced in this report can be defined as a lift of fill material no greater than eight (8) inches. Table 9 below provides the recommended compaction parameters for select fill and Class 7 base course to be used on the project.

Table 9: Compaction Requirements

Material Type	Test Standard	Minimum Dry Density (%)	Optimum Moisture Range (%)
Select Fill	ASTM D698 / AASHTO T99	98	-3% to +3%
Base Course	ASTM D1557 / AASHTO T180	95	Near Optimum

11.0 Construction Materials Testing and Special Inspections

Construction materials testing and special inspection services are recommended to be provided by MCE to provide consistency with the recommendations in this report and the documentation of those recommendations being implemented during construction. Testing of the earthwork, concrete, paving, structure, and other phases is recommended to be conducted and documented during construction to assure the Owner and Engineer that the construction complies with the specifications. In particular, field verification of earthwork operations will be required to confirm the recommendations contained herein. Additionally, all trenching and excavations should be conducted following the current Arkansas State Law and Occupational Safety and Health Administration (OSHA) guidelines and requirements.

12.0 Limitations and Reserved Rights

The recommendations and conclusions made in this report are based on the assumption that the subsoil conditions do not deviate appreciably from those disclosed in the subsurface exploration. Should significant subsoil variations or undesirable conditions be encountered during construction that are not described herein, the Geotechnical Engineer reserves the right to inspect these conditions for the purpose of reevaluating this report. A review of the final construction plans and specifications by this office is encouraged to ensure compliance with the intent of these recommendations.



1580 East Stearns Street
Fayetteville, Arkansas 72703
mce.us.com



Appendix A: Boring Layout



Keyboard shortcuts | Map data ©2024 CNES / Airbus, Maxar Technologies | 10 m | Terms | Report a map error

PLATE 1

— Project Location
 📍 Soil Borings

Corning Airport Terminal Building
 Corning Municipal Airport
 23-5837

McClelland Consulting Engineers, Inc
 Fayetteville, AR





1580 East Stearns Street
Fayetteville, Arkansas 72703
mce.us.com



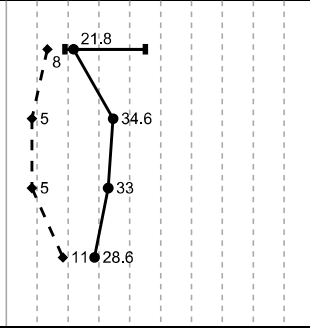
Appendix B: Boring Logs

Corning Airport Terminal Building

Soil Boring: B-01

Project Number: 23-5837 Client Name: Corning Municipal Airport Coordinates: 36.407906 / -90.650053
 Date Started: 02/13/24 Date Completed: 02/13/24 Ground Elev.: ~282'
 Drill Rig: CME-45B Drilling Method: Auger Tooling: 4" Solid Stem Auger
 Hammer Type: Auto Hammer Weight: 140-lbs Geology: Terrace Deposits

Depth (ft)	Elevation (ft)	Sample Graphic	Graphic Log	Soil Description and Remarks	Sample Number	Blow Counts (N/Refusal)	Moisture Content	
							0	100
0	280			Topsoil (6") (CL) LEAN CLAY WITH GRAVEL: Dark Gray to Brown; Stiff; Medium Plasticity; Moist - Firm - Trace Roots - Light Gray - Very Stiff - Ferrrous Staining	1	3	●	●
0.5					2	4	●	●
1					3	(8)	■	■
2					4	2	◆	◆
3					5	1		
4					6	4		
5					7	(5)		
6					8	3		
6.5	275			END OF BORING	9	3		
					10	2		
					11	(5)		
					12	3		
					13	5		
					14	6		
					15	(11)		



Boring Date: **02/13/24**
 Field Engineer/Technician: **Joel Ruble**
 Driller: **David Orozco**



Log of Soil Boring: B-01

Water Level		
Depth	Hour	Date
	-	-
	-	-

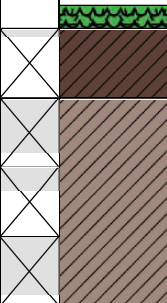
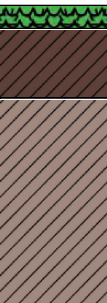
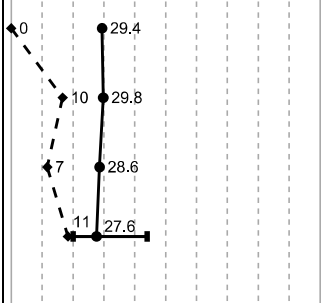
Corning Airport Terminal Building
 66 Airport Hwy 980, Corning, AR 72422, USA

Project No.: 23-5837

Corning Airport Terminal Building

Soil Boring: B-02

Project Number: 23-5837 Client Name: Corning Municipal Airport Coordinates: 36.407878 / -90.649712
 Date Started: 02/13/24 Date Completed: 02/13/24 Ground Elev.: ~283'
 Drill Rig: CME-45B Drilling Method: Auger Tooling: 4" Solid Stem Auger
 Hammer Type: Auto Hammer Weight: 140-lbs Geology: Terrace Deposits

Depth (ft)	Elevation (ft)	Sample Graphic	Graphic Log	Soil Description and Remarks	Sample Number	Blow Counts (N/Refusal)	Moisture Content	
							0	100
							Liquid Limit	
							Plastic Limit	
							Uncorrected N-Value	
0	280			Topsoil (6") (CL) LEAN CLAY WITH SAND: Dark Brown; Very Soft; Low to Medium Plasticity; Moist - Firm - Ferrous Staining - Ferrous Staining - Very Stiff	1 2 3 4	x x x (0) 3 4 6 (10) 2 1 6 (7) 3 5 6 (11)		0 50 100 0 50 100 0 30 60
6.5				END OF BORING				

Boring Date: **02/13/24**
 Field Engineer/Technician: **Joel Ruble**
 Driller: **David Orozco**

Log of Soil Boring: B-02

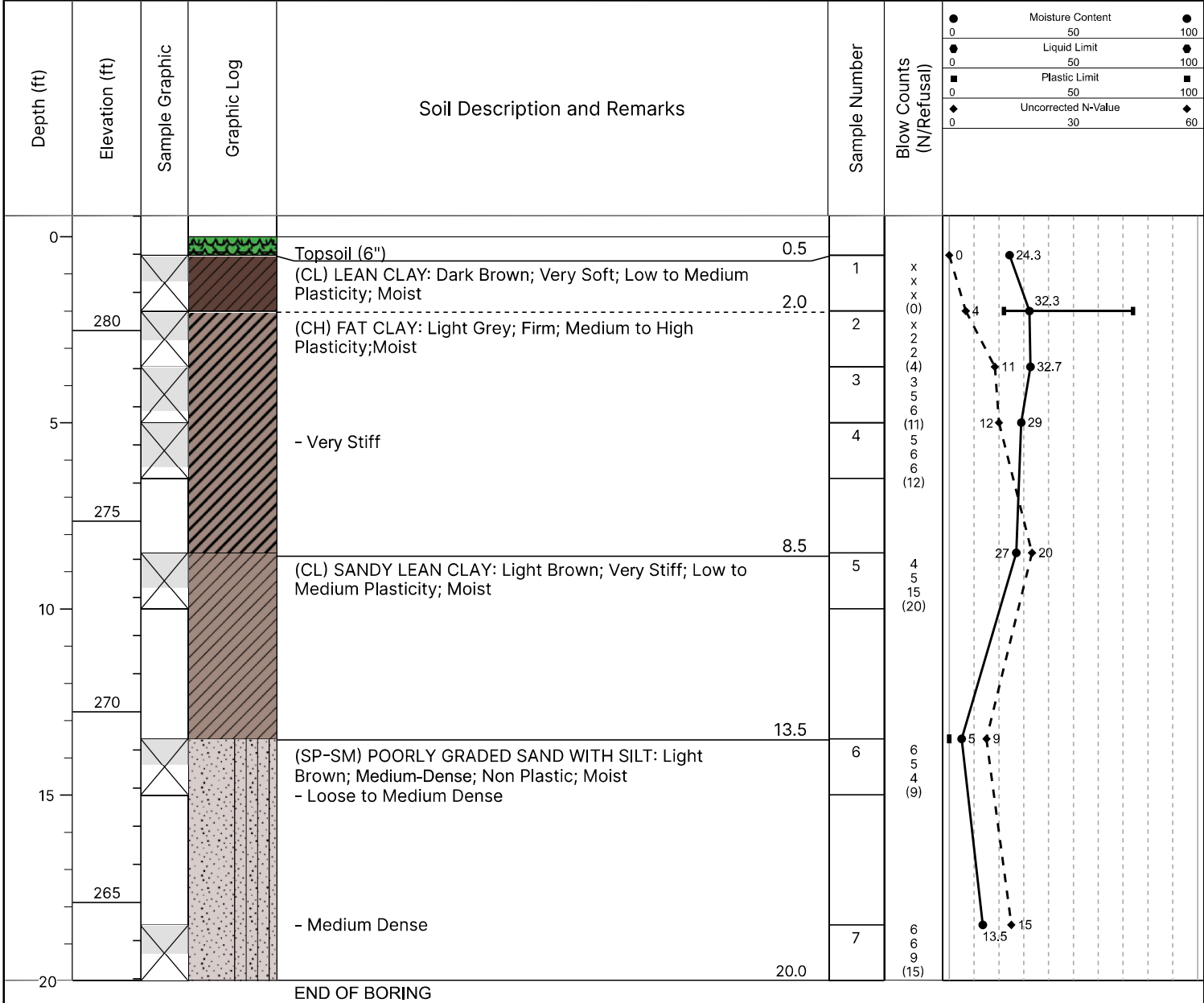
Corning Airport Terminal Building

66 Airport Hwy 980, Corning, AR 72422, USA

Project No.: 23-5837

Water Level		
Depth	Hour	Date
	-	-
	-	-

Project Number: 23-5837 Client Name: Corning Municipal Airport Coordinates: 36.408065 / -90.649679
 Date Started: 02/13/24 Date Completed: 02/13/24 Ground Elev.: ~283'
 Drill Rig: CME-45B Drilling Method: Auger Tooling: 4" Solid Stem Auger
 Hammer Type: Auto Hammer Weight: 140-lbs Geology: Terrace Deposits



Boring Date: 02/13/24
 Field Engineer/Technician: Joel Ruble
 Driller: David Orozco

Log of Soil Boring: B-03

Water Level		
Depth	Hour	Date
	-	-
	-	-

Corning Airport Terminal Building
 66 Airport Hwy 980, Corning, AR 72422, USA
 Project No.: 23-5837

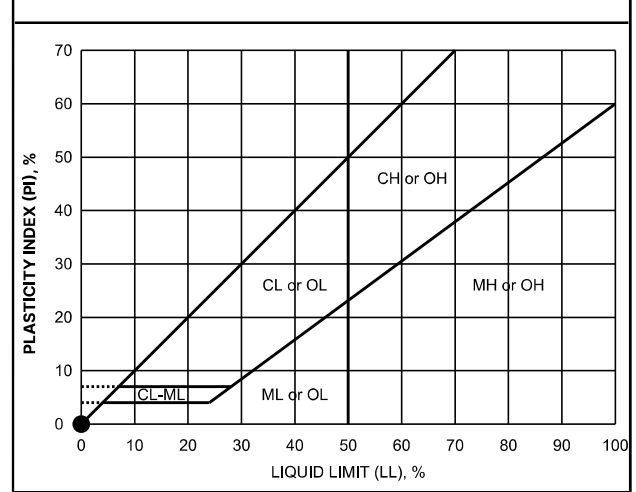
SOIL CLASSIFICATION CHART PER ASTM D 2488

PRIMARY DIVISIONS			SECONDARY DIVISIONS	
			GROUP SYMBOL	GROUP NAME
COARSE-GRAINED SOILS more than 50% retained on No. 200 sieve	GRAVEL more than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVEL less than 5% fines	GW	well-graded GRAVEL
		GRAVEL with DUAL CLASSIFICATIONS 5% to 12% fines	GP	poorly-graded GRAVEL
		GRAVEL with FINES more than 12% fines	GW-GM	well-graded GRAVEL with silt
			GP-GM	poorly-graded GRAVEL with silt
			GW-GC	well-graded GRAVEL with clay
			GP-GC	poorly-graded GRAVEL with clay
	GM	silty GRAVEL		
	GC	clayey GRAVEL		
	GC-GM	silty, clayey GRAVEL		
	SAND 50% or more of coarse fraction retained on No. 4 sieve	CLEAN SAND less than 5% fines	SW	well-graded SAND
		SAND with DUAL CLASSIFICATIONS 5% to 12% fines	SP	poorly-graded SAND
		SAND with FINES more than 12% fines	SW-SM	well-graded SAND with silt
			SP-SM	poorly-graded SAND with silt
			SW-SC	well-graded SAND with clay
			SP-SC	poorly-graded SAND with clay
		SM	silty SAND	
		SC	clayey SAND	
		SC-SM	silty, clayey SAND	
SILT and CLAY liquid limit less than 50%		INORGANIC	CL	lean CLAY
	ML	SILT		
	CL-ML	silty CLAY		
	ORGANIC	OL (PI > 4)	organic CLAY	
	OL (PI < 4)	organic CLAY		
	SILT and CLAY liquid limit 50% or more	INORGANIC	CH	fat CLAY
		MH	elastic SILT	
		ORGANIC	OH (plots on or above 'A'-line)	organic CLAY
OH (plots below 'A'-line)	organic SILT			
Highly Organic Soils		PT	Peat	

GRAIN SIZE

DESCRIPTION	SIEVE SIZE	GRAIN SIZE	APPROXIMATE SIZE
Boulders	> 12"	> 12"	Larger than basketball-sized
Cobbles	3 - 12"	3 - 12"	Fist-sized to basketball-sized
Gravel	Coarse	3/4 - 3"	Thumb-sized to fist-sized
	Fine	#4 - 3/4"	Pea-sized to thumb-sized
Sand	Coarse	#10 - #4	Rock-salt-sized to pea-sized
	Medium	#40 - #10	Sugar-sized to rock-salt-sized
	Fine	#200 - #40	Flour-sized to sugar-sized
Fines	Passing #200	< 0.0029"	Flour-sized and smaller

PLASTICITY CHART



APPARENT DENSITY - COARSE-GRAINED SOIL

APPARENT DENSITY	SPOOLING CABLE OR CATHEAD		AUTOMATIC TRIP HAMMER	
	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)
Very Loose	≤ 4	≤ 8	≤ 3	≤ 5
Loose	5 - 10	9 - 21	4 - 7	6 - 14
Medium Dense	11 - 30	22 - 63	8 - 20	15 - 42
Dense	31 - 50	64 - 105	21 - 33	43 - 70
Very Dense	> 50	> 105	> 33	> 70

CONSISTENCY - FINE-GRAINED SOIL

CONSISTENCY	SPOOLING CABLE OR CATHEAD		AUTOMATIC TRIP HAMMER	
	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)
Very Soft	< 2	< 3	< 1	< 2
Soft	2 - 4	3 - 5	1 - 3	2 - 3
Firm	5 - 8	6 - 10	4 - 5	4 - 6
Stiff	9 - 15	11 - 20	6 - 10	7 - 13
Very Stiff	16 - 30	21 - 39	11 - 20	14 - 26
Hard	> 30	> 39	> 20	> 26

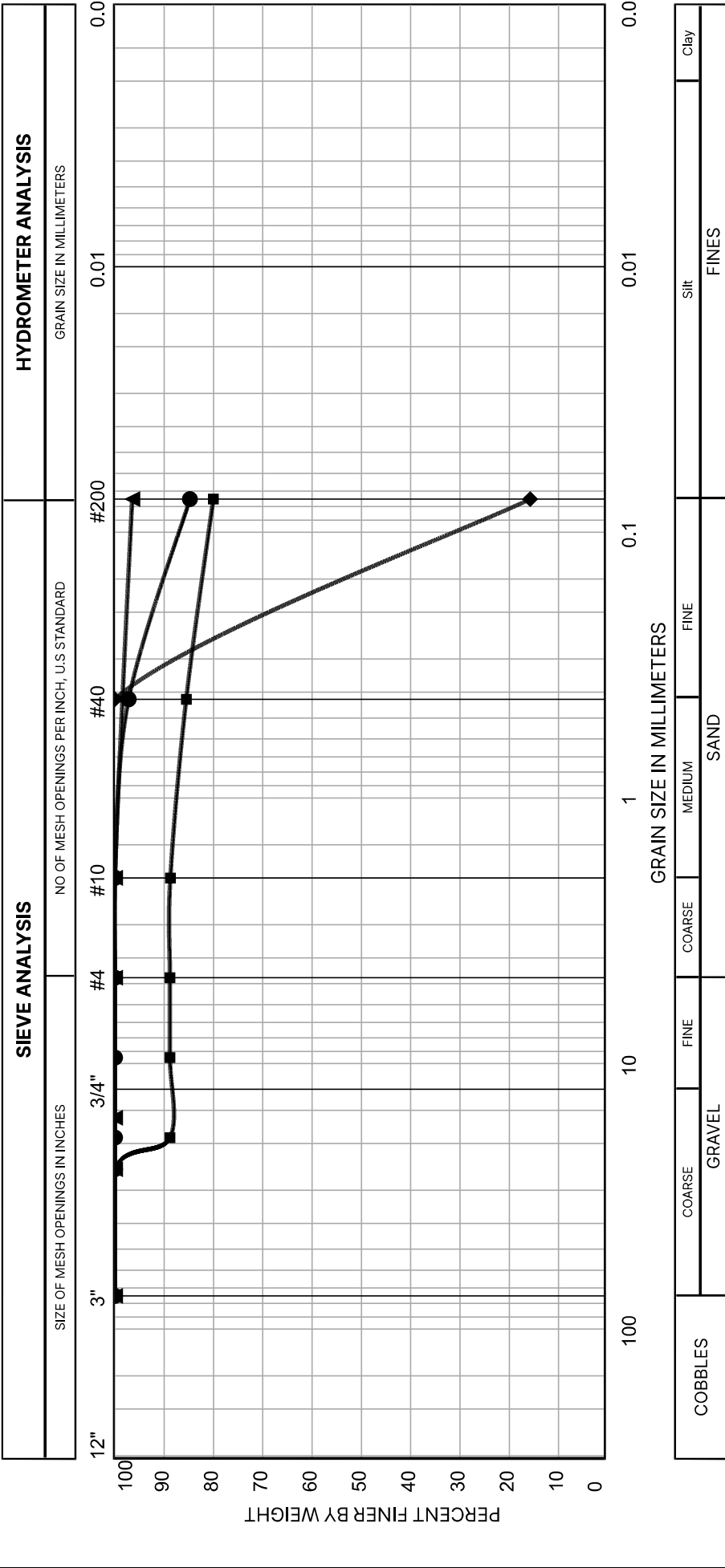


1580 East Stearns Street
Fayetteville, Arkansas 72703
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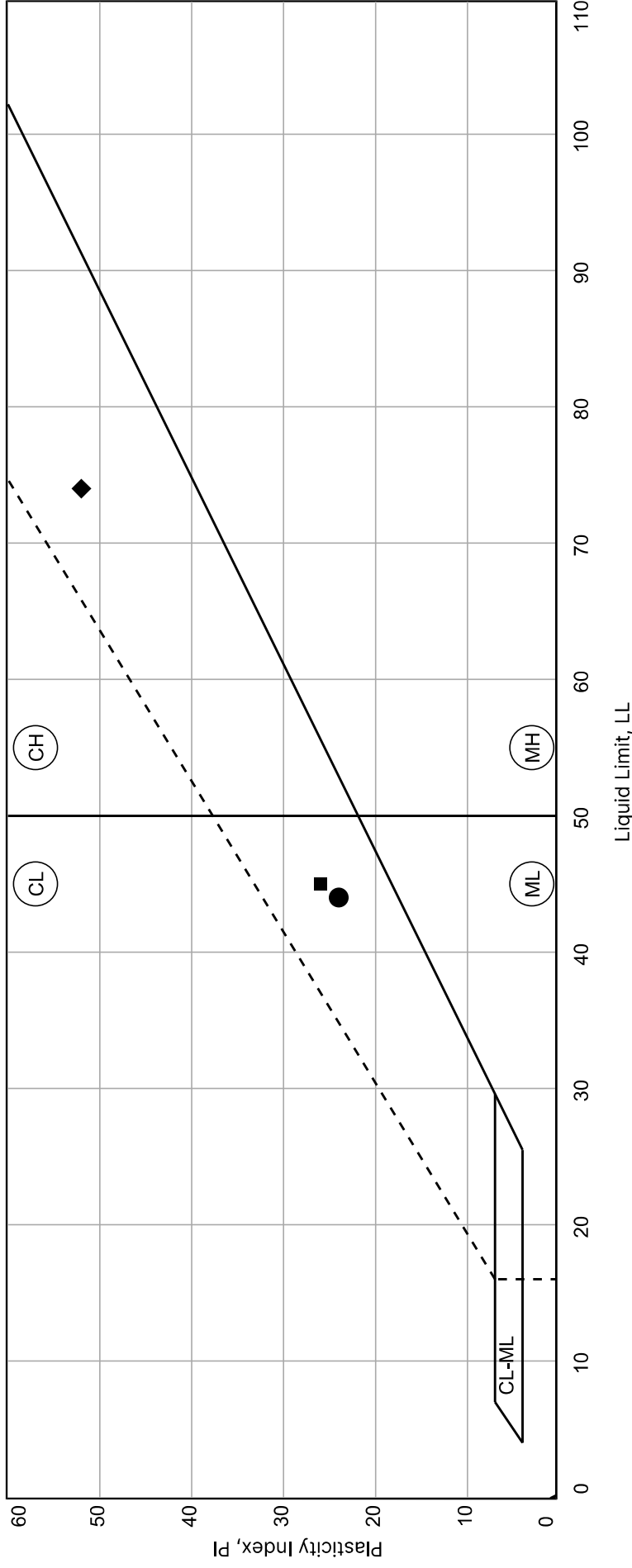
Appendix C: Laboratory Testing Results

**Corning Airport Terminal Building
 Corning, AR**



EXPLORATION AND SAMPLE NUMBER	DEPTH	UNIFIED SOIL CLASSIFICATION SYSTEM (USCS) GROUP NAME	USCS SYMBOL	COBBLE (%)	GRAVEL (%)	SAND (%)	FINES (%)	CF (%)	NAT WC (%)	TEST BY/RWW	TEST STD	TEST NOTE
■ B-01, 1	0.5	LEAN CLAY with Gravel	CL		11	9	80		21.8			
● B-02, 4	5	LEAN CLAY with Sand	CL		0	15	85		27.6			
◆ B-03, 6	13.5	POORLY GRADED SAND	SP-SM		0	84	16					
▲ B-03, 2	2	FAT CLAY	CH		0	4	96		32.3			

**Corning Airport Terminal Building
Corning, AR**



EXPLORATION AND	DEPTH	UNIFIED SOIL CLASSIFICATION	USCS	LL	PL	PI	FINES	NAT MC	TEST	TEST STD	TEST NOTE
■	0.5	LEAN CLAY with Gravel	CL	45	19	26				D4318	
●	5	LEAN CLAY with Sand	CL	44	20	24				D4318	
◆	2	FAT CLAY	CH	74	22	52				D4318	
▲	13.5	POORLY GRADED SAND	SP-SM	0	NP	NP				D4318	

"General Decision Number: AR20240021 01/05/2024

Superseded General Decision Number: AR20230021

State: Arkansas

Construction Type: Building

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Counties: Clay, Cross, Fulton and Jackson Counties in Arkansas.

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

ENGI0624-006 01/01/2017

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Crane.....	\$ 26.20	12.30
Forklift.....	\$ 26.20	12.30

IRON0321-010 08/01/2023

	Rates	Fringes
IRONWORKER, STRUCTURAL.....	\$ 27.00	20.96

PAIN0424-008 07/01/2021

	Rates	Fringes
PAINTER (Spray).....	\$ 16.25 **	10.42

SHEE0036-035 06/01/2021

	Rates	Fringes
SHEET METAL WORKER (HVAC Duct Installation Only).....	\$ 24.44	13.66

SUAR2015-018 01/09/2017

	Rates	Fringes
BRICKLAYER.....	\$ 19.15	0.00
CARPENTER, Includes Drywall Hanging.....	\$ 17.20	0.00
CEMENT MASON/CONCRETE FINISHER...	\$ 21.08	0.00
ELECTRICIAN.....	\$ 21.95	6.36
LABORER: Common or General.....	\$ 11.12 **	0.00
LABORER: Mason Tender - Brick...	\$ 12.32 **	0.00
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 23.08	0.00
OPERATOR: Bulldozer.....	\$ 18.14	0.00
PAINTER (Brush and Roller).....	\$ 15.68 **	0.00
PLUMBER.....	\$ 19.72	3.49
SPRINKLER FITTER (Fire Sprinklers).....	\$ 21.77	2.46
TRUCK DRIVER: Dump Truck.....	\$ 15.00 **	0.00

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.

=====

** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$17.20) or 13658 (\$12.90). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations

Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

=====

END OF GENERAL DECISION"

Superseded General Decision Number: AR20230157

State: Arkansas

Construction Type: Highway

Counties: Clay, Fulton, Independence, Izard, Jackson, Lee, Randolph, Sharp and Woodruff Counties in Arkansas.

HIGHWAY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

	Rates	Fringes
CARPENTER (Form Work Only).....	\$ 18.87	0.00
CARPENTER, Excludes Form Work....	\$ 15.92 **	0.00
CEMENT MASON/CONCRETE FINISHER...	\$ 14.36 **	0.00
FENCE ERECTOR.....	\$ 11.80 **	0.00
HIGHWAY/PARKING LOT STRIPING: Operator (Striping Machine).....	\$ 13.50 **	0.00
INSTALLER - GUARDRAIL.....	\$ 15.80 **	0.00
IRONWORKER, REINFORCING.....	\$ 15.80 **	0.00
IRONWORKER, STRUCTURAL.....	\$ 20.95	9.26
LABORER: Asphalt, Includes Raker, Shoveler, Spreader and Distributor.....	\$ 12.95 **	0.00
LABORER: Common or General.....	\$ 12.43 **	0.00
LABORER: Mason Tender - Cement/Concrete.....	\$ 11.51 **	0.00
OPERATOR: Asphalt Plant.....	\$ 17.67	0.00
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 19.73	0.00
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 19.49	0.00
OPERATOR: Broom/Sweeper.....	\$ 14.94 **	0.00
OPERATOR: Bulldozer.....	\$ 18.01	0.00
OPERATOR: Crane.....	\$ 25.21	0.00
OPERATOR: Grade Checker.....	\$ 19.30	0.00
OPERATOR: Grader/Blade.....	\$ 19.75	0.00
OPERATOR: Loader.....	\$ 13.77 **	0.00
OPERATOR: Mechanic.....	\$ 22.42	0.00
OPERATOR: Milling Machine.....	\$ 20.95	0.00
OPERATOR: Oiler.....	\$ 16.06 **	0.00
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 16.31 **	0.00
OPERATOR: Post Driver (Guardrail/Fences).....	\$ 19.30	0.00
OPERATOR: Roller.....	\$ 15.48 **	0.00

OPERATOR: Scraper.....	\$ 17.78	0.00
OPERATOR: Screed.....	\$ 15.91 **	0.00
OPERATOR: Tractor.....	\$ 18.31	0.00
PILEDRIVERMAN.....	\$ 18.75	0.00
TRAFFIC CONTROL: Flagger.....	\$ 11.76 **	0.00
TRAFFIC CONTROL: Laborer-Cones/ Barricades/Barrels - Setter/Mover/Sweeper.....	\$ 10.97 **	0.00
TRUCK DRIVER: Dump Truck.....	\$ 16.64 **	0.00
TRUCK DRIVER: Flatbed Truck.....	\$ 12.75 **	0.00
TRUCK DRIVER: Lowboy Truck.....	\$ 17.74	0.00
TRUCK DRIVER: Water Truck.....	\$ 16.09 **	0.00
TRUCK DRIVER: Semi/Trailer Truck.....	\$ 10.75 **	0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

=====

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=====

END OF GENERAL DECISION"

DOCUMENT 00 21 13

INSTRUCTIONS TO BIDDERS

PARAGRAPH NO./TITLE

1. FORMAT
2. SPECIFICATION LANGUAGE
3. GENERAL DESCRIPTION OF THE PROJECT
4. QUALIFICATION OF CONTRACTORS
5. MINORITY PARTICIPATION
6. DOCUMENT INTERPRETATION
7. BIDDER'S UNDERSTANDING
8. PROJECT MANUAL AND DRAWINGS
9. TYPE OF BID
10. TRENCH AND EXCAVATION SAFETY SYSTEM
11. PREPARATION OF BIDS
12. STATE AND LOCAL SALES AND USE TAXES
13. SUBMISSION OF BIDS
14. TIE BIDS
15. TELEGRAPHIC OR WRITTEN MODIFICATION OF BID
16. WITHDRAWAL OF BID
17. BID SECURITY
18. RETURN OF BID SECURITY
19. AWARD OF CONTRACT
20. BASIS OF AWARD
21. EXECUTION OF CONTRACT
22. PERFORMANCE AND PAYMENT BONDS
23. FAILURE TO EXECUTE CONTRACT AND FURNISH BOND
24. PERFORMANCE OF WORK BY CONTRACTOR
25. TIME OF COMPLETION
26. PROVISION OF REQUIRED INSURANCE

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DOCUMENT 00100

INSTRUCTIONS TO BIDDERS

1. **FORMAT**

The Contract Documents are divided into Parts, Divisions, and Sections in keeping with accepted industry practice in order to separate categories of subject matter for convenient reference thereto. Generally, there has been no attempt to divide the Specification Sections into work performed by the various building trades, work by separate subcontractors, or work required for separate facilities in the Project.

2. **SPECIFICATION LANGUAGE**

"Command" type sentences are used in Contract Documents. These refer to and are directed to the Contractor.

3. **GENERAL DESCRIPTION OF THE PROJECT**

A general description of the Work to be done is contained in the ADVERTISEMENT FOR BIDS. The scope is indicated on the accompanying Drawings and specified in applicable parts of these Contract Documents.

4. **QUALIFICATION OF CONTRACTORS**

The prospective bidders must meet the statutorily prescribed requirements before Award of Contract by the Owner.

Owner and Engineer shall review each Bidder's qualifications before a Contract will be awarded for the work contemplated herein. The Owner will conduct investigations, as necessary, to determine the performance record and ability of the apparent low Bidder to perform the size and type of work specified under this Contract. Upon request, the Bidder shall submit information as deemed necessary by the Owner to evaluate the Bidder's qualifications.

In general, when bidding on a project that **DOES NOT** include Federal Funding, the Bidder must be a Licensed Contractor in the State of Arkansas before a bid is submitted. If a project **DOES** include Federal Funding, the Bidder must have an application on file with the State of Arkansas Contractor's Licensing Board and be in the process of obtaining a Contractor's License in the State of Arkansas. Before the Owner and Contractor enter into a Contract Agreement, the Contractor must have their License in hand. For any questions concerning Contractor's Licensing Requirements contact the State Licensing Board at (501) 372-4661.

5. **MINORITY PARTICIPATION**

Pursuant to Ark. Code Ann. § 22-9-203, the Owner encourages all small, minority, and women business enterprises to submit bids for capital improvements. Encouragement is also made to all general contractors that in the event they subcontract portions of their work, consideration is given to the identified groups.

6. DOCUMENT INTERPRETATION

The Contract Documents governing the Work proposed herein consist of the Drawings and all material bound herewith. These Contract Documents are intended to be mutually cooperative and to provide all details reasonably required for the execution of the proposed Work. Any person contemplating the submission of a Bid shall have thoroughly examined all of the various parts of these Documents and, should there be any doubt as to the meaning or intent of said Contract Documents, the Bidder should request of the Engineer, in writing (received by the Engineer at least 5 working days prior to bid opening), an interpretation thereof.

Any interpretation or change in said Contract Documents will be made only in writing, in the form of Addenda to the Documents, which will be furnished to all Bidders receiving a set of the Documents. Bidders shall submit with their Bids, or indicate receipt, of all Addenda. The Owner or Engineer will not be responsible for any other explanation or interpretations of said Documents not issued in writing by Addendum.

7. BIDDER'S UNDERSTANDING

Each Bidder must inform himself of the conditions relating to the execution of the Work, and it is assumed that he will inspect the site and make himself thoroughly familiar with all the Contract Documents. Failure to do so will not relieve the successful Bidder of his obligation to enter into a Contract and complete the contemplated Work in strict accordance with the Contract Documents. It shall be the Bidder's obligation to verify for himself and to his complete satisfaction all information concerning site and subsurface conditions.

Information derived from topographic maps, or from Drawings showing location of utilities and structures will not in any way relieve the Contractor from any risk, or from proper examination of the site and additional investigations as he may elect, or from proper fulfillment of all the terms of the Contract Documents.

Each Bidder shall inform himself of, and the Bidder awarded a Contract shall comply with, federal, state, and local laws, statutes, and ordinances relative to the execution of the Work. This requirement includes, but is not limited to, applicable regulations concerning minimum wage rates; nondiscrimination in the employment of labor; protection of public and employee safety and of health environment protection, the protection of natural resources, fire protection, burning and nonburning requirements, permits, fees, contractor's license, nonresident contractors' notice and bond requirements, and similar subjects.

8. PROJECT MANUAL AND DRAWINGS

No return of Drawings is required and no refund will be made.

9. TYPE OF BID

Unit prices shall be submitted in the appropriate places on the Bid form. The total amount to be paid to the Contractor shall be the total amount of the unit price items as adjusted based on quantities installed and/or any adjustment for additions or deletions resulting from change orders during construction.

10. TRENCH AND EXCAVATION SAFETY SYSTEM

IN ACCORDANCE WITH **ARK. CODE ANN.§ 22-9-212**, BIDDERS MUST PROVIDE A SEPARATE PRICE FOR TRENCH AND EXCAVATION SAFETY PROGRAMS IN THE SPACE PROVIDED ON THE BID FORM. FAILURE TO DO SO WILL SUBJECT THE BIDDER TO DISQUALIFICATION.

11. PREPARATION OF BIDS

All blank spaces on the Bid Form must be filled in, preferably in BLACK ink. No changes shall be made in the phraseology of the forms. In case of discrepancy between unit prices and totals, unit prices will prevail.

Any Bid which contains material omissions, or irregularities, or in which any of the prices are obviously unbalanced in the opinion of the Owner may be rejected. Also, a bid may be rejected if, in any manner, it shall fail to conform to the conditions of the published ADVERTISEMENT FOR BIDS, Bidding Requirements, and Contract Documents.

Only one bid from any individual, firm, partnership, or corporation, under the same or different names, will be considered. Should it appear to the Owner that any Bidder is interested in more than one bid for Work contemplated, all bids in which such Bidder is interested will be rejected. The Bidder shall sign his Bid Form on the blank space provided therefor. If Bidder is a corporation, the legal name of the corporation shall be set forth above, together with the signature of the officer or officers authorized to sign Contracts on behalf of the corporation. If Bidder is a partnership or sole proprietorship, the true name of the firm shall be set forth above, together with the signature of the sole proprietor, partner, or partners authorized to sign Contracts in behalf of the firm. If signature is by an agent, other than an officer of a corporation or a member of a partnership or sole proprietor, a notarized power-of-attorney must be on file with the Owner prior to opening of bids or submitted with the Bid.

12. STATE AND LOCAL SALES AND USE TAXES

Unless the Supplementary Conditions contains a statement that the Owner is exempt from state sales tax on materials incorporated into the Work, due to the qualification of the Work under this Contract, all state and local sales and use taxes, as required by the laws and statutes of the state and its political subdivisions, shall be paid by the Contractor. Prices quoted in the Bid shall include all nonexempt sales and use taxes, unless provision is made in the Bid Form to separately itemize the tax.

13. SUBMISSION OF BIDS

All Bids must be submitted not later than the time prescribed, at the place, and in the manner set forth in the ADVERTISEMENT FOR BIDS. Bids must be made on the Bid Form provided herein. Each Bid must be submitted in a sealed envelope, so marked as to indicate its contents without being opened, and addressed in conformance with the instructions in the ADVERTISEMENT FOR BIDS.

14. TIE BIDS

If two or more sealed bids are equal in amount, meet specifications, and are the lowest received at the bid opening, then the apparent low bidder will be determined by lot (placing the name of the tie bidders into a container and drawing one name). The drawing will be done by Owner personnel,

or another person designated by the Owner in the presence of a witness and tie bidders. The witness shall be an employee of the Owner or Engineer. Documentation of the drawing must be included on the bid tabulation and be signed by those present. Nothing in the above and foregoing will diminish the Owner's reserved right to reject any and all bids and/or to waive formalities.

15. TELEGRAPHIC OR WRITTEN MODIFICATION OF BID

Any Bidder may modify his bid by telegraphic or written communication at any time prior to the scheduled closing time for receipt of bids, provided such communication is received by the Owner prior to the closing time. The telegraphic or written communication should not reveal the bid price; it shall, however, state the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the sealed bid is opened.

16. WITHDRAWAL OF BID

Any Bid may be withdrawn prior to the scheduled time for the opening of bids either by telegraphic or written request, or in person. No Bid may be withdrawn after the time scheduled for opening of Bids, unless the time specified in Item, AWARD OF CONTRACT, of these INSTRUCTIONS TO BIDDERS shall have elapsed.

17. BID SECURITY

Each bid shall include a bid security in the amount of five percent of the total bid offered. The bidder shall be required to submit a bidder's deposit, which includes enclosing a cashier's check payable to the order of the OWNER drawn upon a bank or trust company doing business in Arkansas or by a corporate bid bond in an amount equal to five (5) percent of the bid.

The Attorney-in-Fact who executes this bond in behalf of the Surety must attach a notarized copy of his power-of-attorney as evidence of his authority to bind the Surety on the date of execution of the bond.

If the Bidder elects to furnish a Bid Bond, he shall use the Bid Bond form bound herewith or one conforming substantially thereto in form and content.

The bid bond shall indemnify the Owner against failure of the Contractor to execute and deliver the contract and necessary Performance and Payment Bonds for faithful performance of the contract. The bid bond shall provide that the Contractor or surety must pay the damage, loss, cost, and expense subject to the amount of the bid security directly arising out the Contractor's default in failing to execute and deliver the contract and bonds.

Owner will have the right to retain the bid security of bidders to whom an award is being considered until the Contract has been executed and bonds have been furnished, or until specified time has elapsed so that bids may be withdrawn, or until all bids have been rejected.

18. RETURN OF BID SECURITY

Within fifteen (15) days after the award of the Contract, the Owner will return the bid securities to all Bidders whose Bids are not to be further considered in awarding the Contract. Retained bid securities will be held until the Contract has been finally executed, after which all bid securities, other than Bidders' bonds and any guarantees which have been forfeited, will be returned to the respective Bidders whose Bids they accompanied.

19. AWARD OF CONTRACT

Within ninety (90) calendar days after the opening of Bids, unless otherwise stated in the ADVERTISEMENT FOR BIDS or SUPPLEMENTARY CONDITIONS of these Documents, the Owner will accept one of the Bids or will act in accordance with BASIS OF AWARD, below. The acceptance of the Bid will be by written notice of award, mailed or delivered to the office designated on the Bid Form. In the event of failure of the lowest responsible and responsive qualified Bidder to sign and return the Contract with acceptable Performance and Payment Bonds, as prescribed herein, the Owner may award the Contract to the next lowest responsible and responsive qualified Bidder. Such award, if made, will be made within ninety (90) days after the opening of Bids.

20. BASIS OF AWARD

If, at the time this Contract is to be awarded, the Total Base Bid of the lowest acceptable Bid exceeds the funds then estimated by the Owner as available, the Owner may reject all bids or take other action as best serves the Owner's interests. The basis of the award will be as stated in the bid.

21. EXECUTION OF CONTRACT

The successful Bidder shall, within fifteen (15) consecutive days after receiving notice of award, sign and deliver to the Owner the Contract hereto attached, together with the acceptable bonds as required in these Documents. Within fifteen (15) consecutive days after receiving the signed Contract with acceptable bonds from the successful Bidder, the Owner's authorized agent will sign the Contract. Signature by both parties constitutes execution of the Contract.

The successful bidder shall conform to the Rules and Regulations of Arkansas Department of Finance and Administration concerning nonresident contractor's notice and bond requirements.

22. PERFORMANCE AND PAYMENT BONDS

The successful Bidder shall furnish a Performance and Payment Bond in the amount equal to one hundred percent (100%) of the contract price on the forms provided in the Contract Documents as security for faithful performance of the Contract and payment of all obligations arising thereunder within ten days after receipt of the Notice of Award. The bond shall be written by a surety company qualified and authorized to do business in the State of Arkansas and shall be listed on the current U. S. Department of Treasury, Circular Number 570, or amendments thereto, in the Federal Register of acceptable Sureties for Federal projects. The bond shall be executed by a resident agent licensed by the State Insurance Commissioner to represent the surety company in Arkansas. The bond shall be written in favor of the Owner. Bond company rating by "AM Best Rating Company" to be "A-" or above and have a Positive or Stable Rating Outlooks.

The Attorney-in-Fact who executes this Performance Bond and Payment Bond in behalf of the Surety must attach a notarized copy of his power-of-attorney as evidence of his authority to bind the Surety on the date of execution of the bond. All Contracts, Performance and Payment Bonds, and respective powers-of-attorney will have the same date.

If the Surety on any Bond furnished by Contractor is declared bankrupt, or becomes insolvent, or its right to do business is terminated in any location where any part of the project is located, or ceases to meet the requirements of the preceding paragraph, the Contractor shall within five days thereafter substitute another Bond and Surety, both of which must be acceptable to Owner.

Before execution of the Contract Documents, the Contractor shall submit the Bonds (in triplicate) to the Owner. The Bonds shall be submitted **WITHOUT DATES**, as they will be dated by the Owner at the same time as the Contracts are executed.

23. FAILURE TO EXECUTE CONTRACT AND FURNISH BOND

Failure to deliver bonds as specified above shall be considered as having abandoned the Contract, and the bid security will be retained by the Owner as liquidated damages.

24. PERFORMANCE OF WORK BY CONTRACTOR

The Contractor shall perform on the site, and with his own organization, work equivalent to at least twenty-five percent of the total amount of the Work to be performed under this Contract. Contractors submitting bids where twenty-five percent of Work is not with their own forces shall be deemed a "Brokerage Contractor" and the bid may be rejected by Owner. If determined during the "Award of Contract" phase that the Contractor is not going to be performing forty percent of Work as bid, the Contractor's bid may be subject to rejection and forfeiture of Bid Bond.

If, during the progress of the Work hereunder, the Contractor requests a reduction of the percentage and the Engineer determines that it would be to the Owner's advantage, the percentage of the work required to be performed by the Contractor's own organization may be reduced, PROVIDED prior written approval of such reduction is obtained by the Contractor from the Engineer.

Each bidder must furnish with his bid a list of the items that he will perform with his own forces and the estimated total cost of these items.

25. TIME OF COMPLETION

The time of completion of the Work to be performed under this Contract is of the essence of the Contract. Delays and extensions of time may be allowed in accordance with the provisions stated in Document 00700 - GENERAL CONDITIONS. The time allowed for the completion of the Work is stated in Document 00500 - Contract.

26. PROVISION OF REQUIRED INSURANCE

The Bidder's attention is directed to the insurance requirements set forth in the General Conditions (amended in the Supplementary Conditions, if appropriate). Submittal of a bid indicates full understanding and intent to comply with the insurance requirements which are a condition of the contract.

END OF SECTION

DOCUMENT 00 41 13

BID FORM

NOTE TO BIDDER: Please use BLACK ink for completing this Bid form.

To: _____

Address: _____

Project Title: **CORNING MUNICIPAL AIRPORT (4M9) CONSTRUCT TERMINAL BUILDING**

Project No.: **23-5837**

Date: _____ Arkansas Contractor's License No.: _____

Bidder: _____

Address: _____

Bidder's person to contact for additional information on this Bid:

Name: _____

Telephone: _____

ADDENDA

The Bidder hereby acknowledges that he/she has received Addenda Numbers:

_____ to these Specifications.
(Bidder insert number of each addendum received.)

INSURANCE AND BONDING REQUIREMENTS

The Bidder hereby acknowledges that he/she has read and understands the performance bond, payment bond, and insurance requirements for this project as specified in the General Conditions. If awarded a construction contract, the Bidder agrees to furnish the required bonds and insurance certificates within fifteen (15) days of the date the award is made.

Signature _____ Title _____

INFORMATION AVAILABLE TO BIDDERS CERTIFICATION OF NON-SEGREGATED FACILITIES

The Bidder hereby acknowledges that he/she has read and understands Section - INFORMATION AVAILABLE TO BIDDERS - Certification of Non-Segregated Facilities prior to completing this Bid Form.

NOTICE TO PROSPECTIVE CONTRACTORS OF REQUIREMENT FOR CERTIFICATION OF NON-SEGREGATED FACILITIES

A Certification of Non-segregated Facilities must be submitted prior to the award of a contract or subcontract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity Clause.

Certification - The information above is true and complete to the best of my knowledge and belief.

Name and Title of Signer (Please Type)

Signature

Date

Note: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

MEASUREMENT AND PAYMENT

The Bidder hereby acknowledges that he/she has read and understands Section 90 - Measurement and Payment and Measurement and Payment associated with each Technical Specification completely prior to completing this Bid Form.

Signature _____ Title _____

BIDDER'S DECLARATION AND UNDERSTANDING

The undersigned, hereinafter called the Bidder, declares that the only persons or parties interested in this Bid are those named herein, that this Bid is, in all respects, fair and without fraud, that it is made without collusion with any official of the Owner, and that the Bid is made without any connection or collusion with any person submitting another Bid on this Contract.

The Bidder further declares that he has carefully examined the Contract Documents for the construction of the project, that he has personally inspected the site, that he has satisfied himself as to the quantities involved, including materials and equipment, and conditions of work involved, including the fact that the description of the quantities of work and materials, as included herein, is brief and is intended only to indicate the general nature of the work and to identify the said quantities with the detailed requirements of the Contract Documents, and that this Bid is made according to the provisions and under the terms of the Contract Documents, which Documents are hereby made a part of this Bid.

The Bidder further agrees that he has exercised his own judgement and has utilized all data which he believes pertinent from the Engineer, Owner, and other sources in arriving at his own conclusions.

The Bidder states that he has experience in and is qualified to perform the work herein specified and, if he does not have craftsmen experienced and qualified in any phase of the work for which this Bid is offered, that he will subcontract the work under said phase to a contractor who does have the necessary experience and qualifications.

The Bidder (proposer) has ___ has not ___ participated in a previous contract subject to the equal opportunity clause prescribed by Executive Order 10925, or Executive Order 11114, or Executive Order 11246.

The Bidder (proposer) has ___ has not ___ submitted all compliance reports in connection with any such contract due under the applicable filing requirements; and that representations indicating submission of required compliance reports signed by proposed subcontracts will be obtained prior to award of subcontracts.

If the Bidder (proposer) has participated in a previous contract subject to the equal opportunity clause and has not submitted compliance reports due under applicable filing requirements, the Bidder (Proposer) shall submit a compliance report on Standard Form 100, "Employee Information Report EEO-1" prior to the award of contract.

Standard Form 100 is normally furnished contractors annually, based on a mailing list currently maintained by the Joint Reporting Committee. In the event a contractor has not received the form, it may be obtained by writing to the following address:

Joint Reporting Committee
1800 G Street
Washington, DC 20506

DISADVANTAGED BUSINESS ENTERPRISE (DBE) (49 CFR PART 26)

PART A

Policy. It is the policy of the Department of Transportation (DOT) that disadvantaged business enterprises as defined in 49 CFR Part 26 shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal funds under this agreement. Consequently, the DBE requirements of 49 CFR Part 26 apply to this agreement.

DBE Obligation. The contractor agrees to ensure that disadvantaged business enterprises as defined in 49 CFR Part 26 have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with Federal funds provided under this agreement. In this regard all contractors shall take all necessary and reasonable steps in accordance with 49 CFR Part 26 to ensure that disadvantaged business enterprises have the maximum opportunity to compete for and perform contracts. Contractors shall not discriminate on the basis of race, color, national origin or sex in the award and performance of DOT-assisted contracts.

Compliance. All bidders, potential contractors, or subcontractors for this DOT-assisted contract are hereby notified that failure to carry out the DOT policy and the DBE obligation, as set forth above, shall constitute a breach of contract which may result in termination of the contract or such other remedy as deemed appropriate by the owner.

Subcontract Clauses. All bidders and potential contractors hereby assure that they will include the above clauses in all subcontracts, which offers further subcontracting opportunities.

PART B

It is further understood and agreed:

The award procedure for this solicitation will include the selection criteria of 49 CFR Part 26.45 to apply to this contract. It is the policy of the Owner to practice nondiscrimination based on race, color, sex, or national origin in the award or performance of this contract. All firms qualifying under this solicitation are encouraged to submit bids/proposals. Award of this contract will be conditioned upon satisfying the requirements of this bid specification. These requirements apply to

all bidders, including those who qualify as a DBE. A DBE contract goal of 4.05% percent has been established for this contract. The bidder shall make good faith efforts, as defined in Appendix A, 49 CFR Part 26, to meet the contract goal for DBE participation in the performance of this contract.

All bidders are required to submit the names and addresses of the DBE firms that will participate in the contract along with a description of the work to be performed by each named firm and the dollar value for each contract (subcontract). Written documentation of the bidder's commitment to use a DBE subcontractor and that subcontractor's confirmation must be provided. If the responses do not clearly show DBE participation will meet the goals above, the bidder must provide documentation clearly demonstrating, to the satisfaction of the airport sponsor, that it made good faith efforts in attempting to do so and that meeting said goal is not reasonably possible. A bid that fails to meet these requirements will be considered nonresponsive.

Any bidders meeting or exceeding the established DBE goal shall submit *DBE Form #'s 1-5*. Any bidder unable to meet the goal shall submit *DBE Form #'s 1 & 5-7* along with any other documents necessary to prove Good Faith Efforts.

Agreements between bidder and a DBE in which the DBE promises not to provide subcontracting quotations to other bidders are prohibited. All bidders and proposers shall make a good faith effort to replace a DBE subcontractor that is unable to perform successfully with another DBE subcontractor. The bidder shall establish and maintain records and submit regular reports, as required, which will identify and assess progress in achieving DBE subcontract goals and other DBE affirmative action efforts.

CONTRACT EXECUTION AND BONDS

The Bidder agrees that if this Bid is accepted, he will, within 15 days after notice of award, sign the Contract in the form annexed hereto, and will at that time, deliver to the Owner the Performance Bond and Payment Bond required herein, and will, to the extent of his Bid, furnish all machinery, tools, apparatus, and other means of construction and do the work and furnish all the materials necessary to complete all work as specified or indicated in the Contract Documents.

CERTIFICATES OF INSURANCE, PAYMENT BOND, AND PERFORMANCE BOND

The Bidder further agrees to furnish the Owner, before executing the Contract, the certificates of insurance, Payment Bond, and Performance Bond as specified in these Documents.

START OF CONSTRUCTION, CONTRACT COMPLETION TIME, AND LIQUIDATED DAMAGES

Start of Construction, Contract Completion Time, and Liquidated Damages are stated in Document 00 52 13 - Contract.

SALES AND USE TAXES

The Bidder agrees that all federal, state, and local sales and use taxes are included in the stated bid prices for the work.

UNIT PRICE BASE BID

Any Bid may be rejected which contains material omissions, or irregularities, or in which any of the unit prices are obviously unbalanced in the opinion of the Owner. Also, a bid may be rejected if, in any manner it shall fail to conform to the conditions of the published Bidding Requirements and Contract Documents.

The bidder agrees to accept as full payment for the work proposed herein the amount computed under the provisions of the Contract Documents and based on the following unit price amounts, it being expressly understood that the unit prices are independent of the exact quantities involved. The bidder agrees that the unit

prices represent a true measure of the labor and materials required to perform the work, including all allowances for overhead and profit for each type and unit of work called for in the Contract Documents.

SCHEDULE "A"
CONSTRUCT TERMINAL BUILDING
AIP ELIGIBLE

Item No.	Item Description	Units	Qty.	Unit Cost	Total Cost
1	Mobilization (10% Maximum of Base Bid)	LS	1	\$	\$
2	Temporary Sandbag Ditch Check	EA	1	\$	\$
3	Installation and Removal of Silt Fence	LF	86	\$	\$
4	Unclassified Excavation	CY	100	\$	\$
5	Embankment in Place	CY	600	\$	\$
6	Class 7 Crushed Aggregate Base Course (12" Depth)	SY	565	\$	\$
7	Asphalt Surface Course (4" Depth)	TON	115	\$	\$
8	Concrete Sidewalk (4" Depth)	SY	100	\$	\$
9	Pavement Markings	SF	80	\$	\$
10	Accessible Parking Sign, Installed	EA	1	\$	\$
11	Class III 18" RCP, Installed	LF	28	\$	\$
12	Class III 18" RCP Flared End Section with Toe Wall, Installed	EA	4	\$	\$
13	Seeding and Mulching	ACRE	0.3	\$	\$
14	Wheel Stops	EA	5	\$	\$
15	Water Utilities	LS	1	\$	\$
16	Electric Utilities	LS	1	\$	\$
17	Sewer System Including Septic Tank	LS	1	\$	\$
18	Terminal Building, Complete	LS	1	\$	\$

Total Amount Bid Schedule "A"

\$ _____

(Words)

**SCHEDULE "B"
 THIRD PARTY OCP INSURANCE
 NON-AIP ELIGIBLE**

Item No.	Item Description	Units	Qty.	Unit Cost	Total Cost
	Third Party (OCP) Insurance	LS	1	\$	\$

Total Amount Bid Schedule "B" \$ _____

Total Amount Bid (Schedule "A" and "B") \$ _____

BASIS OF AWARD

The Bidder understands that the Contract will be awarded to the most qualified bidder with the lowest Total Amount Bid Schedules "A" and "B". Bid Schedules may be awarded separately within 90 days of the bid opening or as Grant Funding becomes available.

PAYMENT SCHEDULE

A detailed payment schedule for each structure or unit shall be submitted by the successful low Bidder. The successful low Bidder shall meet with the Engineer and Owner, to review the format and details of the payment schedule. This meeting shall be held within 5 days of notification that the Contractor is the low Bidder. The purpose of the meeting shall be to establish an acceptable format for the payment schedule. The construction detailed payment schedule shall be completed by the Contractor 14 days after the meeting and submitted to the Engineer and Owner for review and approval. Failure of the Contractor to submit the payment schedule as required may result in the Owner's rejection of the Bid or delay in processing the Contractor's request for a progress payment.

SUBCONTRACTORS

The Bidder further certifies that proposals from the following subcontractors were used in the preparation of this Bid; and if awarded a contract, Bidder agrees to not enter into Contracts with others for these divisions of the Work without written approval from the Owner and Engineer.

Subcontractor

Arkansas Contractor License #

Street Address, City, State, Zip Code

Subcontractor

Arkansas Contractor License #

Street Address, City, State, Zip Code

Subcontractor

Arkansas Contractor License #

Street Address, City, State, Zip Code

Subcontractor

Arkansas Contractor License #

Street Address, City, State, Zip Code

SUPPLIERS/VENDORS

The Bidder shall list the suppliers/vendors where material for this Project will be purchased from and successful Bidder shall updated suppliers/vendors during construction of the Project.

<hr/> Supplier/Vendor Name <hr/>	<hr/> Supplier/Vendor Name <hr/>
<hr/> Street Address, City, State, Zip Code <hr/>	<hr/> Street Address, City, State, Zip Code <hr/>
<hr/> Phone Number <hr/>	<hr/> Phone Number <hr/>
<hr/> Supplier/Vendor Name <hr/>	<hr/> Supplier/Vendor Name <hr/>
<hr/> Street Address, City, State, Zip Code <hr/>	<hr/> Street Address, City, State, Zip Code <hr/>
<hr/> Phone Number <hr/>	<hr/> Phone Number <hr/>

PERFORMANCE OF WORK BY CONTRACTOR

The Bidder shall perform at least 30 percent of the work with his own forces (refer to Paragraph 24, INSTRUCTIONS TO BIDDERS. Bids from so called "Brokerage Contractors" will not be considered.) List below the items that the Bidder will perform with his own forces, if awarded this Contract, and fill in the blank showing the estimated total cost of these items.

Estimated total cost of the above items the Bidder states that will be performed with his own forces, if awarded Contract:

_____ Dollars (\$ _____)
(Words)

EXPERIENCE OF BIDDER

The Bidder states that he is an experienced Contractor and has completed similar projects within the last 5 years. (List similar projects, with types, names of clients, construction costs, and references with telephone numbers. Use additional sheets if necessary.)

SURETY

If the Bidder is awarded a construction Contract on this Bid, the Surety who provides the Performance and Payment Bond will be:

_____ whose address is:

Street, City, State Zip Code

BIDDER

The name of the Bidder submitting this Bid is:

_____ doing business at:

Street, City, State, Zip Code

which is the address to which all communications concerned with this Bid and with the Contract shall be sent.

The names of the principal officers of the corporation submitting this Bid, or of the partnership, or of all persons interested in this Bid as principals are as follows:

If Sole Proprietor or Partnership

IN WITNESS hereto the undersigned has set his (its) hand this ____ day of _____, 20__.

Signature of Bidder

Title

If Corporation

IN WITNESS WHEREOF the undersigned corporation has caused this instrument to be executed and its seal affixed by its duly authorized officers this ____ day of _____, 20__.

Name of Corporation

(SEAL)

By _____

Title _____

Attest _____

Secretary

DBE Form #1

Bidder's Questionnaire	
Sponsor's Name:	
Airport Name:	
City, State:	
AIP Number:	
Federal Fiscal Year:	

**In accordance with Section 26.11 Record Keeping Requirements-
Bidders List: 26.11 (C), this form shall be completed by each firm
and all subcontractors quoting on the project as indicated above.**

Name of Bidder	Address	DBE Status (Check Box as applicable)	Age of Firm	Type(s) of Work	Annual Gross Receipts (Check Box as applicable)
		<input type="checkbox"/> DBE <input type="checkbox"/> Non DBE <input type="checkbox"/> SBE			<input type="checkbox"/> Less than \$500,000 <input type="checkbox"/> \$500,000-\$1 million <input type="checkbox"/> \$1 million-\$2 million <input type="checkbox"/> \$2 million-\$5 million <input type="checkbox"/> \$5 million and above
		<input type="checkbox"/> DBE <input type="checkbox"/> Non DBE <input type="checkbox"/> SBE			<input type="checkbox"/> Less than \$500,000 <input type="checkbox"/> \$500,000-\$1 million <input type="checkbox"/> \$1 million-\$2 million <input type="checkbox"/> \$2 million-\$5 million <input type="checkbox"/> \$5 million and above
		<input type="checkbox"/> DBE <input type="checkbox"/> Non DBE <input type="checkbox"/> SBE			<input type="checkbox"/> Less than \$500,000 <input type="checkbox"/> \$500,000-\$1 million <input type="checkbox"/> \$1 million-\$2 million <input type="checkbox"/> \$2 million-\$5 million <input type="checkbox"/> \$5 million and above
		<input type="checkbox"/> DBE <input type="checkbox"/> Non DBE <input type="checkbox"/> SBE			<input type="checkbox"/> Less than \$500,000 <input type="checkbox"/> \$500,000-\$1 million <input type="checkbox"/> \$1 million-\$2 million <input type="checkbox"/> \$2 million-\$5 million <input type="checkbox"/> \$5 million and above
		<input type="checkbox"/> DBE <input type="checkbox"/> Non DBE <input type="checkbox"/> SBE			<input type="checkbox"/> Less than \$500,000 <input type="checkbox"/> \$500,000-\$1 million <input type="checkbox"/> \$1 million-\$2 million <input type="checkbox"/> \$2 million-\$5 million <input type="checkbox"/> \$5 million and above
		<input type="checkbox"/> DBE <input type="checkbox"/> Non DBE <input type="checkbox"/> SBE			<input type="checkbox"/> Less than \$500,000 <input type="checkbox"/> \$500,000-\$1 million <input type="checkbox"/> \$1 million-\$2 million <input type="checkbox"/> \$2 million-\$5 million <input type="checkbox"/> \$5 million and above
		<input type="checkbox"/> DBE <input type="checkbox"/> Non DBE <input type="checkbox"/> SBE			<input type="checkbox"/> Less than \$500,000 <input type="checkbox"/> \$500,000-\$1 million <input type="checkbox"/> \$1 million-\$2 million <input type="checkbox"/> \$2 million-\$5 million <input type="checkbox"/> \$5 million and above

DBE Form #2

Monitoring & Enforcement: Verification to Ensure Work Committed to DBE's at Contract Award is Performed by DBE's	
Sponsor's Name:	
Airport Name:	
City, State:	
AIP Number:	
Federal Fiscal Year:	

In Accordance with Section 26.37 Monitoring and Enforcement Mechanisms, the following detailed list shall be completed by the Prime Contractor. Note to Prime Contractor: Copies of paid invoices to DBE contractors shall be submitted to the Sponsor for monitoring purposes.

DBE Firms to be Utilized (Name, Address, Phone)	Work to be Performed	Total Estimated Cost of Work								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20%;">Name</td><td></td></tr> <tr><td>Address</td><td></td></tr> <tr><td>City, St, Zip</td><td></td></tr> <tr><td>Telephone</td><td></td></tr> </table>	Name		Address		City, St, Zip		Telephone			
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City, St, Zip										
Telephone										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20%;">Name</td><td></td></tr> <tr><td>Address</td><td></td></tr> <tr><td>City, St, Zip</td><td></td></tr> <tr><td>Telephone</td><td></td></tr> </table>	Name		Address		City, St, Zip		Telephone			
Name										
Address										
City, St, Zip										
Telephone										

DBE Form #3

Schedule of DBE Participation
(Must be submitted at the time of bid)

(Name of Prime Contractor) _____ Bid No. _____

NAME OF DBE CONTRACTOR	ADDRESS	TYPE OF WORK (ELECTRICAL, PAVING, ETC.) AND CONTRACT ITEMS OR PARTS THEREOF TO BE PERFORMED	REASON UNAVAILABLE	AGREED PRICE

The failure to submit this form at the time of bid submission is a ground for rejection of the bid. The making of a material misrepresentation of fact is a ground for consideration of disqualification.

NOTE: This document will become a binding, contractual agreement when signed by both the prime contractor and the disadvantaged business contractor.

(Signature of Prime Contractor Official)	(Signature of DBE Firm Official)
(Date)	Date: _____
	Date: _____
	Date: _____
	Date: _____

DBE Form #4

LETTER OF INTENT

Name of bidder/offeror's firm: _____

Address: _____

City: _____ State: _____ Zip: _____

Name of DBE firm: _____

Address: _____

City: _____ State: _____ Zip: _____

Telephone: _____

Description of work to be performed by DBE firm:

The bidder/offeror is committed to utilizing the above-named DBE firm for the work described above. The estimated dollar value of this work is \$ _____.

Affirmation

The above-named DBE firm affirms that it will perform the portion of the contract for the estimated dollar value as stated above.

By _____
(Signature) (Title)

If the bidder/offeror does not receive award of the prime contract, any and all representations in this Letter of Intent and Affirmation shall be null and void.

[Submit this page for each DBE subcontractor.]

DBE Form #5

Demonstration of Good Faith Efforts

DISADVANTAGED BUSINESS ENTERPRISE (DBE) UTILIZATION

The undersigned bidder/offeror has satisfied the requirements of the bid specification in the following manner (please check the appropriate space):

_____ The bidder/offeror is committed to a minimum of _____ % DBE utilization on this contract.

_____ The bidder/offeror (if unable to meet the DBE goal of _____%) is committed to a minimum of _____% DBE utilization on this contract and should submit documentation demonstrating good faith efforts.

Name of bidder/offeror's firm: _____

State Registration No. _____

By _____
(Signature) Title

DBE Form #6

**Schedule of DBE Unavailability
(Must be submitted at the time of bid)**

 Bid No. _____
 (Name of Prime Contractor)

NAME OF DBE CONTRACTOR	ADDRESS	TYPE OF WORK (ELECTRICAL, PAVING, ETC.) AND CONTRACT ITEMS OR PARTS THEREOF TO BE PERFORMED	REASON UNAVAILABLE

The undersigned certifies that the above DBE(s) was/were contacted, in good faith, and the said DBE(s) was/were unable to submit an acceptable responsive bid. Failure to fill out DBE forms is a ground for rejection of the bid. The making of a material misrepresentation of fact is a ground for consideration for disqualification.

DATE: _____ SIGNATURE: _____ TITLE: _____

DBE Form #7

Certification of Lack of DBE Availability

I, _____, _____
(Name) (Title)

of _____
(Prime or General Bidder)

certify that on _____ I contacted the following disadvantaged
(Date)

Contractor to obtain a bid for work to be performed on the following contract

(Name and/or Number of Contract)

DBE Contractor		Work Items Sought
Name:		
Address:		
Phone:		

To the best of my knowledge and belief, said disadvantaged contractor was unavailable (exclusive of unavailability due to lack of agreement on price for work on this project, or unable to prepare a bid for the following reasons:

Signature _____

Date _____

_____ was offered an opportunity to bid on the
(Name of DBE Business)

above-identified work on _____ by _____
(Date) (Source)

The above statement is a true and accurate account of why I did not submit a bid on this project.

Signature of DBE Contractor: _____

Title: _____

Date: _____

DOCUMENT 00 43 13

BID BOND

STATE OF ARKANSAS

KNOW ALL MEN BY THESE PRESENTS, that we:

Principal and Contractor, and _____

hereinafter called Surety, are held and firmly bound unto the **City of Corning, Arkansas** and represented by its Mayor and City Council, hereinafter called Owner, in the sum of

_____ DOLLARS (\$ _____)

lawful money of the United States of America, for the payment of which well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, by these presents.

WHEREAS, the Principal contemplates submitting or has submitted a bid to the Owner for the furnishing of all labor, materials (except those to be specifically furnished by the Owner), equipment, machinery, tools, apparatus, means of transportation for, and the performance of the work covered in the Bid and the detailed Drawings and Specifications, entitled:

**CORNING MUNICIPAL AIRPORT (4M9) CONSTRUCT TERMINAL BUILDING –
23-5837
Corning, Arkansas**

WHEREAS, it was a condition precedent to the submission of said bid that a cashier's check, certified check, or bid bond in the amount of 5 percent of the base bid be submitted with said bid as a guarantee that the Bidder would, if awarded the Contract, enter into a written Contract with the Owner for the performance of said Contract within 15 consecutive calendar days after written notice having been given of the award of the Contract.

NOW, THEREFORE, the conditions of this obligation are such that if the Principal within 15 consecutive calendar days after written notice of such acceptance enters into a written Contract with the Owner and furnishes a Contract Surety Bond in an amount equal to 100 percent of the base bid, satisfactory to the Owner, then this obligation shall be void; otherwise the sum herein stated shall be due and payable to the Owner and the Surety herein agrees to pay said sum immediately upon demand of the Owner in good and lawful money of the United States of America, as liquidated damages for failure thereof of said Principal.

IN WITNESS WHEREOF, the said _____, as Principal herein,
has caused these presents to be signed in its name by its _____
and attested by its _____ under its corporate seal, and the
said _____ as Surety herein, has caused
these presents to be signed in its name by its _____
_____ under its corporate seal, this _____ day of _____ A.D., 20__.

Signed, sealed and delivered
in the presence of:

Principal-Contractor

By _____

As to Principal

Title

Surety

Attorney-in-Fact
(Power-of-Attorney to be Attached)

As to Surety

By _____
Agent

DOCUMENT 00 51 00
NOTICE OF AWARD

TO:

**PROJECT: CORNING MUNICIPAL AIRPORT (4M9) CONSTRUCT TERMINAL
BUILDING – 23-5837**

The OWNER has considered the BID submitted by you on April 18, 2024 for the above described WORK in response to its Advertisement for Bids and Instructions to Bidders.

You are hereby notified that your BID has been accepted in the amount of:

_____ Dollars (\$_____)

You are required by the Instructions to Bidders to execute the Contract and furnish the required CONTRACTOR'S Performance BOND, Payment BOND, and certificates of insurance within fifteen (15) calendar days from the date of this Notice to you.

If you fail to execute said Contract and to furnish said BONDS within fifteen (15) days from the date of this Notice, said OWNER will be entitled to consider your bid in default, to annul this Notice of Award and to declare your Bid Security forfeited. 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 _____, 20__.

CORNING, ARKANSAS
Owner

By _____

Title _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged

by _____, this the _____ day of _____, 20__.

By _____

Title _____

DOCUMENT 00 52 13

CONTRACT

PROJECT: CORNING MUNICIPAL AIRPORT (4M9) CONSTRUCT TERMINAL BUILDING

PROJECT NUMBER: 23-5837

THIS AGREEMENT, made and entered into on the ____ day of _____, 20____, by and between _____, herein called the Contractor, and the **City of Corning, Arkansas**, hereinafter called the Owner:

W I T N E S S E T H:

That the Contractor, for the consideration hereinafter fully set out, hereby agrees with the Owner as follows:

1. That the Contractor shall furnish all the materials, and perform all of the work in manner and form as provided by the following enumerated Drawings, Specifications, and Documents, which are attached hereto and made a part hereof, as if fully contained herein and are entitled, **Corning Municipal Airport (4M9) Construct Terminal Building – 23-5837**, dated March, 2024.

Advertisement for Bids	Payment Bond
Instructions to Bidders	General Conditions
Bid and Acceptance Thereof	Supplemental Conditions
Performance Bond	Specifications
	Drawings (See Sheet Index below)

SHEET INDEX

<u>Sheet No.</u>	<u>Description</u>
T0.0	Cover Sheet
C1.0	Construction Safety and Phasing Plan – Phase I
C1.1	Construction Safety and Phasing Plan – Phase II
C2.0	Topographic Survey
C3.0	Site Overview
C4.0	Demolition and Erosion Control Plan
C5.0	Site Layout
C5.1	Coordinate Plan
C6.0	Grading and Drainage Plan
C6.1	Drainage Plan and Profiles
C7.0	Utility Plan
C8.0	Miscellaneous Details I
C8.1	Miscellaneous Details II

SHEET INDEX

<u>Sheet No.</u>	<u>Description</u>
<u>ARCHITECTURAL</u>	
A0.1	Architectural Site Plan
A1.0	Floor Plans
A1.1	Interiors
A1.2	Details
A2.0	Building Elevations & Section
<u>STRUCTURAL</u>	
S1.1	Structural Plans & General Notes
S2.1	Foundation Sections
<u>MECHANICAL</u>	
M1.1	HVAC Notes and Legend
M3.1	HVAC Details
<u>PLUMBING</u>	
P1.1	Plumbing Notes and Legend
<u>ELECTRICAL</u>	
E1.1	Electrical Notes and Legend

2. That the Owner hereby agrees to pay to the Contractor for the faithful performance of this Agreement in lawful money of the United States, the amount of:

_____ Dollars (\$_____).

3. The Work will be completed and ready for final payment in accordance with the General Conditions within 120 days after the date when the Contract Time commences to run as provided in Notice to Proceed.
4. Liquidated Damages: Owner and Contractor recognize that time is of the essence of this Agreement and the Owner will suffer financial loss if the Work is not completed within the time specified in above, plus any extensions thereof allowed in accordance with the General Conditions. They also recognize the delays, expense, and difficulties involved in proving the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay Owner Three Hundred and Fifty Dollars (\$350.00) for each day that expires after the time specified in Paragraph 3 for completion and readiness for final payment.
5. That within 30 days of receipt of an approved payment request, the Owner shall make partial payments to the Contractor on the basis of a duly certified and approved estimate of work performed during the preceding calendar month by the Contractor, LESS the retainage provided in the General Conditions, which is to be withheld by the Owner until all work

within a particular part has been performed strictly in accordance with this Agreement and until such work has been accepted by the Owner.

6. That the Contractor agrees to pay each Subcontractor under this prime contract for satisfactory performance of its contract no later than 30 days from the receipt of each partial payment the prime contractor receives from the Owner. The prime contractor agrees further to return retainage payments to each subcontractor within 30 days after the subcontractor's work is satisfactorily completed. A subcontractor's work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished and documented as required by the Owner. When the Owner has made an incremental acceptance of a portion of a prime contract, the work of a subcontractor covered by that acceptance is deemed to be satisfactorily completed.
7. That upon submission by the Contractor of evidence satisfactory to the Owner that all payrolls, material bills, and other costs incurred by the Contractor in connection with the construction of the work have been paid in full, final payment on account of this Agreement shall be made within 60 days after the completion by the Contractor of all work covered by this Agreement and the acceptance of such work by the Owner.
8. It is further mutually agreed between the parties hereto that if, at any time after the execution of this Agreement and the Surety Bond hereto attached for its faithful performance and payment, the Owner shall deem the Surety or Sureties upon such bond to be unsatisfactory or if, for any reason such bond ceases to be adequate to cover the performance of the work, the Contractor shall, at his expense, within 5 days after the receipt of notice from the Owner, furnish an additional bond or bonds in such form and amount and with such Surety or Sureties as shall be satisfactory to the Owner. In such event, no further payment to the Contractor shall be deemed to be due under this Agreement until such new or additional security for the faithful performance of the work shall be furnished in manner and form satisfactory to the Owner.
9. No additional work or extras shall be done unless the same shall be duly authorized by appropriate action by the Owner in writing.
10. The Owner and Contractor agree that any controversy or claim arising out of or relating to the Contract, or breach thereof, shall be settled by arbitration administered by the American Arbitration Association under its Construction Industry Arbitration Rules, and judgement on the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the day and date first above written, in three (3) counterparts, each of which shall, without proof or accounting for the other counterpart be deemed an original Contract.

SEAL:

CONTRACTOR

WITNESSES:

By _____

Title

CORNING, ARKANSAS
OWNER

ATTEST:

By _____

Clerk

Title

Approved as to form:

Attorney for Owner

DOCUMENT 00 55 00
NOTICE TO PROCEED

TO:

PROJECT: CORNING MUNICIPAL AIRPORT (4M9) CONSTRUCT TERMINAL BUILDING – 23-5837

You are hereby notified to commence WORK in accordance with the Contract dated _____ on or before _____, and you are to complete the WORK within 120 consecutive calendar days thereafter. The date of completion of all WORK is therefore _____, 20____.

CORNING, ARKANSAS
Owner

By _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by

_____, this the _____ day of _____ 20____.

By _____

Title _____

SECTION 00 61 13.13 - PERFORMANCE BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (*Name and Address*): SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

City of Corning
308 SW 2nd Street
Corning, Arkansas 72422

CONTRACT

Effective Date of Agreement:

Amount:

Description (*Name and Location*): **CORNING MUNICIPAL AIRPORT (4M9) CONSTRUCT
TERMIANL BUILDING – 23-5837**

BOND

Bond Number:

Date (*Not earlier than Effective Date
of Agreement*):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner for the performance of the Contract, which is incorporated herein by reference.

1. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 2.1.
2. If there is no Owner Default, Surety's obligation under this Bond shall arise after:
 - 2.1 Owner has notified Contractor and Surety, at the addresses described in Paragraph 9 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor, and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and
 - 2.2 Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 2.1; and
 - 2.3 Owner has agreed to pay the Balance of the Contract Price to:
 1. Surety in accordance with the terms of the Contract; or
 2. Another contractor selected pursuant to Paragraph 3.3 to perform the Contract.
3. When Owner has satisfied the conditions of Paragraph 2, Surety shall promptly, and at Surety's expense, take one of the following actions:
 - 3.1 Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or
 - 3.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
 - 3.3 Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 5 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or
 - 3.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
 1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
 2. Deny liability in whole or in part and notify Owner citing reasons therefor.
4. If Surety does not proceed as provided in Paragraph 3 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 3.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.
5. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 3.1, 3.2, or 3.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To the limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

- 5.1 The responsibilities of Contractor for correction of defective Work and completion of the Contract;
- 5.2 Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions of or failure to act of Surety under Paragraph 3; and
- 5.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.

6. Surety shall not be liable to Owner or others for obligations of Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, or successors.

7. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.

8. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located, and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

9. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.

10. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

11. Definitions.

- 11.1 Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.
- 11.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
- 11.3 Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
- 11.4 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – *(Name, Address and Telephone)*

Surety Agency or Broker:

Owner's Representative *(Engineer or other party)*:

SECTION 00 61 13.16 - PAYMENT BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*: City of Corning, 308 SW 2nd Street, Corning, Arkansas 72422

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location)*: **CORNING MUNICIPAL AIRPORT (4M9) CONSTRUCT TERMINAL BUILDING – 23-5837**

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form: None See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal *(seal)*

Surety's Name and Corporate Seal *(seal)*

By: _____
Signature

By: _____
Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
 - 5.1 Claimants who do not have a direct contract with the Contractor,
 - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2 Pay or arrange for payment of any undisputed amounts.
 - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or

(2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. **Definitions**

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond

shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

Project Payment Request Summary Form Monthly DBE Report

CIP Number: _____

Date: _____

Project Name: _____

Prime Contractor: _____

AIP Project Number	
PFC	

Date of Award: _____ Contract Award Total: _____

Submitted By: _____ Title: _____

Phone: _____ Email: _____

Pay Request Period/Dates: From: _____ To: _____
MM/DD/YY MM/DD/YY

Pay Request Number: _____ Has this contract been completed? YES / NO

The following is a description of payment distributions for the above referenced project:

	Dollar Amount This Period	Contract Dollar Amount to Date
Total amount of payment request:		
Amount payable to the prime contractor:		
Amount payable to subcontractors, excluding DBEs*:		
Amount payable to DBE* subcontractors:		

Itemize payments to DBE* subcontractors below:

Name of DBE* Firm	Dollar Amount This Period	Dollar Amount to Date

For Official Use Only By McClelland Consulting Engineers, Inc., Indicate Modifications or Adjustments to Payment Request

Pay Request Approved By:

Name: _____

Date: _____

McClelland Consulting Engineers, Inc.

Title: _____

*From Arkansas DBE Directory or other Airport approval listing

Contractor's Application for Payment No.

Application Period:	Application Date:
To (Owner):	Via (Engineer):
Project: CORNING MUNICIPAL AIRPORT (4M9) CONSTRUCT TERMINAL BUILDING	Contractor's Project No.: 23-5837
Owner's Contract No.:	Contractor's Project No.:

Application For Payment Change Order Summary

Approved Change Orders Number	Additions	Deductions
TOTALS		
NET CHANGE BY CHANGE ORDERS		

- 1. ORIGINAL CONTRACT PRICE..... \$ _____
- 2. Net change by Change Orders..... \$ _____
- 3. Current Contract Price (Line 1 ± 2)..... \$ _____
- 4. TOTAL COMPLETED AND STORED TO DATE
(Column F on Progress Estimate)..... \$ _____
- 5. RETAINAGE:
 - a. X _____ Work Completed..... \$ _____
 - b. X _____ Stored Material..... \$ _____
 - c. Total Retainage (Line 5a + Line 5b)..... \$ _____
- 6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)..... \$ _____
- 7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)..... \$ _____
- 8. AMOUNT DUE THIS APPLICATION..... \$ _____
- 9. BALANCE TO FINISH, PLUS RETAINAGE
(Column G on Progress Estimate + Line 5 above)..... \$ _____

Contractor's Certification The undersigned Contractor certifies that to the best of its knowledge: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.	Date:
Payment of: \$ _____ is recommended by: _____ (Engineer) _____ (Date) Payment of: \$ _____ is approved by: _____ (Owner) _____ (Date) Approved by: _____ Funding Agency (if applicable) _____ (Date)	

Progress Estimate

Contractor's Application

For (contract):		Application Number:					
Application Period:		Application Date:					
Item Specification Section No.	A Description	B Scheduled Value	C Work Completed		E Materials Presently Stored (not in C or D)	F Total Completed and Stored to Date (C + D + E)	G Balance to Finish (B - F)
			From Previous Application (C+D)	D This Period			
Totals							

Progress Estimate

Contractor's Application

Application Period:		Application Number:									
		Application Date:									
Bid Item No.	Item Description	A			B	C	D	E	F		
		Bid Quantity	Unit Price	Bid Value					Estimated Quantity Installed	Value	Materials Presently Stored (not in C)
Totals											

Stored Material Summary

Contractor's Application

A		B		C		D		E		F		G
Invoice No.	Shop Drawing Transmittal No.	Materials Description	Stored Previously Date (Month/Year)	Stored Previously Amount (\$)	Stored this Month Amount (\$)	Subtotal	Incorporated in Work Date (Month/Year)	Incorporated in Work Amount (\$)	Materials Remaining in Storage (\$)	(D + E - F)		
Totals												

For (contract):

Application Number:

Application Period:

Application Date:

Change Order

No. _____

Date of Issuance: _____

Effective Date: _____

Project: Corning Municipal Airport (4M9) Construct Terminal Building	Owner: City of Corning, Arkansas	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.: 23-5837

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments (list documents supporting change):

CHANGE IN CONTRACT PRICE:

CHANGE IN CONTRACT TIMES:

Original Contract Price:

\$ _____

[Increase] [Decrease] from previously approved
Change Orders No. _____ to No. _____:

\$ _____

Contract Price prior to this Change Order:

\$ _____

[Increase] [Decrease] of this Change Order:

\$ _____

Contract Price incorporating this Change Order:

\$ _____

Original Contract Times: Working days Calendar days

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] from previously approved Change Orders
No. _____ to No. _____:

Substantial completion (days): _____

Ready for final payment (days): _____

Contract Times prior to this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] of this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

Contract Times with all approved Change Orders:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

RECOMMENDED:

By: _____
Engineer (Authorized Signature)

Date: _____

Approved by Funding Agency (if applicable):

ACCEPTED:

By: _____
Owner (Authorized Signature)

Date: _____

ACCEPTED:

By: _____
Contractor (Authorized Signature)

Date: _____

Date: _____

Change Order

Instructions

A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order should be used.

B. COMPLETING THE CHANGE ORDER FORM

Engineer normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies should be sent to Owner or Contractor for approval, depending on whether the Change Order is a true order to the Contractor or the formalization of a negotiated agreement for a previously performed change. After approval by one contracting party, all copies should be sent to the other party for approval. Engineer should make distribution of executed copies after approval by both parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.

Section 00 65 16 - Certificate of Substantial Completion

Project: CORNING MUNICIPAL AIRPORT (4M9) CONSTRUCT TERMINAL BUILDING

Owner: CITY OF CORNING, ARKANSAS

Owner's Contract No.:

Contract:

Engineer's Project No.: 23-5837

This [tentative] [definitive] Certificate of Substantial Completion applies to:

- All Work under the Contract Documents: The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [definitive] list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

- Amended Responsibilities Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

The following documents are attached to and made part of this Certificate:

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by Engineer

Date

Accepted by Contractor

Date

Accepted by Owner

Date

SECTION 00 65 19.16 - LIEN RELEASE

NAME OF GENERAL CONTRACTOR:

PROJECT: CORNING MUNICIPAL AIRPORT (4M9) CONSTRUCT TERMINAL BUILDING

ENGINEER'S PROJECT NUMBER: 23-5837

PAY REQUEST NUMBER: _____

The undersigned Contractor certifies that: (1) all previous progress payments received from OWNER on account of Work done under the Contract referred to above have been applied to discharge in full all obligations of CONTRACTOR incurred in connection with Work covered by prior Applications for Payment numbered 1 through ____ inclusive; (2) title to all Work, materials, labor, and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to OWNER at time of payment free and clear of all (i.e., all stored materials, subcontracted work, labor, materials, equipment, and other items incorporated into Work have been paid to date by the Contractor) liens, claims, security interest, and encumbrances; and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and not *defective* as that term is defined in Contract Documents.

If it is found that material or work has not been paid as sworn on this document, the full amount of the unpaid payment shall be withheld from the next pay estimate, and a check will be prepared by the Owner, made out jointly to the Contractor and the payee for materials or work. The check will be mailed to the payee.

Signed this _____ day of _____, 20____.

Subscribed and Sworn to before me

Contractor

this ____ day of _____, 20____.

By _____

Notary Public

Title _____

My commission expires the _____ day of _____, 20____.

**FEDERAL AVIATION ADMINISTRATION
REQUIREMENTS**

BUY AMERICAN PREFERENCES

(a) The Aviation Safety and Capacity Expansion Act of 1990 provides that preference be given to steel and manufactured products produced in the United States when funds are expended pursuant to a grant issued under the Airport Improvement Program. The following terms apply:

1. Steel and manufactured products. As used in this clause, steel and manufactured products include (1) steel produced in the United States or (2) a manufactured product produced in the United States, if the cost of its components mined, produced or manufactured in the United States exceeds 60 percent of the cost of all its components and final assembly has taken place in the United States. Components of foreign origin of the same class or kind as the products referred to in subparagraphs b. (1) or (2) shall be treated as domestic.
2. Components. AS used in this clause, components mean those articles, materials, and supplies incorporated directly into steel and manufactured products.
3. Cost of Components. This means the costs for production of the components, exclusive of final assembly labor costs.

(b) The successful bidder will be required to assure that only domestic steel and manufactured products will be used by the Contractor, subcontractors, materialmen and suppliers in the performance of this contract, except those:

1. that the US Department of Transportation has determined, under the Aviation Safety and Capacity Expansion Act of 1990, are not produced in the United States in sufficient and reasonably available quantities and of satisfactory quality;
2. that the US Department of Transportation has determined, under the Aviation Safety and Capacity Expansion Act of 1990, that domestic preference would be inconsistent with the public interest; or
3. that inclusion of domestic material will increase the cost of the overall project contract by more than 25 percent.

BUY AMERICAN CERTIFICATE

By submitting a bid/proposal under this solicitation, except for those items listed by the offeror below or on a separate and clearly identified attachment to this bid/proposal, the offeror certifies that steel and each manufactured product, are produced in the United States, as defined in the clause Buy American – Steel and Manufactured Products for Construction Contracts and that components of unknown origin are considered to have been produced or manufactured outside the United States.

Offerors may obtain from the owner a listing of articles, materials and supplies excepted from this provision.

Product	Country of Origin

Application

Incorporate into all construction and equipment procurements. Paragraphs (a) and (b) should be placed in the solicitation. The Buy American certificate should be placed in the contract documents.

CIVIL RIGHTS ACT OF 1964, TITLE VI – CONTRACTOR CONTRACTUAL REQUIREMENTS

During the performance of this contract, the contractor, for itself, its assignees and successors in the interest (hereinafter referred to as the “contractor”) agrees as follows:

- 1.1 Compliance with Regulations.** The contractor shall comply with the Regulations relative to

nondiscrimination in federally assisted programs of the Department of Transportation (hereinafter, "DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

1.2 Nondiscrimination. The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

1.3 Solicitations for Subcontracts, Including Procurements of Material and Equipment. In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

1.4 Information and Reports. The contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto and shall permit access to its books, records, accounts, other sources of information and its facilities as may be determined by the Sponsor or the Federal Aviation Administration (FAA) to be pertinent to ascertain compliance with such Regulations, orders, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refused to furnish this information, the contractor shall so certify to the sponsor or the FAA, as appropriate, and shall set forth what efforts it has made to obtain the information.

1.5 Sanctions for Noncompliance. In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the sponsor shall impose such contract sanctions as it or the FAA may determine to be appropriate, including, but not limited to:

- a. Withholding of payments to the contractor under the contract until the contractor complies, and/or
- b. Cancellation, termination, or suspension of the contract, in whole or in part.

1.6 Incorporation of Provisions. The contractor shall include the provisions of paragraphs 1 through 5 in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the sponsor or the FAA may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the Sponsor to enter into such litigation to protect the interests of the sponsor and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

Application

Required in all contracts and subcontracts

AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, SECTION 520 – GENERAL CIVIL RIGHTS PROVISIONS

The contractor assures that it will comply with pertinent statutes, Executive orders and such rules as are promulgated to assure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or handicap be excluded from participating in any activity conducted with or benefiting from Federal assistance. This provision obligates the tenant/concessionaire/lessee or its transferee for the period during which Federal assistance is extended to the airport a program, except where Federal assistance is to

provide, or is in the form of personal property or real property or interest therein or structures or improvements thereon. In these cases the provision obligates the party or any transferee for the longer of the following periods: (a) the period during which the property is used by the airport sponsor or any transferee for a purpose for which Federal assistance is extended, or for another purpose involving the provision of similar services or benefits or (b) the period during which the airport sponsor or any transferee retains ownership or possession of the property. In the case of contractors, this provision binds the contractors from the bid solicitation period through the completion of the contract. This provision is in addition to that required of Title VI of the Civil Rights Act of 1964.

Application

Incorporate in all contracts funded under AIP

LOBBYING AND INFLUENCING FEDERAL EMPLOYEES

(1) No Federal appropriated funds shall be paid, by or on behalf of the contractor, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the making of any Federal grant and the amendment or modification of any Federal grant.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any Federal grant, the contractor shall complete and submit Standard Form-LLL, "Disclosure of Lobby Activities," in accordance with its instruction.

Application

Required in all contracts and subcontracts

ACCESS TO RECORDS AND REPORTS

The Contractor shall maintain an acceptable cost accounting system. The Contractor agrees to provide the Sponsor, the Federal Aviation Administration and the Comptroller General of the United States or any of their duly authorized representative's access to any books, documents, papers, and records of the contractor which are directly pertinent to the specific contract for the purpose of making audit, examination, excerpts and transcriptions. The Contractor agrees to maintain all books, records and reports required under this contract for a period of not less than three years after final payment is made and all pending matters are closed.

Application

Incorporate into all procurement contracts that funded by AIP funds

DISADVANTAGED BUSINESS ENTERPRISES

Contract Assurance (§26.13) – The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy, as the recipient deems appropriate.

Prompt Payment (§26.29) – The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than **14** days from the receipt of each payment the prime contractor receives from **Corning Municipal Airport**. The prime contractor agrees further to return retainage payments to each subcontractor within 14 days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for

good cause following written approval of the *Corning Municipal Airport*. This clause applies to both DBE and non-DBE subcontractors.

Application

The contract assurance clause shall be incorporated verbatim. The prompt payment clause represents sample language that meets the requirements of 49 CFR Part 26.29. Recipients should refer to the language included their approved DBE program.

ENERGY CONSERVATION REQUIREMENTS

The Contractor agrees to comply with mandatory standards and policies relating to energy efficiency that are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Public Law 94-163)

Application

The regulation does not prescribe the language for the requirement. The above clause represents sample language that meets the intent of 49 CFR Part 18.36(i)(13)

BREACH OF CONTRACT TERMS

Any violation or breach of terms of this contract on the part of the contractor or their subcontractors may result in the suspension or termination of this contract or such other action that may be necessary to enforce the rights of the parties of this agreement. The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

Application

The FAA does not prescribe the exact language to be incorporated. The above clause represents sample language that addresses the requirements of 49 CFR Part 18.36(i)(1). This provision requires grantees to incorporate administrative, contractual or legal remedies in instances where contractors violate or breach contract terms. Grantees should consult with their legal counsel to develop the appropriate clause that meets the minimum requirements of 49 CFR Part 18.36.

This provision is required in all contracts that exceed the simplified acquisition threshold, presently set at \$100,000.

RIGHTS TO INVENTIONS

All rights to inventions and materials generated under this contract are subject to regulations issued by the FAA and the Sponsor of the Federal grant under which this contract is executed.

Application

Incorporate into all procurement contracts that funded by AIP funds

TRADE RESTRICTION CLAUSE

The contractor or subcontractor, by submission of an offer and/or execution of a contract, certifies that it:

- a. is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms published by the Office of the United States Trade Representative (USTR);
- b. has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country on said list, or is owned or controlled directly or indirectly by one or more citizens or nationals of a foreign country on said list;

- c. has not procured any product nor subcontracted for the supply of any product for use on the project that is produced in a foreign country on said list.

Unless the restrictions of this clause are waived by the Secretary of Transportation in accordance with 49 CFR 30.17, no contract shall be awarded to a contractor or subcontractor who is unable to certify to the above. If the contractor knowingly procures or subcontracts for the supply of any product or service of a foreign country on said list for use on the project, the Federal Aviation Administration may direct through the Sponsor cancellation of the contract at no cost to the Government.

Further, the contractor agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in each contract and in all lower tier subcontracts. The contractor may rely on the certification of a prospective subcontractor unless it has knowledge that the certification is erroneous.

The contractor shall provide immediate written notice to the sponsor if the contractor learns that its certification or that of a subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances. The subcontractor agrees to provide written notice to the contractor if at any time it learns that its certification was erroneous by reason of changed circumstances.

This certification is a material representation of fact upon which reliance was placed when making the award. If it is later determined that the contractor or subcontractor knowingly rendered an erroneous certification, the Federal Aviation Administration may direct through the Sponsor cancellation of the contract or subcontract for default at no cost to the Government.

Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by this provision. The knowledge and information of a contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

This certification concerns a matter within the jurisdiction of an agency of the United States of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code, Section 1001.

Application

Incorporate into all contracts funded by AIP.

VETERAN'S PREFERENCE

In the employment of labor (except in executive, administrative, and supervisory positions), preference shall be given to Veterans of the Vietnam era and disabled veterans as defined in Section 515(c)(1) and (2) of the Airport and Airway Improvement Act of 1982. However, this preference shall apply only where the individuals are available and qualified to perform the work to which the employment relates.

Application

Incorporate into all construction contracts financed under the AIP program.

DAVIS BACON REQUIREMENTS

1. Minimum Wages

- (i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalent thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of

any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 20 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; *Provided*, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can easily be seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

- (1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
- (2) The classification is utilized in the area by the construction industry; and
- (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii) (B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided*, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The Federal Aviation Administration or the Sponsor shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of work, all or part of the wages required by the contract, the Federal Aviation Administration may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and Basic Records

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the Federal Aviation Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under paragraph 5.5(a)(3)(i) above. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be maintained under paragraph (3)(i) above and that such information is correct and complete;

(2) That each laborer and mechanic (including each helper, apprentice and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (3)(i) of this section available for inspection, copying or transcription by authorized representatives of the Sponsor, the Federal Aviation Administration or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentices' level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize

apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

5. Compliance with Copeland Act Requirements.

The contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

6. Subcontracts.

The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR Part 5.5(a)(1) through (10) and such other clauses as the Federal Aviation Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR Part 5.5

7. Contract Termination: Debarment.

A breach of the contract clauses in paragraph 1 through 10 of this section may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements.

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes Concerning Labor Standards.

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of Eligibility.

- (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

Application

Incorporate into all construction contracts and subcontracts that exceed \$2,000 and are financed under the AIP program.

EQUAL EMPLOYMENT OPPORTUNITY – 41 CFR PART 60-1.4(b)

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of 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 to be provided setting forth the provisions of this nondiscrimination clause.
2. The contractor will, in all solicitations or advertisement for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.
3. The contractor will send to each labor union or representative of workers with which s/he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.
5. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
6. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedure authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
7. The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provision, including sanctions for noncompliance: *Provided,*

however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the contractor may request the United States to enter into such litigation to protect the interests of the United States.

Application

Incorporate in all construction contracts and subcontracts that exceed \$10,000.

CERTIFICATION OF NONSEGREGATED FACILITIES – 41 CFR PART 60-1.8

Notice to Prospective Federally Assisted construction contractors

1. A Certification of Non-segregated Facilities shall be submitted prior to the award of a federally-assisted construction contract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity Clause.
2. Contractors receiving federally-assisted construction contract awards exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of the following notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed \$10,000 and are not exempt from the provisions of the Equal Opportunity Clause. NOTE: The penalty for making false statement in offers is prescribed in 18 U.S.C. 1001.

Notice to Prospective Subcontractors of Requirements for Certification of Non-Segregated Facilities

1. A Certification of Non-segregated Facilities shall be submitted prior to the award of a subcontract exceeding \$10,000, which is not exempt from the provisions of the Equal Opportunity Clause.
2. Contractors receiving subcontract awards exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of this notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed \$10,000 and are not exempt from the provisions of the Equal Opportunity Clause. NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

CERTIFICATION ON NONSEGREGATED FACILITIES

The federally-assisted construction contractor certifies that she or he does not maintain or provide, for his employees, any segregated facilities at any of his establishments and that she or he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally-assisted construction contractor certifies that she or he will maintain or provide, for his employees, segregated facilities at any of his establishments and that she or he will not permit his employees to perform their services at any location under his control where segregated facilities are maintained. The federally-assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this contract.

As used in this certification, the term “segregated facilities” means any waiting rooms, work areas, restrooms, and washrooms, restaurants and other eating areas, timeclocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directives or are, in fact, segregated on the basis of race, color, religion, or national origin because of habit, local custom, or any other reason. The federally-assisted construction contractor agrees that (except where she or he has obtained identical certifications from proposed subcontractors for specific time periods) she or he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause and that she or he will retain such certifications in his files.

Application

Incorporate in all construction contracts and subcontracts that exceed \$10,000. The notices should be placed within the solicitation for proposals. The actual certification should be incorporated in the contract agreement.

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION – 41 CFR PART 60-2

1. The Offeror’s or Bidder’s attention is called to the “Equal Opportunity Clause” and the “Standard Federal Equal Employment Opportunity Construction Contract Specifications” set for herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor’s aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables

Goals for minority participation for each trade (Vol. 45 Federal Register pg. 65984 10/3/80)

Goals for female participation in each trade (6.9%)

These goals are applicable to all the contractor’s construction work (whether or not it is Federal or federally-assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its Federally involved and non-federally involved construction.

The contractor’s compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training shall be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from contractor to contractor or from project to project, for the sole purpose of meeting the contractor’s goals, shall be a violation of the contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The contractor shall provide written notification to the Director, OFCCP, within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of subcontract; and the geographical area in which the subcontract is to be performed.

4. As used in this notice and in the contract resulting from this solicitation, the “covered area” is [insert description of the geographical areas where the contract is to be performed giving the state, county, and city, if any.

Application

Incorporate in all construction contracts and subcontracts that exceed \$10,000. This notice should be placed within the solicitation for proposals. The goals for minority participation are dependent upon the Economic Area (EA) and Standard Metropolitan Statistical Area (SMSA). Refer to Volume 45 of the Federal Register dated 10/3/80. Page 65984 contains a table listed all EA and SMSA and their associated minority goals. The 6.9% for female participation represents a national goal.

**STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION
CONTRACT SPECIFICATIONS – 41 CFR Part 60.4.3**

1. As used in these specifications:

- a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
- b. "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, or any person to whom the Director delegates authority;
- c. "Employer Identification number" means the Federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;
- d. "Minority" includes:
 - (1) Black (all) persons having origins in any of the Black African racial groups not of Hispanic origin;
 - (2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin regardless of race);
 - (3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - (4) American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors shall be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The contractor shall implement the specific affirmative action standards provided in paragraphs 18.7a through 18.7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the contractor should reasonable be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in a geographical area where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement nor the failure by a union with whom the contractor has a collective bargaining agreement to refer either minorities or women shall excuse the contractor's obligations under these specifications. Executive Order 11246 or the regulations promulgated pursuant thereto.

6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees shall be employed by the contractor during the training period and the

contractor shall have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees shall be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the contractor's employees are assigned to work. The contractor, where possible, will assign two or more women to each construction project. The contractor shall specifically ensure that all foreman, superintendents, and other onsite supervisory personnel are aware of and carry out the contractor's obligation to maintain such a working environment with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason therefore along with whatever additional actions the contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the contractor has a collective bargaining agreement has not referred to the contractor a minority person or female sent by the contractor, or when the contractor has other information that the union referral process has impeded the contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship trainee programs relevant to the contractor's employment needs, especially those programs funded or approved by the Department of Labor. The contractor shall provide notice of these programs to the sources complied under 7b above.

f. Disseminate the contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such as superintendents, general foreman, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to

and discussing the contractor's EEO policy with other contractors and subcontractors with whom the contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students; and to minority and female recruitment and training organizations serving the contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations, such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable provide after school, summer, and vacation employment to minority and female youth both on site and in other areas of a contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are non-segregated except that separate or single user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations, which assist in fulfilling one or more of their affirmative action obligations (18.7a through 18.7p). The efforts of a contractor association, joint contractor union, contractor community, or other similar groups of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 18.7a through 18.7p of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the contractor. The obligation to comply, however, is the contractor's and failure of such a group to fulfill an obligation shall not be a defense for the contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, if the particular group is employed in a substantially disparate manner (for example, even though the contractor has achieved its goals for women generally,) the contractor may be in violation of the Executive Order if a specific minority group of women is underutilized.

10. The contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The contractor shall not enter into any subcontract with any person or firm debarred from Government

contracts pursuant to Executive Order 11246.

12. The contractor shall carry out such sanctions and penalties for violation of these specifications and of the equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 18.7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the director shall proceed in accordance with 41 CFR 60-4.8.

14. The contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include, for each employee, identification, number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

Application

Incorporate in all construction contracts and subcontracts that exceed \$10,000. This provision shall be included in the solicitation and the contract agreement.

TERMINATION OF CONTRACT

- a. The Sponsor may, by written notice, terminate this contract in whole or in part at any time, either for the Sponsor's convenience or because of failure to fulfill the contract obligations. Upon receipt of such notice services shall be immediately discontinued (unless the notice directs otherwise) and all materials as may have been accumulated in performing this contract, whether completed or in progress, delivered to the Sponsor.
- b. If the termination is for the convenience of the Sponsor, an equitable adjustment in the contract price shall be made, but no amount shall be allowed for anticipated profit on unperformed services.
- c. If the termination is due to failure to fulfill the contractor's obligations, the Sponsor may take over the work and prosecute the same to completion by contract or otherwise. In such case, the contractor shall be liable to the Sponsor for any additional cost occasioned to the Sponsor thereby.
- d. If, after notice of termination for failure to fulfill contract obligations, it is determined that the contractor had not so filed, then termination shall be deemed to have been effected for the convenience of the Sponsor. In such event, adjustment in the contract price shall be made as provided in paragraph 2 of this clause.
- e. The rights and remedies of the sponsor provided in this clause are in addition to any other rights and remedies provided by law or under this contract.

Application

Incorporate into all procurement contracts that funded by AIP funds that exceed \$10,000.

**CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND
VOLUNTARY EXCLUSION**

The bidder/offeror certifies, by submission of this proposal or acceptance of this contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. It further agrees by submitting this proposal that it will include this clause without modification in all lower tier transactions, solicitations, proposals, contracts, and subcontracts. Where the bidder/offeror/contractor or any lower tier participant is unable to certify to this statement, it shall attach an explanation to this solicitation/proposal.

Application

Incorporate into all contracts that exceed \$25,000, which funded under the AIP. Incorporate in all contracts for auditing services regardless of the contract amount.

**CONTRACT WORKHOURS AND SAFETY STANDARDS ACT REQUIREMENTS
29 CFR PART 5**

1. Overtime Requirements.

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic, including watchmen and guards, in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic received compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; Liability for Unpaid Wages; Liquidated Damages.

In the event of any violation of the clause set forth in paragraph (1) above, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph 1 above, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1 above.

3. Withholding for Unpaid Wages and Liquidated Damages.

The Federal Aviation Administration or the Sponsor shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any monies payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 2 above.

4. Subcontractors.

The contractor or subcontractor shall insert in any subcontracts the clauses set for in paragraphs 1 through 4 and also a clause requiring the subcontractor to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1 through 4 of this section.

Application

Incorporate into all construction contracts and subcontracts that exceed \$100,000 and are financed under the AIP program.

CLEAN AIR AND WATER POLLUTION CONTROL

Contractors and subcontractors agree:

a. That any facility to be used in the performance of the contract or subcontract or to benefit from the contract is not listed on the Environmental Protection Agency (EPA) List of Violating Facilities.

b. To comply with all the requirements of Section 114 of the Clean Air Act, as amended, 42 U.S.C. 1857 et seq. and Section 308 of the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. relating to inspection, monitoring, entry, reports, and information, as well as all other requirements specified in Section 114 and Section 308 of the Acts, respectively, and all other regulations and guidelines issued thereunder;

c. That, as a condition for the award of this contract, the contractor or subcontractor will notify the awarding official of the receipt of any communication from the EPA indicating that a facility to be used for the performance of or benefit from the contract is under consideration to be listed on the EPA List of Violating Facilities;

d. To include or cause to be included in any construction contract or subcontract which exceeds \$100,000 the aforementioned criteria and requirements.

Application

Incorporate in all contracts and subcontracts that exceed \$100,000.

SPECIAL PROVISIONS

SPECIAL PROVISIONS

GENERAL. The Special Provisions presented hereinbefore are basically a presentation of FAA's (the primary funding agency's) standards. These SPECIAL PROVISIONS, where in conflict with the GENERAL PROVISIONS, shall supersede and take precedence over the GENERAL PROVISIONS. Otherwise, the GENERAL PROVISIONS shall govern the work to which they apply.

COORDINATION OF THE WORK. The work on this project consists of improvements to an airport in actual operation; therefore, the Contractor shall cooperate with the airport management during construction. The airport is to remain open during the construction of these improvements unless the Contractor is completing the connecting taxiway within the Runway Safety Area (RSA), and it is imperative that construction activities be carried on in such a manner that the safety of aircraft using the airport will not be impaired in any way. The Contractor's equipment will not be operated closer than 60 feet of any runway centerline or 240 feet from the end of the existing runway unless the runway is closed as detailed in the Construction Safety Plan. Additional safety and construction requirements are listed hereinafter in these SPECIAL PROVISIONS under the sub-heading SAFETY REQUIREMENTS AND CONSTRUCTION PROCEDURES.

In addition, the Contractors and/or Subcontractors must coordinate their activities so that one does not damage work previously completed by the other.

SAFETY REQUIREMENTS AND CONSTRUCTION PROCEDURES. FAA Advisory Circular 150/5370-2 (Current Edition). These safety requirements shall govern the construction process.

Construction Activity and Aircraft Movements

- (a) Safety requirements for construction activity affecting aircraft movement areas have been coordinated with the airport owner (or operator) and representatives of the Airports District Office, Airports Certification Staff, General Aviation District Office, Air Carrier District Office, Air Transportation Security Field Office, Air Traffic Division (ASW-530), Airway Facilities Division (ASW-420), and Logistics Division (ASW-56) as appropriate for the particular location. As a result of this coordination, a work sequence intending a minimum of disruption to aircraft operations has been developed. The resulting restrictions imposed on the Contractor have been included as a part of the contract provisions.
- (b) During the time that the contractor is performing the work, the aprons, taxiways, and runway at the airport will remain in use by aircraft, to the maximum extent allowable. Aircraft operations, unless otherwise specified in the contract specifications, shall always have priority over any and all of the Contractor's operations. The Contractor shall not allow his employees, subcontractors, material suppliers or any other persons over whom he has control, to enter or remain upon any part of the airport which would be a hazardous location. Should the contractor be too close to the portion used by aircraft for safety, the Engineer may, at his sole discretion, order the contractor to suspend his operations, remove his personnel, plant, equipment, and materials to a safe distance and stand by until the runway and taxiways are no longer required for use by aircraft.

Limitations on Construction. The following restrictions shall normally pertain for activity at airports. In cases where it has been determined that the following restrictions are inappropriate, similar requirements shall be developed on a case-by-case basis.

- (a) All work, which is too close to the ends of the runway for accomplishment, shall be performed when the runway is closed. (Ref. NOTAM requirements hereafter).

- (b) Men, equipment or other construction material will be permitted in the approach or departure zones of active runways, provided that the construction activity is conducted below 34:1 approach plane originating 200 feet from end of runway. Any construction activity which is contemplated in the approach zones which would violate these planes will require consideration (threshold displacement, lighting, runway closure, etc.)
- (c) Open trenches, excavation and stockpiled material will not be permitted within 75 feet of the centerline of the active runways. Coverings for open trenches must be of such strength as to support the weight of the heaviest aircraft operating on the runway.
- (d) Construction equipment shall not exceed a height of 20 feet above the airport surface. Any equipment exceeding a height of 20 feet shall be obstruction-marked and lighted at night, and when not in use lowered to its stowed height.
- (e) Instructions of the Construction Safety Plan must be followed at all times for the duration of the project.

Notams

- (a) The Airport Owner or his Designated Representative shall issue the necessary Notice to Airmen (NOTAMS) to reflect hazardous conditions during construction. The Contractor shall provide the Engineer with the necessary information as to the work schedule in advance so the Engineer may coordinate with and provide the Owner with the work schedule for the issuance of the NOTAMS. It is important that NOTAMS be kept current and reflect the actual conditions with respect to the construction situation. Active NOTAMS shall be reviewed periodically and revised to reflect the current conditions.
- (b) Inspections will be made frequently by both the Airport Owner and Engineer during critical phases of the work to insure that the Contractor is following the required safety procedures.

Clean-up. From time to time the Contractor shall clean up the construction site, in order that the site present a neat appearance and the progress of the work not be impeded. One such period of clean-up shall immediately precede final inspection. Immediately following acceptance of the work by the Owner, the Contractor shall remove all temporary plant, equipment, surplus materials, and debris resulting from his operations, and leave the site in a condition fully acceptable to the Owner. Following each work shift, the runway and taxiway shall be swept clean of all loose aggregate and other foreign matter. Clean-up will not be measured for separate payment but shall be considered subsidiary work pertaining to the several items of the contract.

Entrance, Parking Area and Security. Forces of the Contractor and the Engineer shall enter and leave the airfield at the gate location shown on the Plans. Only the designated entrance shall be used. The gate shall be unlocked or opened at work time for access to the airfield then shall be locked or closed for the remainder of the work day. The movement of equipment and materials shall be made through the designated gate. The gate shall remain closed at all times except when needed for access. Should the gate need to remain open for extended periods of time the Contractor shall station a watchman at the gate to prevent unauthorized personnel from entering the airfield.

The Contractor shall store his equipment during non-working hours at locations approved by the Airport Manager within the airport property close to the project sites. The Owner may limit areas available for parking for the Contractor's work force.

Motorized Vehicles.

- (a) When any vehicle other than those routinely used in the aircraft movement area and runway approach area is required to travel over any portion of that area, it shall be escorted by a vehicle properly identified to operate in the area or provided with a flag on a staff attached to the vehicle so that the flag will be readily visible. The flag shall be not less than 3-foot square consisting of a checkered pattern of international orange and white squares of not less than 1 foot on each side and displayed in full view above the vehicle. A flag or escort vehicle is not required for vehicles which have been painted, marked and lighted for routine use on aircraft movement areas. Optionally, all vehicles may be equipped with a flashing yellow dome-type light, with two lights being provided to the Engineer. Any vehicle operating on the movement area during the hours of darkness should be equipped with a flashing red dome-type light. If the airport has a security plan, check for guidance on additional identification and control of construction equipment.
- (b) Vehicular traffic crossing active movement areas must be controlled either by two-way radio with the control tower, by escort, or the means appropriate for the particular airport. The clearance shall be confirmed by the driver's personal observation that no aircraft is approaching his position.
- (c) Debris, waste and loose material capable of causing damage to aircraft landing gears, propellers or being ingested in jet engines shall not be placed on active aircraft movement areas. Material tracked on these areas shall be removed continuously during the work project.

RECORD DRAWINGS. The Contractor shall keep one record copy of all Project Specifications, Plans, Addenda, Modifications, and Shop Drawings at the site in good order and annotated to show all changes made during the construction process. These shall be available to the Engineer and shall be delivered to him for the Owner prior to final acceptance of the Project.

PUBLICITY. No information relative to the Work shall be released by the Contractor, either before or after completion of the Work, for publication or for advertising purposes without the prior written consent of the Owner and the Engineer.

STANDARDS. Materials or processes for which ASTM standards have been adopted shall, unless in conflict with specified requirements, meet the requirements of the latest edition of the ASTM standards. Where a specified material is followed by a reference to a specification, standard, test method or code such as "ASTM C150", "ASA Code", etc., it shall be understood to mean that the material shall meet the requirements of the referenced specification, standard, test method or code; and, except where a specific edition is referred to, it shall be understood that the latest edition including additions and/or amendments thereto, as of the date the Contract is awarded, shall apply to Work under this Contract.

OWNERSHIP OF ENGINEERING DATA. All Specifications, Plans and copies thereof furnished by the Engineer shall remain his property. They shall not be used on another Project, and, with the exception of those sets which have been signed in connection with the execution of the Construction Contract shall be returned to him on request upon completion of the Project.

REPORTING OF ACCIDENTS The Contractor shall submit a written report to the Engineer of any accident or injury occurring at the Construction Site.

PRE-CONSTRUCTION CONFERENCE. Within twenty (20) days after delivery of the executed Construction Contract by the Owner to the Contractor, but before starting the Work at the site, a conference will be held to review the heretofore mentioned schedules, to establish procedures for

handling Shop Drawings and other submissions, and for processing Applications for Payment, and to establish a working understanding between the parties as to the Project. Present at the conference will be the Owner or his representative, the Engineer, Resident Project Representatives, the Contractor and his Superintendent.

WATERWAYS. Present natural and artificial waterways shall be left open to flow freely. Temporary dams or by-passes shall be provided when found necessary or ordered by the Engineer.

DEFINITIONS.

- (a) **As Approved.** The words "as approved", unless otherwise qualified, shall be understood to be followed by the words "by the Engineer".
- (b) **As Shown, And As Indicated.** The words "as shown" and "as indicated" shall be understood to be followed by the words "on the Drawings".
- (c) **Drawings.** The term "Drawings" refers to the official Drawings, profiles, cross sections, elevations, details, and other working drawings and supplementary drawings, or reproductions thereof, sealed by the Engineer, which show the location, character, dimensions, and details of the Work to be performed. Drawings may either be bound in the same book as the Project Manual or bound separately and are a part of the Contract Documents, regardless of the method of binding.
- (d) **Notice.** The term "notice" or the requirement to notify, as used in the Contract Documents or applicable state or federal statutes, shall signify a written communication delivered in person or by certified or registered mail to the individual, or to a member of the firm, or to an officer of the corporation for whom it is intended. Certified or registered mail shall be addressed to the last business address known to him who gives the notice.
- (e) **Or Equal.** The term "or equal" shall be understood to indicate that the "equal" product is the same or better than the product named in function, performance, reliability, quality, and general configuration. Determination of equality in reference to the Project design requirements will be made by the Engineer. Such "equal" products shall not be purchased or installed by the Contractor without the Engineer's written approval.
- (f) **Plans (See Drawings).**

CONTRACT DOCUMENTS.

Sub-Surface Conditions Found Different. Should the Contractor encounter sub-surface and/or latent conditions at the site materially differing from those shown on the Drawings or indicated in the Specifications, the Contractor shall immediately give notice to the Engineer of such conditions before they are disturbed. The Engineer will thereupon promptly investigate the conditions, and if the Engineer finds that they materially differ from those shown on the Drawings or indicated in the Specifications, the Engineer will at once make such changes in the Drawings and/or the Specifications as he may find necessary. Any increase or decrease of cost resulting from such changes to be adjusted in the manner provided in the Paragraph titled "Changes in Work."

Documents To Be Kept On The Job Site. The Contractor shall keep one copy of the Contract Documents on the job site, in good order, available to the Engineer and to his representatives.

The Contractor shall maintain on a daily basis at the job site, and make available to the Engineer on request, one current record set of the Drawings which have been accurately marked up to indicate all

modifications in the completed Work that differ from the design information shown on the Drawings. Upon substantial completion of the Work, the Contractor shall give the Engineer one complete set of marked up record Drawings.

Failure of the Contractor to submit accurate Record Drawings to the Engineer will be adequate justification for postponement of the Final Inspection and Final Payment.

Ownership Of Drawings. All Drawings, Plans, Specifications, and copies thereof furnished by the Engineer and the Owner are their property. They are not to be used on other work and, with the exception of the signed Contract set, are to be returned to them on request at the completion of the Work. Any reuse of these materials without specific written verification or adaptation by the Engineer and the Owner will be at the risk of the user and without liability or legal expense to the Engineer and the Owner.

Such user shall hold the Engineer and the Owner harmless from any and all damages, including reasonable attorneys' fees, from any and all claims arising from any such reuse. Any such verification and adaptation by the Engineer and the Owner will entitle the Engineer to further compensation at rates to be agreed upon by the user, the Engineer and the Owner. All models are the property of the Owner.

THE ENGINEER.

Unnoticed Defects. Any defective Work or material that may be discovered by the Engineer during construction or before the final acceptance of Work, or before final payment has been made, or during the guarantee period, shall be removed and replaced by Work and materials which shall conform to the provisions of the Contract Documents. Failure on the part of the Engineer to condemn or reject bad or inferior Work or materials shall not be construed to imply acceptance of such Work or materials. The Owner shall reserve and retain all of its rights and remedies at law against the Contractor and its surety for correction of any and all latent defects discovered after the guarantee period.

Right To Retain Imperfect Work. If any part or portion of the Work done or material furnished under this Contract shall prove defective and not in accordance with the Drawings and Specifications, and if the imperfection in the same shall not be of sufficient magnitude or importance as to make the Work dangerous or unsuitable, or if the removal of such Work will create conditions which are dangerous or undesirable, the Owner shall have the right and authority to retain such Work but shall make such deductions in the final payment therefore as may be just and reasonable. The Owner shall also have the option to require, at no added cost to the Owner, extended warranties, maintenance bonds, or other remedies to provide for repair or reconstruction of imperfect Work.

Shop Drawing Submittal Procedure. The Contractor shall submit a sufficient number of copies to allow the Engineer to retain four copies (2 for himself; 2 for the Owner) for review, such shop drawings, electrical diagrams, and catalog cuts for fabricated items and manufactured items (including mechanical and electrical equipment) required for construction, except as noted below.

Should the Contractor fail to submit acceptable shop drawings on the second submittal, one copy will be returned to him and the cost of the Engineer's time to review subsequent submittals on the unacceptable item will be deducted from the Contractor's monthly payment invoice. Shop drawings shall be submitted in sufficient time to allow the Engineer not less than 20 regular working days per submittal for examining the shop drawings.

These shop drawings shall be accurate, distinct, and complete and shall contain all required information, including satisfactory identification of items, units, and assemblies in relation to the Contract Drawings and Specifications.

Unless otherwise approved by the Engineer, shop drawings shall be submitted only by the Contractor, who shall indicate by a signed stamp on the shop drawings, or other approved means, that he (the Contractor) has checked the shop drawings, and that the Work shown is in accordance with Contract requirements and has been checked for dimensions and relationship with Work of all other trades involved.

The practice of submitting incomplete or unchecked shop drawings for the Engineer to correct or finish will not be acceptable, and shop drawings which, in the opinion of the Engineer, clearly indicate that they have not been checked by the Contractor will be considered as not complying with the intent of the Contract Documents and will be returned to the Contractor for resubmission in the proper form.

When the shop drawings have been reviewed by the Engineer, two (2) sets of submittals will be returned to the Contractor appropriately stamped. If major changes or corrections are necessary, the shop drawing may be rejected and one (1) set will be returned to the Contractor with such changes or corrections indicated, and the Contractor shall correct and resubmit the shop drawings in quadruplicate, unless otherwise directed by the Engineer. No changes shall be made by the Contractor to resubmitted shop drawings other than those changes indicated by the Engineer, unless such changes are clearly described in a letter accompanying the resubmitted shop drawings.

The review of such shop drawings and catalog cuts by the Engineer shall not relieve the Contractor from responsibility for correctness of dimensions, fabrication details, and space requirements or for deviations from the Contract Drawings or Specifications unless the Contractor has called attention to such deviations in writing by a letter accompanying the shop drawings and the Engineer approves the change or deviation in writing at the time of submission; nor shall review by the Engineer relieve the Contractor from the responsibility for errors in the shop drawings. When the Contractor does call such deviations to the attention of the Engineer, the Contractor shall state in his letter whether or not such deviations involve any deduction or extra cost adjustment.

Additional Detail Drawings And Instructions. The Engineer will furnish, with reasonable promptness, additional instructions by means of drawings or otherwise, if, in the Engineer's opinion, such are required for the proper execution of the Work. All such drawings and instructions will be consistent with the Contract Documents, true developments thereof, and reasonably inferable therefrom.

THE CONTRATOR AND HIS EMPLOYEES.

Independent Contractor. The Contractor shall perform all Work under this Contract as an Independent Contractor and shall not be considered as an agent of the Owner or of the Engineer, nor shall the Contractor's subcontractors or employees be subagents of the Owner or of the Engineer.

The Contractor shall employ only employees who are competent and skillful in their respective line of work, and local labor shall be given preference. Whenever the Engineer or the Owner notify the Contractor that any person on this work is, in their opinion, incompetent, disorderly, or refuses to carry out the provisions of this Contract, or uses threatening or abusive language to any person representing the Owner on the work or is otherwise unsatisfactory, such person shall be immediately discharged from the Project and shall not be re-employed thereon except with the consent of the Engineer by the Owner.

Subcontracting. Within 30 days after the execution of the Contract, the Contractor shall submit to the Engineer the names of all subcontractors proposed for the Work, including the names of any subcontractors that were submitted with the Bid. The Contractor shall not employ any subcontractors that the Engineer may object to as lacking capability to properly perform Work of the type and scope anticipated. No changes will be allowed from the approved subcontractor list without written approval of the Engineer.

Nothing contained in the Contract Documents shall create any contractual relation between any subcontractor and the Owner.

INSURANCE AND LIABILITY.

General

- (a) The Contractor shall provide (from insurance companies acceptable to the Owner) the insurance coverage designated hereinafter and pay all costs.

Before execution of the Contract, Contractor shall furnish the Owner with complete copies of all certificates of insurance specified herein showing the type, amount, class of operations covered, effective dates, and date of expiration of policies. Each Certificate shall contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least thirty (30) days prior written notice has been give to the Owner.

In case of the breach of any provision of this Article, the Owner, at his option, may take out and maintain, at the expense of the Contractor, such insurance as the Owner may deem proper and may deduct the cost of such insurance from any monies which may be due or become due the Contractor under this Contract.

All insurance contracts and certificates shall be executed by a licensed resident agent of the insurance company, and in all ways comply with the insurance laws of the State of Arkansas. Further, the said insurance company shall be duly licensed and qualified to do business in the

State of Arkansas, and have an A.M. Best rating of A- or better and have a Positive or Stable Rating Outlooks.

In the event any Work under this Contract is performed by a subcontractor, the Contractor shall be responsible for any liability directly or indirectly arising out of the Work performed under this Contract by a subcontractor, which liability is not covered by the subcontractor's insurance.

The Contractor's and any subcontractor's general liability and automobile liability insurance policies shall include the Owner and Engineer, their officers, agents, subconsultants and employees as additional insureds for any claims arising out of Work performed under this Contract. Certificates of insurance shall explicitly name the Owner and Engineer as additional insureds. Inclusion of either party as "certificate holder" does not meet this requirement.

Worker's Compensation and Employer's Liability Insurance

- (a) Worker's Compensation Insurance in statutory limits shall be secured and maintained as required by the laws of the State of Arkansas. In addition, Employer's Liability Insurance in an amount not less than \$500,000 for each accident, \$500,000 for each employee regarding disease, and \$500,000 policy limit regarding disease shall cover all employees who have

performed any of the obligations assumed by the Contractor under these Contract Documents. This insurance will protect the Contractor against any and all claims resulting from injuries, sickness, disease, or death to employees engaged in work under this Contract. The Contractor shall require the subcontractor similarly to provide Worker's Compensation and Employer's Liability Insurance for all the latter's employees to be engaged in such Work. Workers Compensation and Employers Liability must include a Waiver of Subrogation in favor of the Owner and the Engineer.

Where Work under this Contract includes any water or navigational exposure, coverage shall be included to cover the Federal Longshoremen's and Harborworker's Act and the Federal Jones Act when applicable.

Commercial General Liability Insurance

- (a) The Contractor shall maintain during the life of this Contract such *independent contractor's* general liability, completed operations and products liability, and automobile liability insurance as will provide coverage for claims for damages for bodily injury, including accidental death, as well as for claims for property damage which may arise directly or indirectly from performance of the Work under this Contract. The general liability policy should also specifically ensure the contractual liability assumed by the Contractor under Article 38, Indemnity. The General Liability policy must provide coverage on an occurrence basis, not a claims-made basis. A Waiver of Subrogation is to be provided in favor of the Owner and the Engineer in regards to General Liability. A Designated Construction Project Aggregate (also known as Per Project Aggregate) liability limit is required also. The Contractor's General Liability policy is to be primary and non-contributory.

(1) **Required limits of General Liability Insurance**

General Aggregate: Not less than \$2,000,000

Completed Operations Aggregate: Not less than \$2,000,000

Each Occurrence of Injury or Property Damage: Not less than \$1,000,000 Combined Single Limit

Commercial Auto Liability Insurance

- (a) The Contractor shall maintain during the life of this Contract automobile liability insurance that will provide coverage for claims for damages for bodily injury, including accidental death, as well as for claims for property damage which may arise directly or indirectly from performance of the Work under this Contract.

(1) **Commercial Automobile Liability Insurance**

Shall include Personal Injury and Property Damage coverage for "Any Auto", "Hired Autos", and "Non-Owned Auto" at a Combined Single Limit of not less than \$1,000,000.

Excess Umbrella Liability Insurance

- (a) \$2,000,000 limit of liability policy shall be provided in additional limits to underlying Limits required for General Liability, Auto Liability, and Employers Liability.

Owner's And Contractor's Protective Liability Insurance

- (a) The Contractor shall indemnify and save harmless the Owner and Engineer from and against all losses and all suits, claims, demands, judgments, actions, and payment of every description

and nature brought or recovered against him by reason of any omission or act of the Contractor, his agents, or employees in the execution of the work or in the guarding of it. The Contractor shall secure and maintain protective liability insurance in the name of the Owner and the Contractor covering from contingent liability under this contract.

- (1) **General Aggregate:** Not less than \$2,000,000
- (2) **Each Occurrence of Personal Injury or Property Damage:** Not less than \$1,000,000 Combined Single Limit.

Builder's Risk Insurance

- (a) The Contractor shall procure and maintain during the life of this contract Builder's Risk Insurance fire, lightening, extended coverage, vandalism, and property theft on the insurable portion of the Project on a 100 percent completed value basis against damage to the equipment, structures, or material. The Owner and the Contractor, as their interests may appear shall be names as the Insured.

Installation Floater Insurance Policy

- (a) The Contractor shall procure and maintain during the life of this contract an Installation Floater for fire, lightening, extended coverage, vandalism, and property theft on the insurance portion of the Project. The Owner and the Contractor, as their interests may appear, shall be named as the Insured. Coverage shall be based on 100 percent of the total value of the completed Project. The Installation Floater Insurance Policy shall protect against damage to all equipment and materials.

Note: **Builder's Risk Insurance** must be procured and maintained during the life of the project if there is an actual structure being erected or which exists on the premises. If no structure exists, or is being erected an **Installation Floater Insurance Policy** must be procured and maintained during the life of the project.

Note: Builder's Risk Insurance and Installation Floaters do not provide coverage for Contractor's equipment if stolen or damaged at a job site. Contractors are responsible for insuring their own equipment.

Insurance Coverage for Special Conditions

- (a) When the construction is to be accomplished within a public or private right-of-way requiring special insurance coverage, the Contractor shall conform to the particular requirements and provide the required insurance. The Contractor shall include in his liability policy all endorsements, or purchase additional liability insurance that the said authority may require for the protection of the authority, its officers, agents, and employees. Insurance coverage for special conditions, when required, shall be provided as set forth in the Supplementary Conditions.

No Personal Liability Of Public Officials

- (a) In carrying out any of the provisions hereof in exercising any authority granted by the Contract, there will be no personal liability upon any public official.

PERFORMANCE AND PAYMENT BONDS. The successful Bidder shall furnish a Performance and Payment Bond in the amount equal to one hundred percent (100%) of the contract price on the forms provided in the Contract Documents as security for faithful performance of the Contract and payment of all obligations arising thereunder within ten days after receipt of the Notice of Award. The bond shall be written by a surety company qualified and authorized to do business in the State of Arkansas and shall be listed on the current U.S. Department of Treasury, Circular Number 570, or amendments thereto, in the Federal Register of acceptable Sureties for Federal projects. The bond shall be executed by a resident agent licensed by the State Insurance Commissioner to represent the surety company in Arkansas. The bond shall be written in favor of the Owner. Bond company rating by "AM Best Rating Company" to be "A-" or above and have a Positive or Stable Rating Outlooks.

The Attorney-in-Fact who executes this Performance Bond and Payment Bond in behalf of the Surety must attach a notarized copy of his power-of-attorney as evidence of his authority to bind the Surety on the date of execution of the bond. All Contracts, Performance and Payment Bonds, and respective powers-of-attorney will have the same date.

If the Surety on any Bond furnished by Contractor is declared bankrupt, or becomes insolvent, or its right to do business is terminated in any location where any part of the project is located, or ceases to meet the requirements of the preceding paragraph, the Contractor shall within five days thereafter substitute another Bond and Surety, both of which must be acceptable to Owner.

Before execution of the Contract Documents, the Contractor shall submit the Bonds (in triplicate) to the Owner. The Bonds shall be submitted **WITHOUT DATES**, as they will be dated by the Owner at the same time as the Contracts are executed.

PROJECT MEETINGS. The Engineer may conduct Project meetings, as he deems necessary, for the purposes of discussing and resolving matters concerning the various elements of the Work. Time and place for these meetings and the names of persons required to be present shall be as directed by the Engineer. Contractor shall comply with these attendance requirements and shall also require his subcontractors to comply.

SAFETY. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons (including employees) and property during performance of the Work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to U. S. Department of Labor (OSHA); the State Labor Department Laws; all other applicable federal, state, county, and local laws, ordinances, and codes; the requirements set forth below; and any regulations that may be detailed in other parts of these Documents. Where any of these are in conflict, the more stringent requirement shall be followed. The Contractor's failure to thoroughly familiarize himself with the aforementioned safety provisions shall not relieve him from compliance with the obligations and penalties set forth herein.

The Contractor shall develop and maintain for the duration of this Contract, a safety program that will effectively incorporate and implement all required safety provisions. The Contractor shall appoint an employee who is qualified and authorized to supervise and enforce compliance with the safety program.

The duty of the Engineer to conduct construction review of the Contractor's performance is not intended to include a review or approval of the adequacy of the Contractor's safety supervisor, the safety program, or any safety measures taken in, on, or near the construction site.

The Contractor, as a part of his safety program, shall maintain at his office or other well-known place at the job site, safety equipment applicable to the Work as prescribed by the aforementioned authorities, all articles necessary for giving first aid to the injured, and shall establish the procedure for the immediate

removal to a hospital or a doctor's care of persons (including employees) who may be injured on the job site.

If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Engineer and the Owner. In addition, the Contractor must promptly report in writing to the Engineer all accidents whatsoever arising out of, or in connection with, the performance of the Work whether on, or adjacent to, the site, giving full details and statements of witnesses.

If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Engineer, giving full details of the claim.

CONTRACTOR'S TOOLS AND EQUIPMENT. The Contractor's tools and equipment used on the Work shall be furnished in sufficient quantity and of a capacity and type that will safely perform the Work specified, and shall be maintained and used in a manner that will not create a hazard to persons or property, or cause a delay in the progress of the Work.

RESPONSIBILITY OF CONTRACTOR TO ACT IN EMERGENCY. In case of an emergency which threatens loss or injury of property, and/or safety of life, the Contractor shall act, without previous instructions from the Owner or Engineer, as the situation may warrant. The Contractor shall notify the Engineer thereof immediately thereafter. Any claim for compensation by the Contractor, together with substantiating documents in regard to expense, shall be submitted to the Owner through the Engineer and the amount of compensation shall be determined by agreement.

MATERIALS AND APPLIANCES. Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation, and other facilities necessary for the execution and completion of the Work.

Unless otherwise specified, all materials shall be new, and both workmanship and materials shall be of good quality. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

In selecting and/or approving equipment for installation in the Project, the Owner and Engineer assume no responsibility for injury or claims resulting from failure of the equipment to comply with applicable national, state, and local safety codes or requirements, or the safety requirements of a recognized agency, or failure due to faulty design concepts, or defective workmanship and materials.

CONTRACTORS' AND MANUFACTURERS' COMPLIANCE WITH STATE SAFETY, OSHA, AND OTHER CODE REQUIREMENTS. The completed Work shall include all necessary permanent safety devices, such as machinery guards and similar ordinary safety items required by the state and federal (OSHA) industrial authorities and applicable local and national codes. Further, any features of the Work (including Owner-selected equipment) subject to such safety regulations shall be fabricated, furnished, and installed in compliance with these requirements. Contractors and manufacturers of equipment shall be held responsible for compliance with the requirements included herein. Contractors shall notify all equipment suppliers and subcontractors of the provisions of this Article.

SUBSTITUTION OF MATERIALS. Except for Owner-selected equipment items and items where no substitution is clearly specified, whenever any material, article, device, product, fixture, form, type of construction, or process is indicated or specified by patent or proprietary name, by name of manufacturer, or by catalog number, such specifications shall be deemed to be used for the purpose of establishing a standard of quality and facilitating the description of the material or process desired. This procedure is not to be construed as eliminating from competition other products of equal or better quality by other

manufacturers where fully suitable in design, and shall be deemed to be followed by the words "or equal". The Bidder may, in such cases, submit complete data to the Engineer 10 days prior to bid date for consideration of another material, type, or process which shall be substantially equal in every respect to that so indicated or specified. Substitute materials shall not be used unless approved in writing. The Owner or his authorized agent will be the sole judge of the substituted article or material.

PROGRESS OF THE WORK.

Prosecution Of The Work. It is expressly understood and agreed that the time of beginning, rate of progress, and time of completion of the Work are the essence of this Contract. The Work shall be prosecuted at such time, and in or on such part or parts of the Project as may be required, to complete the Project as contemplated in the Contract Documents and the approved construction schedule.

Regular Work hours shall be from 7:00 a.m. to 6:00 p.m. Monday through Friday. No Work requiring the presence of the Engineer's representative will be performed outside of regular Work hours. If, however, the Contractor works additional hours (other than specified herein), the Contractor shall pay the Owner for additional engineering services as outlined below.

The cost of additional engineering services shall be borne by the Contractor and will be based upon actual hours worked (labor cost x 3 x 1.5) plus out-of-pocket expenses such as lodging, mileage, materials, etc. Otherwise, the Contractor may perform clean-up work only outside of regular hours (including Saturdays and Sundays). No Work will be accomplished on holidays.

McClelland Consulting Engineers, Inc. observes the following holidays during the year: New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day and Friday following, Christmas Eve, and Christmas Day. When a holiday occurs on a Saturday, the Company will observe it on the Friday preceding, and when a holiday occurs on a Sunday, the Company will observe it on the following Monday.

Assignment. Neither party to the Contract shall assign the Contract or sublet it as a whole, without the written consent of the other, nor shall the Contractor assign any monies due or to become due to him hereunder without the prior written consent of the Owner.

Cutting And Patching. The Contractor shall do all cutting, fitting, or patching of his Work that may be required to make its several parts come together properly and fit it to receive or be received by Work of other Contractors shown upon or reasonably implied by the Drawings. Any defective Work or material, performed or furnished by the Contractor, that may be discovered by the Engineer before the final acceptance of the Work or before final payment has been made, shall be removed and replaced or patched, in a manner as approved by the Engineer at the expense of the Contractor.

END OF SECTION

GENERAL CONTRACT PROVISIONS

Part 1 – General Contract Provisions

Section 10 Definition of Terms

When the following terms are used in these specifications, in the contract, or in any documents or other instruments pertaining to construction where these specifications govern, the intent and meaning shall be defined as follows:

Paragraph Number	Term	Definition
10-01	AASHTO	The American Association of State Highway and Transportation Officials.
10-02	Access Road	The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public roadway.
10-03	Advertisement	A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.
10-04	Airport	Airport means an area of land or water which is used or intended to be used for the landing and takeoff of aircraft; an appurtenant area used or intended to be used for airport buildings or other airport facilities or rights of way; airport buildings and facilities located in any of these areas, and a heliport.
10-05	Airport Improvement Program (AIP)	A grant-in-aid program, administered by the Federal Aviation Administration (FAA).
10-06	Air Operations Area (AOA)	The term air operations area (AOA) shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron.
10-07	Apron	Area where aircraft are parked, unloaded or loaded, fueled and/or serviced.
10-08	ASTM International (ASTM)	Formerly known as the American Society for Testing and Materials (ASTM).
10-09	Award	The Owner's notice to the successful bidder of the acceptance of the submitted bid.
10-10	Bidder	Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.
10-11	Building Area	An area on the airport to be used, considered, or intended to be

Paragraph Number	Term	Definition
		used for airport buildings or other airport facilities or rights-of-way together with all airport buildings and facilities located thereon.
10-12	Calendar Day	Every day shown on the calendar.
10-13	Certificate of Analysis (COA)	The COA is the manufacturer's Certificate of Compliance (COC) including all applicable test results required by the specifications.
10-14	Certificate of Compliance (COC)	The manufacturer's certification stating that materials or assemblies furnished fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer's authorized representative.
10-15	Change Order	A written order to the Contractor covering changes in the plans, specifications, or proposal quantities and establishing the basis of payment and contract time adjustment, if any, for work within the scope of the contract and necessary to complete the project.
10-16	Contract	<p>A written agreement between the Owner and the Contractor that establishes the obligations of the parties including but not limited to performance of work, furnishing of labor, equipment and materials and the basis of payment.</p> <p>The awarded contract includes but may not be limited to: Advertisement, Contract form, Proposal, Performance bond, payment bond, General provisions, certifications and representations, Technical Specifications, Plans, Supplemental Provisions, standards incorporated by reference and issued addenda.</p>
10-17	Contract Item (Pay Item)	A specific unit of work for which a price is provided in the contract.
10-18	Contract Time	The number of calendar days or working days, stated in the proposal, allowed for completion of the contract, including authorized time extensions. If a calendar date of completion is stated in the proposal, in lieu of a number of calendar or working days, the contract shall be completed by that date.
10-19	Contractor	The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the work contracted and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the contract work.
10-20	Contractors Quality Control (QC) Facilities	The Contractor's QC facilities in accordance with the Contractor Quality Control Program (CQCP).
10-21	Contractor Quality Control Program (CQCP)	Details the methods and procedures that will be taken to assure that all materials and completed construction required by the contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or

Paragraph Number	Term	Definition
		procured from subcontractors or vendors.
10-22	Control Strip	A demonstration by the Contractor that the materials, equipment, and construction processes results in a product meeting the requirements of the specification.
10-23	Construction Safety and Phasing Plan (CSPP)	The overall plan for safety and phasing of a construction project developed by the airport operator, or developed by the airport operator's consultant and approved by the airport operator. It is included in the invitation for bids and becomes part of the project specifications.
10-24	Drainage System	The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.
10-25	Engineer	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for engineering, inspection, and/or observation of the contract work and acting directly or through an authorized representative.
10-26	Equipment	All machinery, together with the necessary supplies for upkeep and maintenance; and all tools and apparatus necessary for the proper construction and acceptable completion of the work.
10-27	Extra Work	An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which is found by the Owner's Engineer or Resident Project Representative (RPR) to be necessary to complete the work within the intended scope of the contract as previously modified.
10-28	FAA	The Federal Aviation Administration. When used to designate a person, FAA shall mean the Administrator or their duly authorized representative.
10-29	Federal Specifications	The federal specifications and standards, commercial item descriptions, and supplements, amendments, and indices prepared and issued by the General Services Administration.
10-30	Force Account	<p>a. Contract Force Account - A method of payment that addresses extra work performed by the Contractor on a time and material basis.</p> <p>b. Owner Force Account - Work performed for the project by the Owner's employees.</p>
10-31	Intention of Terms	Whenever, in these specifications or on the plans, the words "directed," "required," "permitted," "ordered," "designated," "prescribed," or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer and/or Resident Project Representative (RPR) is intended; and similarly, the words "approved," "acceptable," "satisfactory," or words of like import,

Paragraph Number	Term	Definition
		<p>shall mean approved by, or acceptable to, or satisfactory to the Engineer and/or RPR, subject in each case to the final determination of the Owner.</p> <p>Any reference to a specific requirement of a numbered paragraph of the contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.</p>
10-32	Lighting	A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.
10-33	Major and Minor Contract Items	A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 20% of the total amount of the award contract. All other items shall be considered minor contract items.
10-34	Materials	Any substance specified for use in the construction of the contract work.
10-35	Modification of Standards (MOS)	Any deviation from standard specifications applicable to material and construction methods in accordance with FAA Order 5300.1.
10-36	Notice to Proceed (NTP)	A written notice to the Contractor to begin the actual contract work on a previously agreed to date. If applicable, the Notice to Proceed shall state the date on which the contract time begins.
10-37	Owner	The term "Owner" shall mean the party of the first part or the contracting agency signatory to the contract. Where the term "Owner" is capitalized in this document, it shall mean airport Sponsor only. The Owner for this project is Corning Municipal Airport .
10-38	Passenger Facility Charge (PFC)	Per 14 Code of Federal Regulations (CFR) Part 158 and 49 United States Code (USC) § 40117, a PFC is a charge imposed by a public agency on passengers enplaned at a commercial service airport it controls.
10-39	Pavement Structure	The combined surface course, base course(s), and subbase course(s), if any, considered as a single unit.
10-40	Payment bond	The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will pay in full all bills and accounts for materials and labor used in the construction of the work.
10-41	Performance bond	The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will complete the

Paragraph Number	Term	Definition
		work in accordance with the terms of the contract.
10-42	Plans	The official drawings or exact reproductions which show the location, character, dimensions and details of the airport and the work to be done and which are to be considered as a part of the contract, supplementary to the specifications. Plans may also be referred to as 'contract drawings.'
10-43	Project	The agreed scope of work for accomplishing specific airport development with respect to a particular airport.
10-44	Proposal	The written offer of the bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the provisions of the plans and specifications.
10-45	Proposal guaranty	The security furnished with a proposal to guarantee that the bidder will enter into a contract if their own proposal is accepted by the Owner.
10-46	Quality Assurance (QA)	Owner's responsibility to assure that construction work completed complies with specifications for payment.
10-47	Quality Control (QC)	Contractor's responsibility to control material(s) and construction processes to complete construction in accordance with project specifications.
10-48	Quality Assurance (QA) Inspector	An authorized representative of the Engineer and/or Resident Project Representative (RPR) assigned to make all necessary inspections, observations, tests, and/or observation of tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.
10-49	Quality Assurance (QA) Laboratory	The official quality assurance testing laboratories of the Owner or such other laboratories as may be designated by the Engineer or RPR. May also be referred to as Engineer's, Owner's, or QA Laboratory.
10-50	Resident Project Representative (RPR)	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for all necessary inspections, observations, tests, and/or observations of tests of the contract work performed or being performed, or of the materials furnished or being furnished by the Contractor, and acting directly or through an authorized representative.
10-51	Runway	The area on the airport prepared for the landing and takeoff of aircraft.
10-52	Runway Safety Area (RSA)	A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft. See the construction safety and phasing plan (CSPP) for limits of the RSA.

Paragraph Number	Term	Definition
10-53	Safety Plan Compliance Document (SPCD)	Details how the Contractor will comply with the CSPP.
10-54	Specifications	A part of the contract containing the written directions and requirements for completing the contract work. Standards for specifying materials or testing which are cited in the contract specifications by reference shall have the same force and effect as if included in the contract physically.
10-55	Sponsor	A Sponsor is defined in 49 USC § 47102(24) as a public agency that submits to the FAA for an AIP grant; or a private Owner of a public-use airport that submits to the FAA an application for an AIP grant for the airport.
10-56	Structures	Airport facilities such as bridges; culverts; catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.
10-57	Subgrade	The soil that forms the pavement foundation.
10-58	Superintendent	The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instructions from the RPR, and who shall supervise and direct the construction.
10-59	Supplemental Agreement	A written agreement between the Contractor and the Owner that establishes the basis of payment and contract time adjustment, if any, for the work affected by the supplemental agreement. A supplemental agreement is required if: (1) in scope work would increase or decrease the total amount of the awarded contract by more than 25%; (2) in scope work would increase or decrease the total of any major contract item by more than 25%; (3) work that is not within the scope of the originally awarded contract; or (4) adding or deleting of a major contract item.
10-60	Surety	The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the Owner by the Contractor.
10-61	Taxilane	A taxiway designed for low speed movement of aircraft between aircraft parking areas and terminal areas.
10-62	Taxiway	The portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways, aircraft parking areas, and terminal areas.
10-63	Taxiway/Taxilane Safety Area (TSA)	A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an aircraft. See the construction

Paragraph Number	Term	Definition
		safety and phasing plan (CSPP) for limits of the TSA.
10-64	Work	The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the contract, plans, and specifications.
10-65	Working day	A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least six (6) hours toward completion of the contract. When work is suspended for causes beyond the Contractor's control, it will not be counted as a working day. Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work will be considered as working days.
10-66	Owner Defined terms	None

END OF SECTION 10

Section 20 Proposal Requirements and Conditions

20-01 Advertisement (Notice to Bidders). Refer to Section 00030 Advertisement for Bids.

20-02 Qualification of bidders. Each bidder shall submit evidence of competency and evidence of financial responsibility to perform the work to the Owner at the time of bid opening.

Evidence of competency, unless otherwise specified, shall consist of statements covering the bidder's past experience on similar work, and a list of equipment and a list of key personnel that would be available for the work.

Each bidder shall furnish the Owner satisfactory evidence of their financial responsibility. Evidence of financial responsibility, unless otherwise specified, shall consist of a confidential statement or report of the bidder's financial resources and liabilities as of the last calendar year or the bidder's last fiscal year. Such statements or reports shall be certified by a public accountant. At the time of submitting such financial statements or reports, the bidder shall further certify whether their financial responsibility is approximately the same as stated or reported by the public accountant. If the bidder's financial responsibility has changed, the bidder shall qualify the public accountant's statement or report to reflect the bidder's true financial condition at the time such qualified statement or report is submitted to the Owner.

Unless otherwise specified, a bidder may submit evidence that they are prequalified with the State Highway Division and are on the current "bidder's list" of the state in which the proposed work is located. Evidence of State Highway Division prequalification may be submitted as evidence of financial responsibility in lieu of the certified statements or reports specified above.

20-03 Contents of proposal forms. The Owner's proposal forms state the location and description of the proposed construction; the place, date, and time of opening of the proposals; and the estimated quantities of the various items of work to be performed and materials to be furnished for which unit bid prices are asked. The proposal form states the time in which the work must be completed, and the amount of the proposal guaranty that must accompany the proposal. The Owner will accept only those Proposals properly executed on physical forms or electronic forms provided by the Owner. Bidder actions that may cause the Owner to deem a proposal irregular are given in paragraph 20-09 *Irregular proposals*.

Mobilization is limited to 10 percent of the total project cost.

20-04 Issuance of proposal forms. The Owner reserves the right to refuse to issue a proposal form to a prospective bidder if the bidder is in default for any of the following reasons:

- a. Failure to comply with any prequalification regulations of the Owner, if such regulations are cited, or otherwise included, in the proposal as a requirement for bidding.
- b. Failure to pay, or satisfactorily settle, all bills due for labor and materials on former contracts in force with the Owner at the time the Owner issues the proposal to a prospective bidder.
- c. Documented record of Contractor default under previous contracts with the Owner.
- d. Documented record of unsatisfactory work on previous contracts with the Owner.

20-05 Interpretation of estimated proposal quantities. An estimate of quantities of work to be done and materials to be furnished under these specifications is given in the proposal. It is the result of careful calculations and is believed to be correct. It is given only as a basis for comparison of proposals and the

award of the contract. The Owner does not expressly, or by implication, agree that the actual quantities involved will correspond exactly therewith; nor shall the bidder plead misunderstanding or deception because of such estimates of quantities, or of the character, location, or other conditions pertaining to the work. Payment to the Contractor will be made only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications. It is understood that the quantities may be increased or decreased as provided in the Section 40, paragraph 40-02, Alteration of Work and Quantities, without in any way invalidating the unit bid prices.

20-06 Examination of plans, specifications, and site. The bidder is expected to carefully examine the site of the proposed work, the proposal, plans, specifications, and contract forms. Bidders shall satisfy themselves to the character, quality, and quantities of work to be performed, materials to be furnished, and to the requirements of the proposed contract. The submission of a proposal shall be prima facie evidence that the bidder has made such examination and is satisfied to the conditions to be encountered in performing the work and the requirements of the proposed contract, plans, and specifications.

Boring logs and other records of subsurface investigations and tests are available for inspection of bidders. It is understood and agreed that such subsurface information, whether included in the plans, specifications, or otherwise made available to the bidder, was obtained and is intended for the Owner's design and estimating purposes only. Such information has been made available for the convenience of all bidders. It is further understood and agreed that each bidder is solely responsible for all assumptions, deductions, or conclusions which the bidder may make or obtain from their own examination of the boring logs and other records of subsurface investigations and tests that are furnished by the Owner.

20-07 Preparation of proposal. The bidder shall submit their proposal on the forms furnished by the Owner. All blank spaces in the proposal forms, unless explicitly stated otherwise, must be correctly filled in where indicated for each and every item for which a quantity is given. The bidder shall state the price (written in ink or typed) both in words and numerals which they propose for each pay item furnished in the proposal. In case of conflict between words and numerals, the words, unless obviously incorrect, shall govern.

The bidder shall correctly sign the proposal in ink. If the proposal is made by an individual, their name and post office address must be shown. If made by a partnership, the name and post office address of each member of the partnership must be shown. If made by a corporation, the person signing the proposal shall give the name of the state where the corporation was chartered and the name, titles, and business address of the president, secretary, and the treasurer. Anyone signing a proposal as an agent shall file evidence of their authority to do so and that the signature is binding upon the firm or corporation.

20-08 Responsive and responsible bidder. A responsive bid conforms to all significant terms and conditions contained in the Owner's invitation for bid. It is the Owner's responsibility to decide if the exceptions taken by a bidder to the solicitation are material or not and the extent of deviation it is willing to accept.

A responsible bidder has the ability to perform successfully under the terms and conditions of a proposed procurement, as defined in 2 CFR § 200.318(h). This includes such matters as Contractor integrity, compliance with public policy, record of past performance, and financial and technical resources.

20-09 Irregular proposals. Proposals shall be considered irregular for the following reasons:

- a. If the proposal is on a form other than that furnished by the Owner, or if the Owner's form is altered, or if any part of the proposal form is detached.
- b. If there are unauthorized additions, conditional or alternate pay items, or irregularities of any kind that make the proposal incomplete, indefinite, or otherwise ambiguous.
- c. If the proposal does not contain a unit price for each pay item listed in the proposal, except in the case of authorized alternate pay items, for which the bidder is not required to furnish a unit price.

- d. If the proposal contains unit prices that are obviously unbalanced.
- e. If the proposal is not accompanied by the proposal guaranty specified by the Owner.
- f. If the applicable Disadvantaged Business Enterprise information is incomplete.

The Owner reserves the right to reject any irregular proposal and the right to waive technicalities if such waiver is in the best interest of the Owner and conforms to local laws and ordinances pertaining to the letting of construction contracts.

20-10 Bid guarantee. Each separate proposal shall be accompanied by a bid bond, certified check, or other specified acceptable collateral, in the amount specified in the proposal form. Such bond, check, or collateral, shall be made payable to the Owner.

20-11 Delivery of proposal. Each proposal submitted shall be placed in a sealed envelope plainly marked with the project number, location of airport, and name and business address of the bidder on the outside. When sent by mail, preferably registered, the sealed proposal, marked as indicated above, should be enclosed in an additional envelope. No proposal will be considered unless received at the place specified in the advertisement or as modified by Addendum before the time specified for opening all bids. Proposals received after the bid opening time shall be returned to the bidder unopened.

20-12 Withdrawal or revision of proposals. A bidder may withdraw or revise (by withdrawal of one proposal and submission of another) a proposal provided that the bidder's request for withdrawal is received by the Owner in writing or by fax and/or by email before the time specified for opening bids. Revised proposals must be received at the place specified in the advertisement before the time specified for opening all bids.

20-13 Public opening of proposals. Proposals shall be opened, and read, publicly at the time and place specified in the advertisement. Bidders, their authorized agents, and other interested persons are invited to attend. Proposals that have been withdrawn (by written or telegraphic request) or received after the time specified for opening bids shall be returned to the bidder unopened.

20-14 Disqualification of bidders. A bidder shall be considered disqualified for any of the following reasons:

a. Submitting more than one proposal from the same partnership, firm, or corporation under the same or different name.

b. Evidence of collusion among bidders. Bidders participating in such collusion shall be disqualified as bidders for any future work of the Owner until any such participating bidder has been reinstated by the Owner as a qualified bidder.

c. If the bidder is considered to be in "default" for any reason specified in paragraph 20-04, *Issuance of Proposal Forms*, of this section.

20-15 Discrepancies and Omissions. A Bidder who discovers discrepancies or omissions with the project bid documents shall immediately notify the Owner's Engineer of the matter. A bidder that has doubt as to the true meaning of a project requirement may submit to the Owner's Engineer a written request for interpretation no later than 2 days prior to bid opening.

Any interpretation of the project bid documents by the Owner's Engineer will be by written addendum issued by the Owner. The Owner will not consider any instructions, clarifications or interpretations of the bidding documents in any manner other than written addendum.

END OF SECTION 20

Section 30 Award and Execution of Contract

30-01 Consideration of proposals. After the proposals are publicly opened and read, they will be compared on the basis of the summation of the products obtained by multiplying the estimated quantities shown in the proposal by the unit bid prices. If a bidder's proposal contains a discrepancy between unit bid prices written in words and unit bid prices written in numbers, the unit bid price written in words shall govern.

Until the award of a contract is made, the Owner reserves the right to reject a bidder's proposal for any of the following reasons:

a. If the proposal is irregular as specified in Section 20, paragraph 20-09, *Irregular Proposals*.

b. If the bidder is disqualified for any of the reasons specified Section 20, paragraph 20-14, *Disqualification of Bidders*.

In addition, until the award of a contract is made, the Owner reserves the right to reject any or all proposals, waive technicalities, if such waiver is in the best interest of the Owner and is in conformance with applicable state and local laws or regulations pertaining to the letting of construction contracts; advertise for new proposals; or proceed with the work otherwise. All such actions shall promote the Owner's best interests.

30-02 Award of contract. The award of a contract, if it is to be awarded, shall be made within **90** calendar days of the date specified for publicly opening proposals, unless otherwise specified herein.

If the Owner elects to proceed with an award of contract, the Owner will make award to the responsible bidder whose bid, conforming with all the material terms and conditions of the bid documents, is the lowest in price.

30-03 Cancellation of award. The Owner reserves the right to cancel the award without liability to the bidder, except return of proposal guaranty, at any time before a contract has been fully executed by all parties and is approved by the Owner in accordance with paragraph 30-07 *Approval of Contract*.

30-04 Return of proposal guaranty. All proposal guaranties, except those of the two lowest bidders, will be returned immediately after the Owner has made a comparison of bids as specified in the paragraph 30-01, *Consideration of Proposals*. Proposal guaranties of the two lowest bidders will be retained by the Owner until such time as an award is made, at which time, the unsuccessful bidder's proposal guaranty will be returned. The successful bidder's proposal guaranty will be returned as soon as the Owner receives the contract bonds as specified in paragraph 30-05, *Requirements of Contract Bonds*.

30-05 Requirements of contract bonds. At the time of the execution of the contract, the successful bidder shall furnish the Owner a surety bond or bonds that have been fully executed by the bidder and the surety guaranteeing the performance of the work and the payment of all legal debts that may be incurred by reason of the Contractor's performance of the work. The surety and the form of the bond or bonds shall be acceptable to the Owner. Unless otherwise specified in this subsection, the surety bond or bonds shall be in a sum equal to the full amount of the contract.

30-06 Execution of contract. The successful bidder shall sign (execute) the necessary agreements for entering into the contract and return the signed contract to the Owner, along with the fully executed surety bond or bonds specified in paragraph 30-05, *Requirements of Contract Bonds*, of this section, within 15 calendar days from the date mailed or otherwise delivered to the successful bidder.

30-07 Approval of contract. Upon receipt of the contract and contract bond or bonds that have been executed by the successful bidder, the Owner shall complete the execution of the contract in accordance with local laws or ordinances, and return the fully executed contract to the Contractor. Delivery of the fully executed contract to the Contractor shall constitute the Owner's approval to be bound by the successful bidder's proposal and the terms of the contract.

30-08 Failure to execute contract. Failure of the successful bidder to execute the contract and furnish an acceptable surety bond or bonds within the period specified in paragraph 30-06, *Execution of Contract*, of this section shall be just cause for cancellation of the award and forfeiture of the proposal guaranty, not as a penalty, but as liquidated damages to the Owner.

END OF SECTION 30

Section 40 Scope of Work

40-01 Intent of contract. The intent of the contract is to provide for construction and completion, in every detail, of the work described. It is further intended that the Contractor shall furnish all labor, materials, equipment, tools, transportation, and supplies required to complete the work in accordance with the plans, specifications, and terms of the contract.

40-02 Alteration of work and quantities. The Owner reserves the right to make such changes in quantities and work as may be necessary or desirable to complete, in a satisfactory manner, the original intended work. Unless otherwise specified in the Contract, the Owner's Engineer or RPR shall be and is hereby authorized to make, in writing, such in-scope alterations in the work and variation of quantities as may be necessary to complete the work, provided such action does not represent a significant change in the character of the work.

For purpose of this section, a significant change in character of work means: any change that is outside the current contract scope of work; any change (increase or decrease) in the total contract cost by more than 25%; or any change in the total cost of a major contract item by more than 25%.

Work alterations and quantity variances that do not meet the definition of significant change in character of work shall not invalidate the contract nor release the surety. Contractor agrees to accept payment for such work alterations and quantity variances in accordance with Section 90, paragraph 90-03, *Compensation for Altered Quantities*.

Should the value of altered work or quantity variance meet the criteria for significant change in character of work, such altered work and quantity variance shall be covered by a supplemental agreement. Supplemental agreements shall also require consent of the Contractor's surety and separate performance and payment bonds. If the Owner and the Contractor are unable to agree on a unit adjustment for any contract item that requires a supplemental agreement, the Owner reserves the right to terminate the contract with respect to the item and make other arrangements for its completion.

40-03 Omitted items. The Owner, the Owner's Engineer or the RPR may provide written notice to the Contractor to omit from the work any contract item that does not meet the definition of major contract item. Major contract items may be omitted by a supplemental agreement. Such omission of contract items shall not invalidate any other contract provision or requirement.

Should a contract item be omitted or otherwise ordered to be non-performed, the Contractor shall be paid for all work performed toward completion of such item prior to the date of the order to omit such item. Payment for work performed shall be in accordance with Section 90, paragraph 90-04, *Payment for Omitted Items*.

40-04 Extra work. Should acceptable completion of the contract require the Contractor to perform an item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, Owner may issue a Change Order to cover the necessary extra work. Change orders for extra work shall contain agreed unit prices for performing the change order work in accordance with the requirements specified in the order, and shall contain any adjustment to the contract time that, in the RPR's opinion, is necessary for completion of the extra work.

When determined by the RPR to be in the Owner's best interest, the RPR may order the Contractor to proceed with extra work as provided in Section 90, paragraph 90-05, *Payment for Extra Work*. Extra work that is necessary for acceptable completion of the project, but is not within the general scope of the work

covered by the original contract shall be covered by a supplemental agreement as defined in Section 10, paragraph 10-59, *Supplemental Agreement*.

If extra work is essential to maintaining the project critical path, RPR may order the Contractor to commence the extra work under a Time and Material contract method. Once sufficient detail is available to establish the level of effort necessary for the extra work, the Owner shall initiate a change order or supplemental agreement to cover the extra work.

Any claim for payment of extra work that is not covered by written agreement (change order or supplemental agreement) shall be rejected by the Owner.

40-05 Maintenance of traffic. It is the explicit intention of the contract that the safety of aircraft, as well as the Contractor's equipment and personnel, is the most important consideration. The Contractor shall maintain traffic in the manner detailed in the Construction Safety and Phasing Plan (CSPP).

a. It is understood and agreed that the Contractor shall provide for the free and unobstructed movement of aircraft in the air operations areas (AOAs) of the airport with respect to their own operations and the operations of all subcontractors as specified in Section 80, paragraph 80-04, *Limitation of Operations*. It is further understood and agreed that the Contractor shall provide for the uninterrupted operation of visual and electronic signals (including power supplies thereto) used in the guidance of aircraft while operating to, from, and upon the airport as specified in Section 70, paragraph 70-15, *Contractor's Responsibility for Utility Service and Facilities of Others*.

b. With respect to their own operations and the operations of all subcontractors, the Contractor shall provide marking, lighting, and other acceptable means of identifying personnel, equipment, vehicles, storage areas, and any work area or condition that may be hazardous to the operation of aircraft, fire-rescue equipment, or maintenance vehicles at the airport in accordance with the construction safety and phasing plan (CSPP) and the safety plan compliance document (SPCD).

c. When the contract requires the maintenance of an existing road, street, or highway during the Contractor's performance of work that is otherwise provided for in the contract, plans, and specifications, the Contractor shall keep the road, street, or highway open to all traffic and shall provide maintenance as may be required to accommodate traffic. The Contractor, at their expense, shall be responsible for the repair to equal or better than preconstruction conditions of any damage caused by the Contractor's equipment and personnel. The Contractor shall furnish, erect, and maintain barricades, warning signs, flag person, and other traffic control devices in reasonable conformity with the Manual on Uniform Traffic Control Devices (MUTCD) (<http://mutcd.fhwa.dot.gov/>), unless otherwise specified. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary for ingress to and egress from abutting property or intersecting roads, streets or highways.

40-06 Removal of existing structures. All existing structures encountered within the established lines, grades, or grading sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the work or to remain in place. The cost of removing such existing structures shall not be measured or paid for directly, but shall be included in the various contract items.

Should the Contractor encounter an existing structure (above or below ground) in the work for which the disposition is not indicated on the plans, the Resident Project Representative (RPR) shall be notified prior to disturbing such structure. The disposition of existing structures so encountered shall be immediately determined by the RPR in accordance with the provisions of the contract.

Except as provided in Section 40, paragraph 40-07, *Rights in and Use of Materials Found in the Work*, it is intended that all existing materials or structures that may be encountered (within the lines, grades, or grading sections established for completion of the work) shall be used in the work as otherwise provided for in the contract and shall remain the property of the Owner when so used in the work.

40-07 Rights in and use of materials found in the work. Should the Contractor encounter any material such as (but not restricted to) sand, stone, gravel, slag, or concrete slabs within the established lines, grades, or grading sections, the use of which is intended by the terms of the contract to be embankment, the Contractor may at their own option either:

- a. Use such material in another contract item, providing such use is approved by the RPR and is in conformance with the contract specifications applicable to such use; or,
- b. Remove such material from the site, upon written approval of the RPR; or
- c. Use such material for the Contractor's own temporary construction on site; or,
- d. Use such material as intended by the terms of the contract.

Should the Contractor wish to exercise option a., b., or c., the Contractor shall request the RPR's approval in advance of such use.

Should the RPR approve the Contractor's request to exercise option a., b., or c., the Contractor shall be paid for the excavation or removal of such material at the applicable contract price. The Contractor shall replace, at their expense, such removed or excavated material with an agreed equal volume of material that is acceptable for use in constructing embankment, backfills, or otherwise to the extent that such replacement material is needed to complete the contract work. The Contractor shall not be charged for use of such material used in the work or removed from the site.

Should the RPR approve the Contractor's exercise of option a., the Contractor shall be paid, at the applicable contract price, for furnishing and installing such material in accordance with requirements of the contract item in which the material is used.

It is understood and agreed that the Contractor shall make no claim for delays by reason of their own exercise of option a., b., or c.

The Contractor shall not excavate, remove, or otherwise disturb any material, structure, or part of a structure which is located outside the lines, grades, or grading sections established for the work, except where such excavation or removal is provided for in the contract, plans, or specifications.

40-08 Final cleanup. Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. The Contractor shall cut all brush and woods within the limits indicated and shall leave the site in a neat and presentable condition. Material cleared from the site and deposited on adjacent property will not be considered as having been disposed of satisfactorily, unless the Contractor has obtained the written permission of the property Owner.

END OF SECTION 40

Section 50 Control of Work

50-01 Authority of the Resident Project Representative (RPR). The RPR has final authority regarding the interpretation of project specification requirements. The RPR shall determine acceptability of the quality of materials furnished, method of performance of work performed, and the manner and rate of performance of the work. The RPR does not have the authority to accept work that does not conform to specification requirements.

50-02 Conformity with plans and specifications. All work and all materials furnished shall be in reasonably close conformity with the lines, grades, grading sections, cross-sections, dimensions, material requirements, and testing requirements that are specified (including specified tolerances) in the contract, plans, or specifications.

If the RPR finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the plans and specifications, but that the portion of the work affected will, in their opinion, result in a finished product having a level of safety, economy, durability, and workmanship acceptable to the Owner, the RPR will advise the Owner of their determination that the affected work be accepted and remain in place. The RPR will document the determination and recommend to the Owner a basis of acceptance that will provide for an adjustment in the contract price for the affected portion of the work. Changes in the contract price must be covered by contract change order or supplemental agreement as applicable.

If the RPR finds the materials furnished, work performed, or the finished product are not in reasonably close conformity with the plans and specifications and have resulted in an unacceptable finished product, the affected work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor in accordance with the RPR's written orders.

The term "reasonably close conformity" shall not be construed as waiving the Contractor's responsibility to complete the work in accordance with the contract, plans, and specifications. The term shall not be construed as waiving the RPR's responsibility to insist on strict compliance with the requirements of the contract, plans, and specifications during the Contractor's execution of the work, when, in the RPR's opinion, such compliance is essential to provide an acceptable finished portion of the work.

The term "reasonably close conformity" is also intended to provide the RPR with the authority, after consultation with the Sponsor and FAA, to use sound engineering judgment in their determinations to accept work that is not in strict conformity, but will provide a finished product equal to or better than that required by the requirements of the contract, plans and specifications.

The RPR will not be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction or the safety precautions incident thereto.

50-03 Coordination of contract, plans, and specifications. The contract, plans, specifications, and all referenced standards cited are essential parts of the contract requirements. If electronic files are provided and used on the project and there is a conflict between the electronic files and hard copy plans, the hard copy plans shall govern. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions; contract technical specifications shall govern over contract general provisions, plans, cited standards for materials or testing, and cited advisory circulars (ACs); contract general provisions shall govern over plans, cited standards for materials or testing, and cited ACs; plans shall govern over cited standards for materials or testing and cited ACs. If

any paragraphs contained in the Special Provisions conflict with General Provisions or Technical Specifications, the Special Provisions shall govern.

From time to time, discrepancies within cited testing standards occur due to the timing of the change, edits, and/or replacement of the standards. If the Contractor discovers any apparent discrepancy within standard test methods, the Contractor shall immediately ask the RPR for an interpretation and decision, and such decision shall be final.

The Contractor shall not take advantage of any apparent error or omission on the plans or specifications. In the event the Contractor discovers any apparent error or discrepancy, Contractor shall immediately notify the Owner or the designated representative in writing requesting their written interpretation and decision.

50-04 List of Special Provisions. See Special Provisions section in the specifications.

50-05 Cooperation of Contractor. The Contractor shall be supplied with **three** hard copies or an electronic PDF of the plans and specifications. The Contractor shall have available on the construction site at all times one hardcopy each of the plans and specifications. Additional hard copies of plans and specifications may be obtained by the Contractor for the cost of reproduction.

The Contractor shall give constant attention to the work to facilitate the progress thereof, and shall cooperate with the RPR and their inspectors and with other Contractors in every way possible. The Contractor shall have a competent superintendent on the work at all times who is fully authorized as their agent on the work. The superintendent shall be capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the RPR or their authorized representative.

50-06 Cooperation between Contractors. The Owner reserves the right to contract for and perform other or additional work on or near the work covered by this contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct the work not to interfere with or hinder the progress of completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with their own contract and shall protect and hold harmless the Owner from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced because of the presence and operations of other Contractors working within the limits of the same project.

The Contractor shall arrange their work and shall place and dispose of the materials being used to not interfere with the operations of the other Contractors within the limits of the same project. The Contractor shall join their work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

50-07 Construction layout and stakes. The Engineer/RPR shall establish necessary horizontal and vertical control. The establishment of Survey Control and/or reestablishment of survey control shall be by a State Licensed Land Surveyor. Contractor is responsible for preserving integrity of horizontal and vertical controls established by Engineer/RPR. In case of negligence on the part of the Contractor or their employees, resulting in the destruction of any horizontal and vertical control, the resulting costs will be deducted as a liquidated damage against the Contractor.

Prior to the start of construction, the Contractor will check all control points for horizontal and vertical accuracy and certify in writing to the RPR that the Contractor concurs with survey control established for the project. All lines, grades and measurements from control points necessary for the proper execution and control of the work on this project will be provided to the RPR. The Contractor is responsible to establish all layout required for the construction of the project.

Copies of survey notes will be provided to the RPR for each area of construction and for each placement of material as specified to allow the RPR to make periodic checks for conformance with plan grades, alignments and grade tolerances required by the applicable material specifications. Surveys will be provided to the RPR prior to commencing work items that cover or disturb the survey staking. Survey(s) and notes shall be provided in the following format(s): **AutoCad Drawings and handwritten or typed Microsoft Office Word notes.**

Laser, GPS, String line, or other automatic control shall be checked with temporary control as necessary. In the case of error, on the part of the Contractor, their surveyor, employees or subcontractors, resulting in established grades, alignment or grade tolerances that do not concur with those specified or shown on the plans, the Contractor is solely responsible for correction, removal, replacement and all associated costs at no additional cost to the Owner.

No direct payment will be made, unless otherwise specified in contract documents, for this labor, materials, or other expenses. The cost shall be included in the price of the bid for the various items of the Contract.

50-08 Authority and duties of Quality Assurance (QA) inspectors. QA inspectors shall be authorized to inspect all work done and all material furnished. Such QA inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. QA inspectors are not authorized to revoke, alter, or waive any provision of the contract. QA inspectors are not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor.

QA Inspectors are authorized to notify the Contractor or their representatives of any failure of the work or materials to conform to the requirements of the contract, plans, or specifications and to reject such nonconforming materials in question until such issues can be referred to the RPR for a decision.

50-09 Inspection of the work. All materials and each part or detail of the work shall be subject to inspection. The RPR shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

If the RPR requests it, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be at the Contractor's expense.

Provide advance written notice to the RPR of work the Contractor plans to perform each week and each day. Any work done or materials used without written notice and allowing opportunity for inspection by the RPR may be ordered removed and replaced at the Contractor's expense.

Should the contract work include relocation, adjustment, or any other modification to existing facilities, not the property of the (contract) Owner, authorized representatives of the Owners of such facilities shall have the right to inspect such work. Such inspection shall in no sense make any facility owner a party to the contract, and shall in no way interfere with the rights of the parties to this contract.

50-10 Removal of unacceptable and unauthorized work. All work that does not conform to the requirements of the contract, plans, and specifications will be considered unacceptable, unless otherwise determined acceptable by the RPR as provided in paragraph 50-02, *Conformity with Plans and Specifications*.

Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed

immediately and replaced in an acceptable manner in accordance with the provisions of Section 70, paragraph 70-14, *Contractor's Responsibility for Work*.

No removal work made under provision of this paragraph shall be done without lines and grades having been established by the RPR. Work done contrary to the instructions of the RPR, work done beyond the lines shown on the plans or as established by the RPR, except as herein specified, or any extra work done without authority, will be considered as unauthorized and will not be paid for under the provisions of the contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply with any order of the RPR made under the provisions of this subsection, the RPR will have authority to cause unacceptable work to be remedied or removed and replaced; and unauthorized work to be removed and recover the resulting costs as a liquidated damage against the Contractor.

50-11 Load restrictions. The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads beyond the limits of the work. A special permit will not relieve the Contractor of liability for damage that may result from the moving of material or equipment.

The operation of equipment of such weight or so loaded as to cause damage to structures or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited as directed. No loads will be permitted on a concrete pavement, base, or structure before the expiration of the curing period. The Contractor, at their own expense, shall be responsible for the repair to equal or better than preconstruction conditions of any damage caused by the Contractor's equipment and personnel.

50-12 Maintenance during construction. The Contractor shall maintain the work during construction and until the work is accepted. Maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

In the case of a contract for the placing of a course upon a course or subgrade previously constructed, the Contractor shall maintain the previous course or subgrade during all construction operations.

All costs of maintenance work during construction and before the project is accepted shall be included in the unit prices bid on the various contract items, and the Contractor will not be paid an additional amount for such work.

50-13 Failure to maintain the work. Should the Contractor at any time fail to maintain the work as provided in paragraph 50-12, *Maintenance during Construction*, the RPR shall immediately notify the Contractor of such noncompliance. Such notification shall specify a reasonable time within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. The time specified will give due consideration to the exigency that exists.

Should the Contractor fail to respond to the RPR's notification, the Owner may suspend any work necessary for the Owner to correct such unsatisfactory maintenance condition, depending on the exigency that exists. Any maintenance cost incurred by the Owner, shall be recovered as a liquidated damage against the Contractor.

50-14 Partial acceptance. If at any time during the execution of the project the Contractor substantially completes a usable unit or portion of the work, the occupancy of which will benefit the Owner, the Contractor may request the RPR to make final inspection of that unit. If the RPR finds upon inspection that the unit has been satisfactorily completed in compliance with the contract, the RPR may accept it as being complete, and the Contractor may be relieved of further responsibility for that unit. Such partial acceptance and beneficial occupancy by the Owner shall not void or alter any provision of the contract.

50-15 Final acceptance. Upon due notice from the Contractor of presumptive completion of the entire project, the RPR and Owner will make an inspection. If all construction provided for and contemplated by

the contract is found to be complete in accordance with the contract, plans, and specifications, such inspection shall constitute the final inspection. The RPR shall notify the Contractor in writing of final acceptance as of the date of the final inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the RPR will notify the Contractor and the Contractor shall correct the unsatisfactory work. Upon correction of the work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed. In such event, the RPR will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

50-16 Claims for adjustment and disputes. If for any reason the Contractor deems that additional compensation is due for work or materials not clearly provided for in the contract, plans, or specifications or previously authorized as extra work, the Contractor shall notify the RPR in writing of their intention to claim such additional compensation before the Contractor begins the work on which the Contractor bases the claim. If such notification is not given or the RPR is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor and the fact that the RPR has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within 10 calendar days, submit a written claim to the RPR who will present it to the Owner for consideration in accordance with local laws or ordinances.

Nothing in this subsection shall be construed as a waiver of the Contractor's right to dispute final payment based on differences in measurements or computations.

END OF SECTION 50

Section 60 Control of Materials

60-01 Source of supply and quality requirements. The materials used in the work shall conform to the requirements of the contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

In order to expedite the inspection and testing of materials, the Contractor shall furnish documentation to the RPR as to the origin, composition, and manufacture of all materials to be used in the work. Documentation shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials.

At the RPR's option, materials may be approved at the source of supply before delivery. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish materials from other sources.

The Contractor shall furnish airport lighting equipment that meets the requirements of the specifications; and is listed in AC 150/5345-53, *Airport Lighting Equipment Certification Program and Addendum*, that is in effect on the date of advertisement.

60-02 Samples, tests, and cited specifications. All materials used in the work shall be inspected, tested, and approved by the RPR before incorporation in the work unless otherwise designated. Any work in which untested materials are used without approval or written permission of the RPR shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the RPR, shall be removed at the Contractor's expense.

Unless otherwise designated, quality assurance tests will be made by and at the expense of the Owner in accordance with the cited standard methods of ASTM, American Association of State Highway and Transportation Officials (AASHTO), federal specifications, Commercial Item Descriptions, and all other cited methods, which are current on the date of advertisement for bids.

The testing organizations performing on-site quality assurance field tests shall have copies of all referenced standards on the construction site for use by all technicians and other personnel. Unless otherwise designated, samples for quality assurance will be taken by a qualified representative of the RPR. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the work. Copies of all tests will be furnished to the Contractor's representative at their request after review and approval of the RPR.

A copy of all Contractor QC test data shall be provided to the RPR daily, along with printed reports, in an approved format, on a weekly basis. After completion of the project, and prior to final payment, the Contractor shall submit a final report to the RPR showing all test data reports, plus an analysis of all results showing ranges, averages, and corrective action taken on all failing tests.

The Contractor shall employ a Quality Control (QC) testing organization to perform all Contractor required QC tests in accordance with Item C-100 Contractor Quality Control Program (CQCP).

60-03 Certification of compliance/analysis (COC/COA). The RPR may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's COC stating that such materials or assemblies fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified. The COA is the manufacturer's COC and includes all applicable test results.

Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

The form and distribution of certificates of compliance shall be as approved by the RPR.

When a material or assembly is specified by “brand name or equal” and the Contractor elects to furnish the specified “or equal,” the Contractor shall be required to furnish the manufacturer’s certificate of compliance for each lot of such material or assembly delivered to the work. Such certificate of compliance shall clearly identify each lot delivered and shall certify as to:

- a. Conformance to the specified performance, testing, quality or dimensional requirements; and,
- b. Suitability of the material or assembly for the use intended in the contract work.

The RPR shall be the sole judge as to whether the proposed “or equal” is suitable for use in the work.

The RPR reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

60-04 Plant inspection. The RPR or their authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for acceptance of the material or assembly.

Should the RPR conduct plant inspections, the following conditions shall exist:

- a. The RPR shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.
- b. The RPR shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.
- c. If required by the RPR, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Place office or working space in a convenient location with respect to the plant.

It is understood and agreed that the Owner shall have the right to retest any material that has been tested and approved at the source of supply after it has been delivered to the site. The RPR shall have the right to reject only material which, when retested, does not meet the requirements of the contract, plans, or specifications.

60-05 Engineer/ Resident Project Representative (RPR) field office. The Contractor shall provide dedicated space for the use of the engineer, RPR, and inspectors, as a field office for the duration of the project. This space shall be located conveniently near the construction and shall be separate from any space used by the Contractor. The Contractor shall furnish water, sanitary facilities, heat, air conditioning, and electricity.

60-06 Storage of materials. Materials shall be stored to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the RPR. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the plans and/or CSPP, the storage of materials and the location of the Contractor’s plant and parked equipment or vehicles shall be as directed by the RPR. Private property shall not be used for storage purposes without written permission of the Owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for

the storage of materials on private property. Upon request, the Contractor shall furnish the RPR a copy of the property Owner's permission.

All storage sites on private or airport property shall be restored to their original condition by the Contractor at their expense, except as otherwise agreed to (in writing) by the Owner or lessee of the property.

60-07 Unacceptable materials. Any material or assembly that does not conform to the requirements of the contract, plans, or specifications shall be considered unacceptable and shall be rejected. The Contractor shall remove any rejected material or assembly from the site of the work, unless otherwise instructed by the RPR.

Rejected material or assembly, the defects of which have been corrected by the Contractor, shall not be returned to the site of the work until such time as the RPR has approved its use in the work.

60-08 Owner furnished materials. The Contractor shall furnish all materials required to complete the work, except those specified, if any, to be furnished by the Owner. Owner-furnished materials shall be made available to the Contractor at the location specified.

All costs of handling, transportation from the specified location to the site of work, storage, and installing Owner-furnished materials shall be included in the unit price bid for the contract item in which such Owner-furnished material is used.

After any Owner-furnished material has been delivered to the location specified, the Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies that may occur during the Contractor's handling, storage, or use of such Owner-furnished material. The Owner will deduct from any monies due or to become due the Contractor any cost incurred by the Owner in making good such loss due to the Contractor's handling, storage, or use of Owner-furnished materials.

END OF SECTION 60

Section 70 Legal Regulations and Responsibility to Public

70-01 Laws to be observed. The Contractor shall keep fully informed of all federal and state laws, all local laws, ordinances, and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. The Contractor shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the Owner and all their officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or the Contractor's employees.

70-02 Permits, licenses, and taxes. The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful execution of the work.

70-03 Patented devices, materials, and processes. If the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall provide for such use by suitable legal agreement with the Patentee or Owner. The Contractor and the surety shall indemnify and hold harmless the Owner, any third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay by reason of an infringement, at any time during the execution or after the completion of the work.

70-04 Restoration of surfaces disturbed by others. The Owner reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, FAA or National Oceanic and Atmospheric Administration (NOAA) facility, or a utility service of another government agency at any time during the progress of the work. To the extent that such construction, reconstruction, or maintenance has been coordinated with the Owner, such authorized work (by others) must be shown on the plans and is indicated as follows: **No other work is anticipated during this contract.**

Except as listed above, the Contractor shall not permit any individual, firm, or corporation to excavate or otherwise disturb such utility services or facilities located within the limits of the work without the written permission of the RPR.

Should the Owner of public or private utility service, FAA, or NOAA facility, or a utility service of another government agency be authorized to construct, reconstruct, or maintain such utility service or facility during the progress of the work, the Contractor shall cooperate with such Owners by arranging and performing the work in this contract to facilitate such construction, reconstruction or maintenance by others whether or not such work by others is listed above. When ordered as extra work by the RPR, the Contractor shall make all necessary repairs to the work which are due to such authorized work by others, unless otherwise provided for in the contract, plans, or specifications. It is understood and agreed that the Contractor shall not be entitled to make any claim for damages due to such authorized work by others or for any delay to the work resulting from such authorized work.

70-05 Federal Participation. The United States Government has agreed to reimburse the Owner for some portion of the contract costs. The contract work is subject to the inspection and approval of duly authorized representatives of the FAA Administrator. No requirement of this contract shall be construed as making the United States a party to the contract nor will any such requirement interfere, in any way, with the rights of either party to the contract.

70-06 Sanitary, health, and safety provisions. The Contractor's worksite and facilities shall comply with applicable federal, state, and local requirements for health, safety and sanitary provisions.

70-07 Public convenience and safety. The Contractor shall control their operations and those of their subcontractors and all suppliers, to assure the least inconvenience to the traveling public. Under all circumstances, safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of aircraft and vehicular traffic with respect to their own operations and those of their own subcontractors and all suppliers in accordance with Section 40, paragraph 40-05, *Maintenance of Traffic*, and shall limit such operations for the convenience and safety of the traveling public as specified in Section 80, paragraph 80-04, *Limitation of Operations*.

The Contractor shall remove or control debris and rubbish resulting from its work operations at frequent intervals, and upon the order of the RPR. If the RPR determines the existence of Contractor debris in the work site represents a hazard to airport operations and the Contractor is unable to respond in a prompt and reasonable manner, the RPR reserves the right to assign the task of debris removal to a third party and recover the resulting costs as a liquidated damage against the Contractor.

70-08 Construction Safety and Phasing Plan (CSPP). The Contractor shall complete the work in accordance with the approved Construction Safety and Phasing Plan (CSPP) developed in accordance with AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP is on sheet(s) **2 & 3** of the project plans.

70-09 Use of explosives. The use of explosives is not permitted on this project.

70-10 Protection and restoration of property and landscape. The Contractor shall be responsible for the preservation of all public and private property, and shall protect carefully from disturbance or damage all land monuments and property markers until the Engineer/RPR has witnessed or otherwise referenced their location and shall not move them until directed.

The Contractor shall be responsible for all damage or injury to property of any character, during the execution of the work, resulting from any act, omission, neglect, or misconduct in manner or method of executing the work, or at any time due to defective work or materials, and said responsibility shall not be released until the project has been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the non-execution thereof by the Contractor, the Contractor shall restore, at their expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, or otherwise restoring as may be directed, or the Contractor shall make good such damage or injury in an acceptable manner.

70-11 Responsibility for damage claims. The Contractor shall indemnify and hold harmless the Engineer/RPR and the Owner and their officers, agents, and employees from all suits, actions, or claims, of any character, brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the "Workmen's Compensation Act," or any other law, ordinance, order, or decree. Money due the Contractor under and by virtue of their own contract considered necessary by the Owner for such purpose may be retained for the use of the Owner or, in case no money is due, their own surety may be held until such suits, actions, or claims for injuries or damages shall have been settled and suitable evidence to that effect furnished to the Owner, except that money due the

Contractor will not be withheld when the Contractor produces satisfactory evidence that he or she is adequately protected by public liability and property damage insurance.

70-12 Third party beneficiary clause. It is specifically agreed between the parties executing the contract that it is not intended by any of the provisions of any part of the contract to create for the public or any member thereof, a third-party beneficiary or to authorize anyone not a party to the contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of the contract.

70-13 Opening sections of the work to traffic. If it is necessary for the Contractor to complete portions of the contract work for the beneficial occupancy of the Owner prior to completion of the entire contract, such “phasing” of the work must be specified below and indicated on the approved Construction Safety and Phasing Plan (CSPP) and the project plans. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified.

- **Phase or Description**
- **Required Date or Sequence of Owner’s Beneficial Occupancy**
- **Work Shown on Plan Sheet**

Upon completion of any portion of work listed above, such portion shall be accepted by the Owner in accordance with Section 50, paragraph 50-14, *Partial Acceptance*.

No portion of the work may be opened by the Contractor until directed by the Owner in writing. Should it become necessary to open a portion of the work to traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the RPR, such portion of the work is in an acceptable condition to support the intended traffic. Temporary or intermittent openings are considered to be inherent in the work and shall not constitute either acceptance of the portion of the work so opened or a waiver of any provision of the contract. Any damage to the portion of the work so opened that is not attributable to traffic which is permitted by the Owner shall be repaired by the Contractor at their expense.

The Contractor shall make their own estimate of the inherent difficulties involved in completing the work under the conditions herein described and shall not claim any added compensation by reason of delay or increased cost due to opening a portion of the contract work.

The Contractor must conform to safety standards contained AC 150/5370-2 and the approved CSPP.

Contractor shall refer to the plans, specifications, and the approved CSPP to identify barricade requirements, temporary and/or permanent markings, airfield lighting, guidance signs and other safety requirements prior to opening up sections of work to traffic.

70-14 Contractor’s responsibility for work. Until the RPR’s final written acceptance of the entire completed work, excepting only those portions of the work accepted in accordance with Section 50, paragraph 50-14, *Partial Acceptance*, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God such as earthquake, tidal wave, tornado, hurricane or other cataclysmic phenomenon of nature, or acts of the public enemy or of government authorities.

If the work is suspended for any cause whatever, the Contractor shall be responsible for the work and shall take such precautions necessary to prevent damage to the work. The Contractor shall provide for normal drainage and shall erect necessary temporary structures, signs, or other facilities at their own expense. During such period of suspension of work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established planting, seeding,

and sodding furnished under the contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

70-15 Contractor's responsibility for utility service and facilities of others. As provided in paragraph 70-04, *Restoration of Surfaces Disturbed by Others*, the Contractor shall cooperate with the owner of any public or private utility service, FAA or NOAA, or a utility service of another government agency that may be authorized by the Owner to construct, reconstruct or maintain such utility services or facilities during the progress of the work. In addition, the Contractor shall control their operations to prevent the unscheduled interruption of such utility services and facilities.

To the extent that such public or private utility services, FAA, or NOAA facilities, or utility services of another governmental agency are known to exist within the limits of the contract work, the approximate locations have been indicated on the plans and/or in the contract documents.

The approximate location of any public or private utilities or facilities, within construction limits, are shown on plan sheets..

It is understood and agreed that the Owner does not guarantee the accuracy or the completeness of the location information relating to existing utility services, facilities, or structures that may be shown on the plans or encountered in the work. Any inaccuracy or omission in such information shall not relieve the Contractor of the responsibility to protect such existing features from damage or unscheduled interruption of service.

It is further understood and agreed that the Contractor shall, upon execution of the contract, notify the Owners of all utility services or other facilities of their plan of operations. Such notification shall be in writing addressed to "The Person to Contact" as provided in this paragraph and paragraph 70-04, *Restoration of Surfaces Disturbed By Others*. A copy of each notification shall be given to the RPR.

In addition to the general written notification provided, it shall be the responsibility of the Contractor to keep such individual Owners advised of changes in their plan of operations that would affect such Owners.

Prior to beginning the work in the general vicinity of an existing utility service or facility, the Contractor shall again notify each such Owner of their plan of operation. If, in the Contractor's opinion, the Owner's assistance is needed to locate the utility service or facility or the presence of a representative of the Owner is desirable to observe the work, such advice should be included in the notification. Such notification shall be given by the most expeditious means to reach the utility owner's "Person to Contact" no later than two normal business days prior to the Contractor's commencement of operations in such general vicinity. The Contractor shall furnish a written summary of the notification to the RPR.

The Contractor's failure to give the two days' notice shall be cause for the Owner to suspend the Contractor's operations in the general vicinity of a utility service or facility.

Where the outside limits of an underground utility service have been located and staked on the ground, the Contractor shall be required to use hand excavation methods within 3 feet (1 m) of such outside limits at such points as may be required to ensure protection from damage due to the Contractor's operations.

Should the Contractor damage or interrupt the operation of a utility service or facility by accident or otherwise, the Contractor shall immediately notify the proper authority and the RPR and shall take all reasonable measures to prevent further damage or interruption of service. The Contractor, in such events, shall cooperate with the utility service or facility owner and the RPR continuously until such damage has been repaired and service restored to the satisfaction of the utility or facility owner.

The Contractor shall bear all costs of damage and restoration of service to any utility service or facility due to their operations whether due to negligence or accident. The Owner reserves the right to deduct such costs from any monies due or which may become due the Contractor, or their own surety.

70-15.1 FAA facilities and cable runs. Not applicable to this project.

70-16 Furnishing rights-of-way. The Owner will be responsible for furnishing all rights-of-way upon which the work is to be constructed in advance of the Contractor's operations.

70-17 Personal liability of public officials. In carrying out any of the contract provisions or in exercising any power or authority granted by this contract, there shall be no liability upon the Engineer, RPR, their authorized representatives, or any officials of the Owner either personally or as an official of the Owner. It is understood that in such matters they act solely as agents and representatives of the Owner.

70-18 No waiver of legal rights. Upon completion of the work, the Owner will expeditiously make final inspection and notify the Contractor of final acceptance. Such final acceptance, however, shall not preclude or stop the Owner from correcting any measurement, estimate, or certificate made before or after completion of the work, nor shall the Owner be precluded or stopped from recovering from the Contractor or their surety, or both, such overpayment as may be sustained, or by failure on the part of the Contractor to fulfill their obligations under the contract. A waiver on the part of the Owner of any breach of any part of the contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor, without prejudice to the terms of the contract, shall be liable to the Owner for latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the Owner's rights under any warranty or guaranty.

70-19 Environmental protection. The Contractor shall comply with all federal, state, and local laws and regulations controlling pollution of the environment. The Contractor shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, asphalts, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

70-20 Archaeological and historical findings. Unless otherwise specified in this subsection, the Contractor is advised that the site of the work is not within any property, district, or site, and does not contain any building, structure, or object listed in the current National Register of Historic Places published by the United States Department of Interior.

Should the Contractor encounter, during their operations, any building, part of a building, structure, or object that is incongruous with its surroundings, the Contractor shall immediately cease operations in that location and notify the RPR. The RPR will immediately investigate the Contractor's finding and the Owner will direct the Contractor to either resume operations or to suspend operations as directed.

Should the Owner order suspension of the Contractor's operations in order to protect an archaeological or historical finding, or order the Contractor to perform extra work, such shall be covered by an appropriate contract change order or supplemental agreement as provided in Section 40, paragraph 40-04, *Extra Work*, and Section 90, paragraph 90-05, *Payment for Extra Work*. If appropriate, the contract change order or supplemental agreement shall include an extension of contract time in accordance with Section 80, paragraph 80-07, *Determination and Extension of Contract Time*.

70-21 Insurance Requirements. See Insurance and Liability in the Special Provisions in the specifications.

END OF SECTION 70

Section 80 Execution and Progress

80-01 Subletting of contract. The Owner will not recognize any subcontractor on the work. The Contractor shall at all times when work is in progress be represented either in person, by a qualified superintendent, or by other designated, qualified representative who is duly authorized to receive and execute orders of the Resident Project Representative (RPR).

The Contractor shall perform, with his organization, an amount of work equal to at least **30** percent of the total contract cost.

Should the Contractor elect to assign their contract, said assignment shall be concurred in by the surety, shall be presented for the consideration and approval of the Owner, and shall be consummated only on the written approval of the Owner.

The Contractor shall provide copies of all subcontracts to the RPR 14 days prior to being utilized on the project. As a minimum, the information shall include the following:

- Subcontractor's legal company name.
- Subcontractor's legal company address, including County name.
- Principal contact person's name, telephone and fax number.
- Complete narrative description, and dollar value of the work to be performed by the subcontractor.
- Copies of required insurance certificates in accordance with the specifications.
- Minority/ non-minority status.

80-02 Notice to proceed (NTP). The Owners notice to proceed will state the date on which contract time commences. The Contractor is expected to commence project operations within 10 days of the NTP date. The Contractor shall notify the RPR at least 24 hours in advance of the time contract operations begins. The Contractor shall not commence any actual operations prior to the date on which the notice to proceed is issued by the Owner.

80-03 Execution and progress. Unless otherwise specified, the Contractor shall submit their coordinated construction schedule showing all work activities for the RPR's review and acceptance at least 10 days prior to the start of work. The Contractor's progress schedule, once accepted by the RPR, will represent the Contractor's baseline plan to accomplish the project in accordance with the terms and conditions of the Contract. The RPR will compare actual Contractor progress against the baseline schedule to determine that status of the Contractor's performance. The Contractor shall provide sufficient materials, equipment, and labor to guarantee the completion of the project in accordance with the plans and specifications within the time set forth in the proposal.

If the Contractor falls significantly behind the submitted schedule, the Contractor shall, upon the RPR's request, submit a revised schedule for completion of the work within the contract time and modify their operations to provide such additional materials, equipment, and labor necessary to meet the revised schedule. Should the execution of the work be discontinued for any reason, the Contractor shall notify the RPR at least 24 hours in advance of resuming operations.

The Contractor shall not commence any actual construction prior to the date on which the NTP is issued by the Owner.

The project schedule shall be prepared as a network diagram in Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), or other format, or as otherwise specified. It shall include information on the sequence of work activities, milestone dates, and activity duration. The schedule shall show all work items identified in the project proposal for each work area and shall include the project start date and end date.

The Contractor shall maintain the work schedule and provide an update and analysis of the progress schedule on a twice monthly basis, or as otherwise specified in the contract. Submission of the work schedule shall not relieve the Contractor of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract.

80-04 Limitation of operations. The Contractor shall control their operations and the operations of their subcontractors and all suppliers to provide for the free and unobstructed movement of aircraft in the air operations areas (AOA) of the airport.

When the work requires the Contractor to conduct their operations within an AOA of the airport, the work shall be coordinated with airport operations (through the RPR) at least 48 hours prior to commencement of such work. The Contractor shall not close an AOA until so authorized by the RPR and until the necessary temporary marking, signage and associated lighting is in place as provided in Section 70, paragraph 70-08, *Construction Safety and Phasing Plan (CSPP)*.

When the contract work requires the Contractor to work within an AOA of the airport on an intermittent basis (intermittent opening and closing of the AOA), the Contractor shall maintain constant communications as specified; immediately obey all instructions to vacate the AOA; and immediately obey all instructions to resume work in such AOA. Failure to maintain the specified communications or to obey instructions shall be cause for suspension of the Contractor's operations in the AOA until satisfactory conditions are provided. The areas of the AOA identified in the Construction Safety Phasing Plan (CSPP) and as listed below, cannot be closed to operating aircraft to permit the Contractor's operations on a continuous basis and will therefore be closed to aircraft operations intermittently as follows:

The closing of any AOA shall be coordinated as shown on the Construction Safety and Phasing Plan.

The Contractor shall be required to conform to safety standards contained in AC 150/5370-2, Operational Safety on Airports During Construction and the approved CSPP.

80-04.1 Operational safety on airport during construction. All Contractors' operations shall be conducted in accordance with the approved project Construction Safety and Phasing Plan (CSPP) and the Safety Plan Compliance Document (SPCD) and the provisions set forth within the current version of AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP included within the contract documents conveys minimum requirements for operational safety on the airport during construction activities. The Contractor shall prepare and submit a SPCD that details how it proposes to comply with the requirements presented within the CSPP.

The Contractor shall implement all necessary safety plan measures prior to commencement of any work activity. The Contractor shall conduct routine checks to assure compliance with the safety plan measures.

The Contractor is responsible to the Owner for the conduct of all subcontractors it employs on the project. The Contractor shall assure that all subcontractors are made aware of the requirements of the CSPP and SPCD and that they implement and maintain all necessary measures.

No deviation or modifications may be made to the approved CSPP and SPCD unless approved in writing by the Owner. The necessary coordination actions to review Contractor proposed modifications to an approved CSPP or approved SPCD can require a significant amount of time.

80-05 Character of workers, methods, and equipment. The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting the work to full completion in the manner and time required by the contract, plans, and specifications.

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.

Any person employed by the Contractor or by any subcontractor who violates any operational regulations or operational safety requirements and, in the opinion of the RPR, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the RPR, be removed immediately by the Contractor or subcontractor employing such person, and shall not be employed again in any portion of the work without approval of the RPR.

Should the Contractor fail to remove such person or persons, or fail to furnish suitable and sufficient personnel for the proper execution of the work, the RPR may suspend the work by written notice until compliance with such orders.

All equipment that is proposed to be used on the work shall be of sufficient size and in such mechanical condition as to meet requirements of the work and to produce a satisfactory quality of work. Equipment used on any portion of the work shall not cause injury to previously completed work, adjacent property, or existing airport facilities due to its use.

When the methods and equipment to be used by the Contractor in accomplishing the work are not prescribed in the contract, the Contractor is free to use any methods or equipment that will accomplish the work in conformity with the requirements of the contract, plans, and specifications.

When the contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless otherwise authorized by the RPR. If the Contractor desires to use a method or type of equipment other than specified in the contract, the Contractor may request authority from the RPR to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing work in conformity with contract requirements. If, after trial use of the substituted methods or equipment, the RPR determines that the work produced does not meet contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove any deficient work and replace it with work of specified quality, or take such other corrective action as the RPR may direct. No change will be made in basis of payment for the contract items involved nor in contract time as a result of authorizing a change in methods or equipment under this paragraph.

80-06 Temporary suspension of the work. The Owner shall have the authority to suspend the work wholly, or in part, for such period or periods the Owner may deem necessary, due to unsuitable weather, or other conditions considered unfavorable for the execution of the work, or for such time necessary due to the failure on the part of the Contractor to carry out orders given or perform any or all provisions of the contract.

In the event that the Contractor is ordered by the Owner, in writing, to suspend work for some unforeseen cause not otherwise provided for in the contract and over which the Contractor has no control, the Contractor may be reimbursed for actual money expended on the work during the period of shutdown. No allowance will be made for anticipated profits. The period of shutdown shall be computed from the

effective date of the written order to suspend work to the effective date of the written order to resume the work. Claims for such compensation shall be filed with the RPR within the time period stated in the RPR's order to resume work. The Contractor shall submit with their own claim information substantiating the amount shown on the claim. The RPR will forward the Contractor's claim to the Owner for consideration in accordance with local laws or ordinances. No provision of this article shall be construed as entitling the Contractor to compensation for delays due to inclement weather or for any other delay provided for in the contract, plans, or specifications.

If it becomes necessary to suspend work for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction nor become damaged in any way. The Contractor shall take every precaution to prevent damage or deterioration of the work performed and provide for normal drainage of the work. The Contractor shall erect temporary structures where necessary to provide for traffic on, to, or from the airport.

80-07 Determination and extension of contract time. The number of calendar days shall be stated in the proposal and contract and shall be known as the Contract Time.

If the contract time requires extension for reasons beyond the Contractor's control, it shall be adjusted as follows:

Contract time based on calendar days. Contract Time based on calendar days shall consist of the number of calendar days stated in the contract counting from the effective date of the Notice to Proceed and including all Saturdays, Sundays, holidays, and non-work days. All calendar days elapsing between the effective dates of the Owner's orders to suspend and resume all work, due to causes not the fault of the Contractor, shall be excluded.

At the time of final payment, the contract time shall be increased in the same proportion as the cost of the actually completed quantities bears to the cost of the originally estimated quantities in the proposal. Such increase in the contract time shall not consider either cost of work or the extension of contract time that has been covered by a change order or supplemental agreement. Charges against the contract time will cease as of the date of final acceptance.

80-08 Failure to complete on time. For each calendar day or working day, as specified in the contract, that any work remains uncompleted after the contract time (including all extensions and adjustments as provided in paragraph 80-07, *Determination and Extension of Contract Time*) the sum specified in the contract and proposal as liquidated damages (LD) will be deducted from any money due or to become due the Contractor or their own surety. Such deducted sums shall not be deducted as a penalty but shall be considered as liquidation of a reasonable portion of damages including but not limited to additional engineering services that will be incurred by the Owner should the Contractor fail to complete the work in the time provided in their contract.

Schedule	Liquidated Damages Cost	Allowed Construction Time
A & B	\$350/DAY	120 Calendar Days

The maximum construction time allowed for Schedules **A & B** will be the sum of the time allowed for individual schedules but not more than **120** days. Permitting the Contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way operate as a waiver on the part of the Owner of any of its rights under the contract.

80-09 Default and termination of contract. The Contractor shall be considered in default of their contract and such default will be considered as cause for the Owner to terminate the contract for any of the following reasons, if the Contractor:

- a. Fails to begin the work under the contract within the time specified in the Notice to Proceed, or
- b. Fails to perform the work or fails to provide sufficient workers, equipment and/or materials to assure completion of work in accordance with the terms of the contract, or
- c. Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable, or
- d. Discontinues the execution of the work, or
- e. Fails to resume work which has been discontinued within a reasonable time after notice to do so, or
- f. Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency, or
- g. Allows any final judgment to stand against the Contractor unsatisfied for a period of 10 days, or
- h. Makes an assignment for the benefit of creditors, or
- i. For any other cause whatsoever, fails to carry on the work in an acceptable manner.

Should the Owner consider the Contractor in default of the contract for any reason above, the Owner shall immediately give written notice to the Contractor and the Contractor's surety as to the reasons for considering the Contractor in default and the Owner's intentions to terminate the contract.

If the Contractor or surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the Owner will, upon written notification from the RPR of the facts of such delay, neglect, or default and the Contractor's failure to comply with such notice, have full power and authority without violating the contract, to take the execution of the work out of the hands of the Contractor. The Owner may appropriate or use any or all materials and equipment that have been mobilized for use in the work and are acceptable and may enter into an agreement for the completion of said contract according to the terms and provisions thereof, or use such other methods as in the opinion of the RPR will be required for the completion of said contract in an acceptable manner.

All costs and charges incurred by the Owner, together with the cost of completing the work under contract, will be deducted from any monies due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the contract, then the Contractor and the surety shall be liable and shall pay to the Owner the amount of such excess.

80-10 Termination for national emergencies. The Owner shall terminate the contract or portion thereof by written notice when the Contractor is prevented from proceeding with the construction contract as a direct result of an Executive Order of the President with respect to the execution of war or in the interest of national defense.

When the contract, or any portion thereof, is terminated before completion of all items of work in the contract, payment will be made for the actual number of units or items of work completed at the contract price or as mutually agreed for items of work partially completed or not started. No claims or loss of anticipated profits shall be considered.

Reimbursement for organization of the work, and other overhead expenses, (when not otherwise included in the contract) and moving equipment and materials to and from the job will be considered, the intent being that an equitable settlement will be made with the Contractor.

Acceptable materials, obtained or ordered by the Contractor for the work and that are not incorporated in the work shall, at the option of the Contractor, be purchased from the Contractor at actual cost as shown by receipted bills and actual cost records at such points of delivery as may be designated by the RPR.

Termination of the contract or a portion thereof shall neither relieve the Contractor of their responsibilities for the completed work nor shall it relieve their surety of its obligation for and concerning any just claim arising out of the work performed.

80-11 Work area, storage area and sequence of operations. The Contractor shall obtain approval from the RPR prior to beginning any work in all areas of the airport. No operating runway, taxiway, or air operations area (AOA) shall be crossed, entered, or obstructed while it is operational. The Contractor shall plan and coordinate work in accordance with the approved CSPP and SPCD.

END OF SECTION 80

Section 90 Measurement and Payment

90-01 Measurement of quantities. All work completed under the contract will be measured by the RPR, or their authorized representatives, using United States Customary Units of Measurement.

The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

Unless otherwise specified, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual fixtures (or leave-outs) having an area of 9 square feet or less. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing by the RPR.

Unless otherwise specified, all contract items which are measured by the linear foot such as electrical ducts, conduits, pipe culverts, underdrains, and similar items shall be measured parallel to the base or foundation upon which such items are placed.

The term “lump sum” when used as an item of payment will mean complete payment for the work described in the contract. When a complete structure or structural unit (in effect, “lump sum” work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

When requested by the Contractor and approved by the RPR in writing, material specified to be measured by the cubic yard (cubic meter) may be weighed, and such weights will be converted to cubic yards (cubic meters) for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the RPR and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.

Measurement and Payment Terms

Term	Description
Excavation and Embankment Volume	In computing volumes of excavation, the average end area method will be used unless otherwise specified.
Measurement and Proportion by Weight	The term “ton” will mean the short ton consisting of 2,000 pounds avoirdupois. All materials that are measured or proportioned by weights shall be weighed on accurate, independently certified scales by competent, qualified personnel at locations designated by the RPR. If material is shipped by rail, the car weight may be accepted provided that only the actual weight of material is paid for. However, car weights will not be acceptable for material to be passed through mixing plants. Trucks used to haul material being paid for by weight shall be weighed empty daily at such times as the RPR directs, and each truck shall bear a plainly legible identification mark.
Measurement by Volume	Materials to be measured by volume in the hauling vehicle shall be hauled in approved vehicles and measured therein at the point of delivery. Vehicles for this purpose may be of any size or type acceptable for the materials hauled, provided that the body is of such shape that the actual contents may be readily and accurately determined. All vehicles

Term	Description
	shall be loaded to at least their water level capacity, and all loads shall be leveled when the vehicles arrive at the point of delivery.
Asphalt Material	Asphalt materials will be measured by the gallon or ton. When measured by volume, such volumes will be measured at 60°F or will be corrected to the volume at 60°F using ASTM D1250 for asphalts. Net certified scale weights or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject to correction when asphalt material has been lost from the car or the distributor, wasted, or otherwise not incorporated in the work. When asphalt materials are shipped by truck or transport, net certified weights by volume, subject to correction for loss or foaming, will be used for computing quantities.
Cement	Cement will be measured by the ton or hundredweight.
Structure	Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.
Timber	Timber will be measured by the thousand feet board measure (MFBM) actually incorporated in the structure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.
Plates and Sheets	The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing will be specified and measured in decimal fraction of inch.
Miscellaneous Items	When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gauge, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.
Scales	<p>Scales must be tested for accuracy and serviced before use. Scales for weighing materials which are required to be proportioned or measured and paid for by weight shall be furnished, erected, and maintained by the Contractor, or be certified permanently installed commercial scales. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end.</p> <p>Scales shall be accurate within 0.5% of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the RPR before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed 0.1% of the nominal rated capacity of the scale, but not less than one pound. The use of spring balances will not be permitted.</p> <p>In the event inspection reveals the scales have been “overweighing” (indicating more than correct weight) they will be immediately adjusted. All materials received subsequent to the last previous correct weighing-accuracy test will be reduced by the percentage of error in excess of 0.5%.</p> <p>In the event inspection reveals the scales have been under-weighing (indicating less than correct weight), they shall be immediately adjusted. No additional payment to the Contractor will be allowed for materials previously weighed and recorded.</p> <p>Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the RPR can safely and conveniently view them.</p>

Term	Description
	<p>Scale installations shall have available ten standard 50-pound weights for testing the weighing equipment or suitable weights and devices for other approved equipment.</p> <p>All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning or payment, shall be included in the unit contract prices for the various items of the project.</p>
Rental Equipment	<p>Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the work. Special equipment ordered in connection with extra work will be measured as agreed in the change order or supplemental agreement authorizing such work as provided in paragraph 90-05 <i>Payment for Extra Work</i>.</p>
Pay Quantities	<p>When the estimated quantities for a specific portion of the work are designated as the pay quantities in the contract, they shall be the final quantities for which payment for such specific portion of the work will be made, unless the dimensions of said portions of the work shown on the plans are revised by the RPR. If revised dimensions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.</p>

90-02 Scope of payment. The Contractor shall receive and accept compensation provided for in the contract as full payment for furnishing all materials, for performing all work under the contract in a complete and acceptable manner, and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the execution thereof, subject to the provisions of Section 70, paragraph 70-18, *No Waiver of Legal Rights*.

When the “basis of payment” subsection of a technical specification requires that the contract price (price bid) include compensation for certain work or material essential to the item, this same work or material will not also be measured for payment under any other contract item which may appear elsewhere in the contract, plans, or specifications.

90-03 Compensation for altered quantities. When the accepted quantities of work vary from the quantities in the proposal, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract price for the accepted quantities of work actually completed and accepted. No allowance, except as provided for in Section 40, paragraph 40-02, *Alteration of Work and Quantities*, will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor which results directly from such alterations or indirectly from their own unbalanced allocation of overhead and profit among the contract items, or from any other cause.

90-04 Payment for omitted items. As specified in Section 40, paragraph 40-03, *Omitted Items*, the RPR shall have the right to omit from the work (order nonperformance) any contract item, except major contract items, in the best interest of the Owner.

Should the RPR omit or order nonperformance of a contract item or portion of such item from the work, the Contractor shall accept payment in full at the contract prices for any work actually completed and acceptable prior to the RPR’s order to omit or non-perform such contract item.

Acceptable materials ordered by the Contractor or delivered on the work prior to the date of the RPR’s order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the Owner.

In addition to the reimbursement hereinbefore provided, the Contractor shall be reimbursed for all actual costs incurred for the purpose of performing the omitted contract item prior to the date of the RPR’s

order. Such additional costs incurred by the Contractor must be directly related to the deleted contract item and shall be supported by certified statements by the Contractor as to the nature the amount of such costs.

90-05 Payment for extra work. Extra work, performed in accordance with Section 40, paragraph 40-04, *Extra Work*, will be paid for at the contract prices or agreed prices specified in the change order or supplemental agreement authorizing the extra work.

90-06 Partial payments. Partial payments will be made to the Contractor at least once each month as the work progresses. Said payments will be based upon estimates, prepared by the RPR, of the value of the work performed and materials complete and in place, in accordance with the contract, plans, and specifications. Such partial payments may also include the delivered actual cost of those materials stockpiled and stored in accordance with paragraph 90-07, *Payment for Materials on Hand*. No partial payment will be made when the amount due to the Contractor since the last estimate amounts to less than five hundred dollars.

a. From the total of the amount determined to be payable on a partial payment, **5%** percent of such total amount will be deducted and retained by the Owner for protection of the Owner's interests. Unless otherwise instructed by the Owner, the amount retained by the Owner will be in effect until the final payment is made except as follows:

(1) Contractor may request release of retainage on work that has been partially accepted by the Owner in accordance with Section 50-03. Contractor must provide a certified invoice to the RPR that supports the value of retainage held by the Owner for partially accepted work.

(2) In lieu of retainage, the Contractor may exercise at its option the establishment of an escrow account per paragraph 90-08.

b. The Contractor is required to pay all subcontractors for satisfactory performance of their contracts no later than 30 days after the Contractor has received a partial payment. Contractor must provide the Owner evidence of prompt and full payment of retainage held by the prime Contractor to the subcontractor within 30 days after the subcontractor's work is satisfactorily completed. A subcontractor's work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished and documented as required by the Owner. When the Owner has made an incremental acceptance of a portion of a prime contract, the work of a subcontractor covered by that acceptance is deemed to be satisfactorily completed.

c. When at least 95% of the work has been completed to the satisfaction of the RPR, the RPR shall, at the Owner's discretion and with the consent of the surety, prepare estimates of both the contract value and the cost of the remaining work to be done. The Owner may retain an amount not less than twice the contract value or estimated cost, whichever is greater, of the work remaining to be done. The remainder, less all previous payments and deductions, will then be certified for payment to the Contractor.

It is understood and agreed that the Contractor shall not be entitled to demand or receive partial payment based on quantities of work in excess of those provided in the proposal or covered by approved change orders or supplemental agreements, except when such excess quantities have been determined by the RPR to be a part of the final quantity for the item of work in question.

No partial payment shall bind the Owner to the acceptance of any materials or work in place as to quality or quantity. All partial payments are subject to correction at the time of final payment as provided in paragraph 90-09, *Acceptance and Final Payment*.

The Contractor shall deliver to the Owner a complete release of all claims for labor and material arising out of this contract before the final payment is made. If any subcontractor or supplier fails to furnish such a release in full, the Contractor may furnish a bond or other collateral satisfactory to the Owner to indemnify the Owner against any potential lien or other such claim. The bond or collateral shall include all costs, expenses, and attorney fees the Owner may be compelled to pay in discharging any such lien or claim.

90-07 Payment for materials on hand. Partial payments may be made to the extent of the delivered cost of materials to be incorporated in the work, provided that such materials meet the requirements of the contract, plans, and specifications and are delivered to acceptable sites on the airport property or at other sites in the vicinity that are acceptable to the Owner. Such delivered costs of stored or stockpiled materials may be included in the next partial payment after the following conditions are met:

- a. The material has been stored or stockpiled in a manner acceptable to the RPR at or on an approved site.
- b. The Contractor has furnished the RPR with acceptable evidence of the quantity and quality of such stored or stockpiled materials.
- c. The Contractor has furnished the RPR with satisfactory evidence that the material and transportation costs have been paid.
- d. The Contractor has furnished the Owner legal title (free of liens or encumbrances of any kind) to the material stored or stockpiled.
- e. The Contractor has furnished the Owner evidence that the material stored or stockpiled is insured against loss by damage to or disappearance of such materials at any time prior to use in the work.

It is understood and agreed that the transfer of title and the Owner's payment for such stored or stockpiled materials shall in no way relieve the Contractor of their responsibility for furnishing and placing such materials in accordance with the requirements of the contract, plans, and specifications.

In no case will the amount of partial payments for materials on hand exceed the contract price for such materials or the contract price for the contract item in which the material is intended to be used.

No partial payment will be made for stored or stockpiled living or perishable plant materials.

The Contractor shall bear all costs associated with the partial payment of stored or stockpiled materials in accordance with the provisions of this paragraph.

90-08 Payment of withheld funds. At the Contractor's option, if an Owner withholds retainage in accordance with the methods described in paragraph 90-06 *Partial Payments*, the Contractor may request that the Owner deposit the retainage into an escrow account. The Owner's deposit of retainage into an escrow account is subject to the following conditions:

- a. The Contractor shall bear all expenses of establishing and maintaining an escrow account and escrow agreement acceptable to the Owner.
- b. The Contractor shall deposit to and maintain in such escrow only those securities or bank certificates of deposit as are acceptable to the Owner and having a value not less than the retainage that would otherwise be withheld from partial payment.
- c. The Contractor shall enter into an escrow agreement satisfactory to the Owner.
- d. The Contractor shall obtain the written consent of the surety to such agreement.

90-09 Acceptance and final payment. When the contract work has been accepted in accordance with the requirements of Section 50, paragraph 50-15, *Final Acceptance*, the RPR will prepare the final estimate of the items of work actually performed. The Contractor shall approve the RPR's final estimate or advise the RPR of the Contractor's objections to the final estimate which are based on disputes in measurements or computations of the final quantities to be paid under the contract as amended by change order or supplemental agreement. The Contractor and the RPR shall resolve all disputes (if any) in the measurement and computation of final quantities to be paid within 30 calendar days of the Contractor's receipt of the RPR's final estimate. If, after such 30-day period, a dispute still exists, the Contractor may approve the RPR's estimate under protest of the quantities in dispute, and such disputed quantities shall be considered by the Owner as a claim in accordance with Section 50, paragraph 50-16, *Claims for Adjustment and Disputes*.

After the Contractor has approved, or approved under protest, the RPR's final estimate, and after the RPR's receipt of the project closeout documentation required in paragraph 90-11, *Contractor Final Project Documentation*, final payment will be processed based on the entire sum, or the undisputed sum in case of approval under protest, determined to be due the Contractor less all previous payments and all amounts to be deducted under the provisions of the contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

If the Contractor has filed a claim for additional compensation under the provisions of Section 50, paragraph 50-16, *Claims for Adjustments and Disputes*, or under the provisions of this paragraph, such claims will be considered by the Owner in accordance with local laws or ordinances. Upon final adjudication of such claims, any additional payment determined to be due the Contractor will be paid pursuant to a supplemental final estimate.

90-10 Construction warranty.

a. In addition to any other warranties in this contract, the Contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, workmanship, or design furnished, or performed by the Contractor or any subcontractor or supplier at any tier.

b. This warranty shall continue for a period of one year from the date of final acceptance of the work, except as noted. If the Owner takes possession of any part of the work before final acceptance, this warranty shall continue for a period of one year from the date the Owner takes possession. However, this will not relieve the Contractor from corrective items required by the final acceptance of the project work. Light Emitting Diode emitting diode (LED) light fixtures with the exception of obstruction lighting, must be warranted by the manufacturer for a minimum of four (4) years after date of installation inclusive of all electronics.

c. The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Owner real or personal property, when that damage is the result of the Contractor's failure to conform to contract requirements; or any defect of equipment, material, workmanship, or design furnished by the Contractor.

d. The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for one year from the date of repair or replacement.

e. The Owner will notify the Contractor, in writing, within seven (7) days after the discovery of any failure, defect, or damage.

f. If the Contractor fails to remedy any failure, defect, or damage within (14) days after receipt of notice, the Owner shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

g. With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall: (1) Obtain all warranties that would be given in normal commercial practice; (2) Require all warranties to be executed, in writing, for the benefit of the Owner, as directed by the Owner, and (3) Enforce all warranties for the benefit of the Owner.

h. This warranty shall not limit the Owner's rights with respect to latent defects, gross mistakes, or fraud.

90-11 Contractor Final Project Documentation. Approval of final payment to the Contractor is contingent upon completion and submittal of the items listed below. The final payment will not be approved until the RPR approves the Contractor's final submittal. The Contractor shall:

a. Provide two (2) copies of all manufacturers warranties specified for materials, equipment, and installations.

b. Provide weekly payroll records (not previously received) from the general Contractor and all subcontractors.

c. Complete final cleanup in accordance with Section 40, paragraph 40-08, *Final Cleanup*.

d. Complete all punch list items identified during the Final Inspection.

e. Provide complete release of all claims for labor and material arising out of the Contract.

f. Provide a certified statement signed by the subcontractors, indicating actual amounts paid to the Disadvantaged Business Enterprise (DBE) subcontractors and/or suppliers associated with the project.

g. When applicable per state requirements, return copies of sales tax completion forms.

h. Manufacturer's certifications for all items incorporated in the work.

i. All required record drawings, as-built drawings or as-constructed drawings.

j. Project Operation and Maintenance (O&M) Manual(s).

k. Security for Construction Warranty.

l. Equipment commissioning documentation submitted, if required.

END OF SECTION 90

PART 01
GENERAL REQUIREMENTS

PART 1 - GENERAL**1.01 GENERAL SITE REQUIREMENTS**

- A. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways.
- B. Ensure safe passage of persons around areas of construction. Conduct operations to prevent injury to adjacent buildings, structures, facilities, and persons.
- C. Erect temporary covered passageways as required by authorities having jurisdiction.
- D. Provide dust-proof partitions if required. If not indicated in the drawings, provide dust-proof partitions as directed by the Architect to comply with applicable sections of the Life Safety Code.
- E. Provide temporary enclosures for doors and other openings in walls as necessitated by weather conditions. Construct enclosures with fire retardant treated lumber. Tape joints and caulk to prevent dust and debris from migrating beyond construction areas. Maintain enclosures in good repair and remove them when no longer needed.
- F. Provide interior and exterior shoring, bracing or support as needed to prevent movement, settlement or collapse.

1.02 PROJECT SIGNS

- A. Subject to prior approval of Owner as to size, design, type, location and to local regulations, Contractor and his subcontractors may erect temporary signs for purposes of identification and controlling traffic.
- B. Additional banner signs with grommets may be provided by the Architect to be placed as directed. Signs shall be maintained throughout the project then returned to architect's site representative or discarded.

1.03 JOB OFFICES AND STORAGE

- A. Contractor and his subcontractors shall maintain office and storage facilities on site as may be necessary. Locate so as to cause no interference with work to be performed on the site by Owner or with Owner's operations. Consult with Architect regarding locations. Office shall have as a minimum the following items:
 - 1. Complete set of Construction Documents including all addenda and supplemental information.
 - 2. Telephone and fax machine.
 - 3. Layout and meeting space for Architects or Owners representative to use when visiting the site.
 - 4. Complete job file with copies of all correspondence concerning the project.

5. Other standard office equipment normally required to operate a business.
- B. Upon completion of project, or as directed by Architect, Contractor shall remove temporary structures and facilities from the site, same to become his property. Leave the premises in condition required by Contract.

1.04 SANITARY ARRANGEMENTS

- A. Contractor, at beginning of Work, to provide on premises suitable temporary convenience and enclosure for use of workmen on job. Maintain in sanitary condition and remove at completion of Work or when directed by Architect.

1.05 TEMPORARY UTILITIES FOR CONSTRUCTION

- A. Provide all gas and electric services for heating, cooling, lighting, and power required for construction purposes.
- B. Provide all the water required for construction purposes. Run temporary lines and provide necessary standpipes.
- C. Contractor to pay all utility charges until the time of substantial completion.

1.06 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise directed. Allow other entities to use temporary services and facilities without cost, including, but not limited to Construction Coordinator, Design Professional, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Pay water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.
- E. Water Service from Existing System: Water from Owner's existing water system is available for use with metering and with payment of use charges. Provide meter connections and extensions of services as required for construction operations.

1.07 TEMPORARY HEATING

- A. Provide temporary heating, coverings, and enclosures necessary to protect operations and

materials against damage by dampness and cold, to dry out work, and facilitate completion of Work.

- B. Maintain critical installation temperatures required in separate Sections of the Specifications. Repair or replace at no additional cost to Owner, any materials and work damaged by dampness, insufficient or abnormal heat.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 50 00

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TEMPORARY STORM WATER POLLUTION CONTROL**PART 1 - GENERAL****1.01 SUMMARY OF WORK**

- A. Work shall consist of temporary and permanent storm water pollution prevention measures through the use of berms, sediment basins, sediment dams, fiberglass roving, filter fabric, silt fences, brush barriers, baled straw erosion checks, temporary flexible pipe slope drains and temporary seeding.
- B. Temporary storm water pollution prevention measures shall be performed promptly when problem conditions exist or when storm water pollution problems are anticipated in certain areas to minimize soil erosion and siltation. Temporary measures shall be properly maintained until permanent control measures are functioning properly.
- C. The Contractor shall comply with all Federal, State and local laws and regulations concerning controlling pollution of the environment. He shall take all necessary precautions to prevent pollution of streams, lakes, ponds and reservoirs with fuel, oils, bitumens, chemicals, soil sedimentation or other harmful materials, and to prevent pollution of the atmosphere from particulate gaseous matter.

1.02 RELATED SECTIONS

- A. Section 31 00 00 - Site Earthwork.
- B. Section 31 10 00 - Site Clearing.
- C. Section 31 23 33 - Trenching and Backfilling.
- D. Section 31 25 00 - Erosion and Sedimentation Control.
- E. Section 32 92 19 - Seeding

- 1.03** At the Preconstruction Conference, or prior to the start of applicable construction, the Contractor shall submit his schedule for the accomplishment of temporary and permanent storm water pollution control work as applicable for clearing and grubbing, trenching and backfill to the Owner and Engineer. The location of the project, nature of the soil, topographic features and proximity to watercourses shall be considered when imposing such limitations.

PART 2 - MATERIALS**2.01 SEED AND FERTILIZER**

- A. Refer to Section 32 92 19.

2.02 STRAW BALES

- A. Straw shall be the threshed plant residue of oats, wheat, barley, rye or rice from which the grain has been removed.

2.03 FENCE OR WIRE FABRIC

- A. The fence fabric shall be a commercial grade of woven wire fence fabric. The wire fabric shall be a welded wire fabric.

2.04 FILTER FABRIC OR SILT FENCING

- A. Nonwoven polypropylene or polyester fabric.
- B. Manufacturer: Typar 3401, Trevira S1115, or equal.

2.05 ACCESSORIES

- A. Wood or steel stakes. If using steel stakes (rebar), stakes shall have safety caps meeting OSHA requirements.
- B. Rectangular hay bales shall be secured with twine or nylon rope.
- C. Filter fabric shall be supported by steel or wooden posts and backed with a woven wire fabric for support.

PART 3 - EXECUTION

3.01 PERMITTING

- A. A Storm Water Pollution Prevention Plan **is** required since the area to be disturbed is **more than** one acre.

END OF SECTION

PART 1 - GENERAL

1.01 CLEANING AND WASTE REMOVAL

- A. Progress Cleaning:
1. The premises and the job site shall be maintained in a reasonable neat and orderly condition and kept free from accumulations of waste materials and rubbish during the entire construction period. Remove crates, cartons, and other flammable waste materials or trash from the work areas at the end of each working day. Do not allow debris to blow onto adjoining properties. Respond immediately to request from adjoining property owners to remove any debris that does manage to show up on adjoining properties. Collect and remove waste materials, debris, and rubbish from site weekly, daily if necessary and dispose off-site.
 2. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
 3. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.
- B. Final Cleaning:
1. Use cleaning materials and agents recommended by manufacturer or fabricator of surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property, or that might damage finished surfaces.
 2. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's published instructions.
 3. Complete following cleaning operations before requesting inspection for Substantial Completion, where applicable to project scope:
 - a. Clean Project Site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances. Sweep paved areas broom clean. Remove petro-chemical spills, stains, and other foreign deposits. Rake grounds to a smooth even-textured surface.
 - b. Remove tools, construction equipment, machinery, and surplus material from Project Site.
 - c. Remove snow and ice to provide safe access to building.
 - d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - f. Broom clean concrete floors in unoccupied spaces.
 - g. Vacuum clean carpet and similar soft surfaces, removing debris and

- excess nap. Shampoo if required.
- h. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped, scratched, or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces. Do not use razor blades to clean glass. Any scratches on the glass caused by the cleaning process will be cause for the removal and replacement of the damaged glass at the Contractor's expense.
 - i. Remove labels that are not permanent labels.
 - j. Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored, or that show evidence of repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical name plates.
 - k. Wipe surfaces of mechanical and electrical equipment, and other similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
 - l. Plumbing fixtures are to be cleaned to a sanitary condition, free of stains, including stains resulting from water exposure.
 - m. Replace all disposable filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - n. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned out bulbs, and defective and noisy starters in fluorescent and mercury vapor fixtures.
 - o. Leave Project clean and ready for occupancy.
- 4. Engage an experienced licensed exterminator to make a final inspection, and rid Project of rodents, insects, and other pests. Comply with regulations of local authorities having jurisdiction.
 - 5. Remove temporary protection and facilities installed during construction to protect previously completed installations during remainder of construction.
 - 6. Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from Project Site and dispose of in accordance with requirements of local authorities having jurisdiction.
 - a. Extra materials of value that remain after completion of construction and have become the Owner's property are to be stored as directed by Owner.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 01 74 23

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Upon completion of Work and prior to final payment, a digital electronic copy of the following items must be submitted to Architect, tabbed and with a Table of Contents conforming to the current version of the CSI MasterFormat. Formatted items may be submitted on a thumb drive or via Microsoft OneDrive file hosting service (OneDrive also works as the storage backend of the web version of Microsoft 365 / Office cloud storage):
1. General Contractors letter of warranty
 2. General Contractors letter stating that all deficiency list items are complete
 3. Lien releases
 4. Consent of Surety to pay final retainage
 5. List of all subcontractors and suppliers, including portions of the work performed, address and telephone number of firm, and a contact name familiar with the project. Two (2) copies. One copy in each binder.
 6. Guarantees and Warranties: Refer to specific sections of Project Manual for general requirements on warranties, product/workmanship bonds, and maintenance agreements. Furnish two (2) fully executed copies of each guarantee and warranty specified for review by Architect, one copy in each binder.
 7. Certificates: Fully executed copy of each certificate specified, where applicable:
 - a. Certificate of Occupancy
 - b. Final Termite Inspection
 - c. Final Plumbing Inspection
 - d. Final Electrical Inspection
 - e. Certificate of Air Balance
 8. Miscellaneous other inspection reports, where applicable:
 - a. Boiler and Tank
 - b. Elevators and Hoist Systems
 - c. Backflow Preventers on Potable Water
 - d. Fire Suppression System
 - e. Fire Alarm System
 - f. Security System
 - g. Backup Power Generator
 - h. Cable Test/Certification Reports and Startup Records
 9. Instructions: Operating, service and maintenance manual or instruction sheet for each item as requested by specifications and required for Owner's use.
 10. Building hardware packet as described in Section 08 71 00, if applicable.
 11. Shop Drawings: A complete file of final copies of all shop drawings used in construction of project.
 12. Complete set of all submittals for products used in construction of project.
- B. Project Record Drawings: The Contractor shall provide one (1) complete set of project record drawings and two (2) CD's or thumb drives of scanned images of the drawings.
1. Cloud and reference each of the following items on the Record Drawings:
 - a. written addendum items

- b. addendum drawings
 - c. "X" drawings
 - d. Supplemental Instructions
 - e. Change Orders
 - f. responses to RFI's
 - g. any other deviations from the original drawings that are made in the field
2. Record final locations of underground lines by depth from finished grade and by accurate horizontal offset distances to permanent surface improvements such as buildings, curbs, edges, or walks.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION

3.01 EXTENDED WARRANTIES

- A. The entire project is warranted for a period of one (1) year from the date of substantial completion and several materials and systems require extended warranties. It is the responsibility of the General Contractor to review the Project Manual to determine the term of the extended warranties and provide the extended warranties required.

END OF SECTION 01 78 00

PART 02
EXISTING CONDITIONS

DEMOLITION AND REMOVAL OF FACILITIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Labor and material that is necessary for the work associated with the removal of the existing facilities as shown on the Drawings.

1.02 RELATED SECTION

- A. Section 31 10 00 - Site Clearing.
- B. Section 31 00 00 - Site Earthwork.

1.03 SAFETY REQUIREMENTS

- A. Work shall be done in conformance with federal, state, and local rules and regulations pertaining to safety and as specified elsewhere in these Specifications.

1.04 SALVAGE

- A. Salvageable piping, valves, and materials removed during demolition are the property of the Owner. Place on the site in an area designated by the Owner.

PART 2 – PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PREPARATION

- A. Make provisions to prevent the entrance of surface runoff from entering the area of excavation.
- B. Coordinate any disconnect and capping of services with Owner before starting demolition.
- C. Protect existing structures and underground utilities within the Work area from being damaged during demolition.

3.02 DEMOLITION AND REMOVAL

- A. Excavate to the minimum extent necessary.
- B. Dispose of demolition debris at a site approved by the Owner. Otherwise, to the nearest state approved landfill permitted to receive waste.

3.03 BACKFILLING

- A. Begin backfilling excavated areas after receiving approval from Engineer.
- B. Backfill in accordance with Section 31 23 33.
- C. Material excavated during demolition may be used as backfill if approved by the Engineer.
- D. Import backfill as required.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Site preparation includes, but is not necessarily limited to:
1. Temporary fencing and protective barricades.
 2. Protection of trees and shrubs to remain.
 3. Felling of trees removed, removal of stumps, roots and debris from Work.
 4. Removal of obstructions which interfere with Work.
 5. Stripping of topsoil and vegetation from earth areas of site.
 6. Removal of concrete and removal of asphaltic concrete pavement.
 7. Abandonment and capping wells or cisterns.
 8. Demolition and removal of buildings or building elements.
 9. Protection of active utilities and removal of utilities abandoned.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are located in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 QUALITY ASSURANCE

- A. Workmen Qualifications: One person present during tree clearing and grubbing operations, thoroughly familiar with types of trees involved. Direct trimming of roots and limbs where required.
- B. Codes and Standards: Comply with pertinent codes and regulations, plus requirements of insurance carriers providing coverage for Work.

1.05 JOB CONDITIONS

- A. Dust Control: Prevent spread of dust during performance of Work. Thoroughly moisten surfaces required to prevent dust nuisance to public, neighbors, and concurrent performance of other work on site.
- B. On-site Burning: Will not be permitted.

- C. Protection: Protect existing objects not to be removed. In event of damage, immediately make repairs and replacements necessary to approval of Architect at Contractor's expense.

1.06 HAZARDOUS MATERIAL ABATEMENT

- A. During the construction of this project, if work involving hazardous material is suspected, or encountered, Contractor shall notify Owner or Owner's representative immediately and Owner, with his own forces or by separate contract is responsible for complete investigation, removal and disposition of hazard material in accordance with applicable laws and regulations.

PART 2 - PRODUCTS

2.01 BARRICADES AND FENCE MATERIALS

- A. Materials required for barricades, tree protection and related fencing furnished by Contractor.

2.02 FILL MATERIAL

- A. Refer to Section 31 00 10, if applicable.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Notification: Notify Architect at least two full working days prior to commencing work.
- B. Site Inspection:
 - 1. Prior to work of this Section, carefully inspect entire site and objects designated to be removed or preserved.
 - 2. Locate existing utility lines to be abandoned and determine requirements for disconnecting and capping.
 - 3. Locate existing active utility lines which are to remain and determine requirements for their protection.
- C. Clarification:
 - 1. Drawings do not purport to show all objects existing on site.
 - 2. Before commencing work of this Section, verify with Architect all objects to be removed and all objects to be preserved.
- D. Scheduling:
 - 1. Schedule work in a careful manner with necessary consideration for neighbors and public.
 - 2. Avoid interference with use of, and passage to and from, adjacent buildings and facilities.

3.02 DISCONNECTION OF UTILITIES

- A. Before commencing demolition or removal, and if not already accomplished, disconnect or arrange for disconnection of utility service connections, including water, gas, electricity, and telephone, to buildings to be demolished complying with regulations of utility concerned. Plug sanitary sewer lines in accordance with local requirements. Conduct operations at Contractor's expense and in manner to preserve service to areas and structures not demolished. If underground utility services disconnections are required in public thorough-fares, comply with removal and restoration of pavement requirements and other pertinent matters.
- B. Preserve in operating condition active utilities bordering or traversing site designated to remain. Protect property, including, but not limited to, valve boxes, poles, guys and related appurtenances. Repair damage to active utility, due to work under contract, to satisfaction of utility concerned. Remove utility lines that are to be abandoned from building area.

3.03 STRIPPING TOPSOIL

- A. Remove existing grass and overburden before excavating topsoil.
- B. Prior to beginning excavation or fill, strip the topsoil to a depth of at least 6 inches or to a depth sufficient to remove all organic material and stockpile for future use.
- C. In general, remove topsoil where structures are to be built, trenches dug and roads, parking lots, walks and similar improvements constructed within the areas presently covered with topsoil.
- D. Store topsoil clear of the construction area.
- E. Take reasonable care to prevent the topsoil from becoming mixed with subsoil or eroding.

3.04 DEMOLITION OF STRUCTURES

- A. Demolish buildings and/or building elements designated for demolition, pulling out foundations and concrete slabs. Completely remove designated building components and any obstructions above ground level and down to bottom of footings below ground level. Salvageable materials become property of Contractor unless otherwise shown or specified and shall be promptly removed from site.
- B. Fill holes and trenches resulting from demolition and removal, to ground surface. Rock and materials from masonry construction may be used in backfilling up to a depth of 1 foot below ground surface if sufficient fine materials are mixed therewith to fill voids. Use dirt for top 1 foot of fill, free from trash, wood, pipe and debris.
- C. After clearing, perform rough grading necessary to provide complete run-off of surface water.
- D. Barricade open excavations until backfilled. Do not backfill until backfill materials have

been inspected and approved by Architect's representative.

- E. Wet down masonry thoroughly during demolition to prevent spread of dust.
- F. Leave parcel site in safe and clean condition, free from rubbish, debris, materials, and equipment.
- G. When Contractor starts building demolition, excluding interior striping of salvable items including plumbing and electrical fixtures, he is to continue work during normal working days suitable to operations until demolition and site clearance is completed, unless otherwise specifically authorized by Owner.

3.05 PROTECTION AND REPAIR

- A. Erect temporary barricades and fencing required to protect existing and new site construction including but not limited to new and existing walks, drives, roads, curb and gutter, etc. during construction.
- B. Allow no heavy traffic on new or existing paving unless authorized in writing by Owner.
- C. Contractor is responsible for restoring all existing site construction, including softscape (landscape), that is damaged during construction to new condition.
- D. If it is necessary to cut or trench across any existing paving (including walks), Contractor is responsible for restoring damaged areas to new condition.

3.06 PROTECTION OF TREES TO REMAIN

- A. At trees to remain, construct temporary barricade around tree at tree's approximate drip line. Provide barricades at least 3 feet high, consisting of 2 inch by 4 inch or larger posts set at least 18 inches into ground, no more than 6 feet on centers, joined at top by 1 inch by 6 inch or larger boards firmly nailed to posts.
- B. Trimming of Trees: In company with Architect, ascertain limbs and roots which are to be trimmed and clearly mark them to designate approved cutting point. Cut evenly, using proper tools and skilled workmen to achieve neat severance with least possible damage to tree. Promptly coat cut area with approved pruning paint complying with manufacturer's recommendations. In case of root cuts, apply wet burlap or related protection approved by Architect, to prevent drying out.

3.07 TREE/BRUSH REMOVAL

- A. Remove trees, brush and vegetation except trees which are to remain, from Project site. Material resulting from clearing becomes property of Contractor, who shall be responsible for disposal.

B. Wet down areas where required during site clearing to prevent spread of dust.

C. Blasting on Project site is not allowed as a means of tree removal.

3.08 STUMPS AND ROOTS

A. Remove completely stumps and roots from areas within building walls and 5 feet outside building walls. Remove remaining stumps and roots to clear depth of not less than 2 feet below subgrade level. Material resulting from grubbing becomes property of Contractor, to dispose of by him. Burn no material on premises.

3.09 OBSTRUCTIONS

A. Remove existing obstructions from area to be occupied by Work under this Contract unless otherwise specified herein, or specifically directed by Architect to remain.

3.10 REMOVAL OF DEBRIS AND CLEANING

A. Remove and legally dispose of rubbish and debris found on demolition area at start of the Work that resulting from demolition activities or deposited on site by others during the duration of contract. Keep project area and public right-of-way reasonably clear at all times. Upon completion of work remove temporary construction, equipment, salvaged materials, trash and debris leaving entire project area in neat condition.

END OF SECTION 02 41 13

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PART 03
CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Form cast-in-place concrete required and subsequently remove forms except as otherwise specified.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 QUALITY ASSURANCE

- A. Qualifications of Workmen: Provide foreman at all times during execution of this portion of the Work, thoroughly familiar with type materials being installed, referenced standards, and requirements of this work, and who shall direct work performed under this Section.
- B. Codes and Standards:
 - 1. In addition to complying with pertinent codes and regulations, comply with pertinent recommendations contained in "Recommended Practice for Concrete Formwork", publication ACI 347 of the American Concrete Institute.
 - 2. Where provisions of pertinent codes and standards conflict with requirements of this Section more stringent provisions govern.

PART 2 - PRODUCTS

2.01 WOOD FORM MATERIALS

- A. Form Lumber: Provide form lumber in contact with exposed concrete using new material except as allowed for re-use of forms. Provide form lumber as follows, a combination thereof, or an equal approved in advance by Architect:
 - 1. "Plyform", class I or II, bearing label of the American Plywood Association.
 - 2. Southern Pine or Douglas Fir, number 2 grade, seasoned, surfaced 4 sides.

- B. Form Sealers: Provide "React S" by Conspec, or approved equal.

2.02 TIES AND SPREADERS

- A. Type: Type which does not leave an open hole through concrete and which permits neat and solid patching at every hole.
- B. Design: Metal not less than one inch from surface at completion of concrete work.

2.03 EXPANSION JOINTS

- A. Non-extruding, pre-moulded filler strips conforming to ASTM D 1751 or D 1752 and compatible with sealant material used to seal joints.

2.04 FORMED JOINTS

- A. Non-staining materials; of wood, plastic, or metals, formed to be removed without spalling concrete.

2.05 KEYED JOINTS

- A. KEY-LOK® by Form-A-Key Products, BoMetals QuicKey by White Cap, Muller Construction Co. or approved equal. Top of stakes set 3/8" below slab surface so when joint form is placed on stakes, painted portion of joint is finished elevation. Finish concrete to top of joint and burn in with hand trowel.

2.16 OTHER MATERIALS

- A. Provide materials, not specifically described but required for completion of concrete formwork as selected by Contractor subject to advance approval of Architect.

PART 3 - EXECUTION

3.01 CONSTRUCTION OF FORMS

- A. General: Construct substantial, sufficiently tight forms to prevent fins and leakage of mortar, and able to withstand deflection when filled with wet concrete.
- B. Layout:
 - 1. Form cast-in-place concrete to shapes, sizes, lines, and dimensions required.
 - 2. Exercise particular care in form layout to avoid necessity for cutting of concrete after placement.
 - 3. Make proper provision for inserts, sleeves, pipes, openings, offsets, recesses, anchorage, blocking, and related features as required.
- C. Forms for footings and related below grade concrete may be omitted when soil and workmanship permit accurate excavation to size and where omission is approved by Architect.

- D. Removal of forms: Time for removing forms is subject to weather conditions after concrete is poured. Remove form work in manner to insure complete safety of structure. Do not place building materials on slabs until they are strong enough to carry the imposed load. Contractor shall decide when to remove forms and accept full responsibility for their removal.

3.02 JOINTS

- A. If proposed layout of joints differs from layout shown on drawings, Contractor shall submit three (3) copies of alternate layout plan to Architect for review. Do not proceed with alternate layout of joints without written approval from Architect.
- B. Provide mechanical "Keyed Kold" joint screed forms used in placing concrete slabs on grade installed to comply with manufacturer's specifications.
- C. Construction Joints: Where joint is made, thoroughly clean concrete surface and remove all laitance. In addition, thoroughly wet and slush vertical joints with a coat of neat cement grout immediately before placing new concrete.
- D. Expansion Joints: Do not run reinforcement, corner protection angles, or related fixed metal items, embedded in or bonded into concrete continuous through expansion joints. Provide filler strips for expansion joints between slabs on grade and all joints between slabs on grade and vertical surfaces. Construct joints 1/2-inch thick and full depth of slab, unless otherwise noted.
- E. Saw-cut Control Joints: In "Green" concrete the following tables will apply.
 - 1. Depth of cut:
 - a. Soff-Cut Saw: 1" minimum
 - b. Wet-Cut Saw: 1/4 slab thickness
 - 2. Joint spacing based upon slab thickness, UNLESS NOTED OTHERWISE:
 - a. 4" slab equals 10'-0" o.c.
 - b. 5" slab equals 13'-0" o.c.
 - c. 6" or thicker slab equals 15'-0" o.c.

3.03 RUBBED SURFACES

- A. Construct forms for exposed cast-in-place concrete with smooth exterior grade plywood or steel with joints butted tight to prevent fins and leaking. As soon as forms are stripped, rub down concrete surface with carborundum grinders using water and Portland cement as rubbing agent. Rub exposed concrete until a uniformly even surface is obtained, with no joint marks or defects showing. Do not apply neat cement or grout to concrete as painted or plastered finish coat.

3.04 JOINT-FREE SURFACES

- A. No joint allowed in formed surfaces where joint-free surfaces are required. In forming for joint-free surfaces, use metal lined forms and cover form joints with form tape.

3.05 CHAMFERED CORNERS

- A. Chamfer corners of rectangular concrete members formed with wood forms except where flush with adjacent concrete or masonry, or where covered with other materials.

END OF SECTION 03 10 00

SITE CONCRETE EXPANSION, CONSTRUCTION, AND CONTRACTION JOINTS**PART 1 - GENERAL****1.01 SUMMARY**

- A. Provide expansion, construction, and contraction joints as specified.

1.02 RELATED SECTIONS

- A. Section 03 47 00 - Site Cast-in-Place Concrete.

1.03 REFERENCES

- A. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.
1. ASTM A36 - Specification for Structural Steel.
 2. ASTM D226 - Specification for Asphalt-Saturated Organic Felt used in Roofing and Waterproofing.
 3. ASTM D994 - Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 4. ASTM D1190 - Specification for Concrete joint Sealer, Hot-Poured Elastic Type.
 5. ASTM D1751 - Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- B. Corp of Engineers, (U.S. Department of the Army) Pulaski Building, 20 Massachusetts Avenue, North West, Washington, D.C. 20314.
1. CRD-C-572 - Polyvinylchloride Waterstops.
- C. Federal Specifications: SS-S-210A; Sealing Compound for Expansion Joints.

PART 2 - PRODUCTS**2.01 WATERSTOPS**

- A. Center bulb type extruded from an elastomeric plastic compound, the basic resin of virgin polyvinyl chloride (PVC).
- B. Size as recommended by manufacturer for each application or as shown on Drawing. Generally, 6 inches for walls with a 12 inches thickness and 9 inches for walls thicker than 12 inches.
- C. Specific gravity approximately 1.37 and the shore durometer Type A hardness, approximately 80.

- D. Meet the performance requirements of the Corps of Engineers' Specification CRD-C-572.
- E. Constant thickness from the edge of the bulb to the outside edge.
- F. Have a number of parallel ribs or protrusions on each side of the center of the strip.
- G. Corrugated type or tapered waterstops are not acceptable.
- H. The minimum weight per foot for waterstop shall be 0.75 pound for 3/16-inch by 6-inch, 1.35 pounds for 3/8-inch by 6-inch, and 2.05 pounds for 3/8-inch by 9-inch.
- I. Manufacturers:
 - 1. Southern Metal and Plastic Products, Inc.
 - a. Type 11RCB for 4-inch by 3/16-inch.
 - b. Type 17RCB for 6-inch by 3/8-inch.
 - c. Type 18RCB for 9-inch by 3/8-inch.
 - 2. Vinylex Corporation.
 - a. Catalog No. RB6-38H for the 6-inch by 3/8-inch.
 - b. Catalog No. RB9-38H for the 9-inch by 3/8-inch.
 - 3. Greenstreak Plastic Products.
 - a. Style 732 for the 6-inch by 3/8-inch.
 - b. Style 735 for the 9-inch by 3/8-inch.
 - 4. Or approved equal.

2.02 BOND BREAKER TAPE FOR EXPANSION JOINTS

- A. Where indicated, adhesive-backed glazed butyl or polyethylene tape that will satisfactorily adhere to the premolded joint material or concrete surface.
- B. Same width as joint.

2.03 PREMOLDED JOINT FILLER - BITUMINOUS TYPE

- A. Bituminous type conforming to ASTM D994 or D1751, unless otherwise shown or specified.
- B. Use around pipe penetrations through existing walls.
- C. Manufacturers:
 - 1. Synko Flex Products Inc.; Synko Flex Preformed Plastic Adhesive Waterstop.
 - 2. American Colloid Co.; Waterstop RX.

2.04 BOND BREAKER

- A. Bond breaker, except where a tape is specifically called for, shall be either bond breaker tape as specified or a bond prevention material, nonstaining type, as specified in Section 03 47 00.

2.05 CORK EXPANSION JOINT FILLER

- A. Manufacturer: W.R. Meadows Sealtight, or equal.
- B. Seal joints with a pourable two-component cold-applied compound to depth as indicated on Drawings.

2.06 POURABLE JOINT FILLERS - RUBBER ASPHALT FILLER

- A. Hot-pour type, conforming to ASTM D1190. Use primer recommended by the manufacturer.

2.07 COAL-TAR TAPE

- A. Manufacturer's:
 - 1. Protecto Wrap 200, by Protecto Wrap Co., Denver, CO.
 - 2. Tapecoat CT, by Tapecoat Company, Inc., Evanston, IL.
 - 3. Or equal.

2.08 STEEL EXPANSION JOINT DOWELS

- A. Smooth steel conforming to ASTM A36. Coating on bars with an approved, FUSION BONDED COATING.

PART 3 - EXECUTION

3.01 INSTALLATION OF WATERSTOPS - GENERAL

- A. Join waterstops at intersections so continuous seal is provided.
- B. Center waterstop on joint.
- C. Hold waterstop positively in correct position.
- D. If waterstop is damaged, repair in acceptable manner.
- E. Vibrate concrete to obtain impervious concrete in the vicinity of joints.
- F. In horizontal joints, fill areas below waterstop completely with concrete; make visual inspection of entire waterstop area during concrete placement.

3.02 WATERSTOPS IN CONSTRUCTION JOINTS

- A. Horizontal Waterstops:
 - 1. Place immediately after the pour is completed and before concrete has begun to set.
 - 2. Puddle each side to level concrete and assure that waterstop is properly embedded.
 - 3. Where stops are spliced, lap at least 12 inches and secure together.

4. After concrete has set to the point where the surface can be cut with a broom or a stream of water, cut off the surface to a rough finish with laitance removed and the concrete left clean.
- B. Vertical Waterstop: Place and secure in forms prior to placing concrete.

3.03 PLASTIC WATERSTOP

- A. Install in accordance with details shown and manufacturer's instructions.
- B. Allow at least 10 minutes before pulling or straining the new splice.
- C. Finished splices shall provide a cross section that is dense and free of porosity with tensile strength of not less than 80 percent of unspliced materials.

3.04 SPLICES AND JOINTS

- A. Prior to use of the waterstop material in the field, submit a sample of a fabricated cross constructed of each size or shape of material to be used for approval.
- B. Fabricate samples so that the material and workmanship represent the fittings provided under this Section.
- C. Make field splices and joints in accordance with waterstop manufacturer's instructions using a thermostatically controlled heating iron.

3.05 JOINT PREPARATION - GENERAL

- A. Accurately locate and construct joints to produce straight joints.
- B. Vertical or horizontal, except where walls intersect sloping floors.
- C. Do not commence concrete pour until after joint preparation has been inspected and approved by Engineer.

3.06 CONSTRUCTION JOINTS

- A. Prior to placing abutting concrete, clean contact surface by sandblasting or other approved means to remove laitance and expose the aggregate.
- B. Remove concrete from exposed portion of reinforcing steel.
- C. Do not damage the waterstop, if one is present, during the cleaning process.
- D. Grout for horizontal construction joints shall be as specified in Section 03003.
- E. Roughen surface of hardened concrete by one of the following methods:
 1. Sandblast foundation and reinforcing dowels after concrete has fully cured to remove laitance and spillage and to expose sound aggregate.

2. Water blast the foundation and reinforcing dowels after concrete has partially cured to remove laitance and spillage and to expose sound aggregate.
3. Green cut fresh concrete with high pressure water and hand tools to remove laitance and spillage from the foundation and reinforcing dowels, and to expose sound aggregate.

3.07 LOCATION

- A. Joints as shown on the Drawings or approved by Engineer.

3.08 TIME BETWEEN POURS

- A. At least 2 hours shall elapse after depositing concrete in long or high columns or heavy walls before depositing in beams, girders, or slabs supported thereon.
- B. For short columns and low height walls, 10 feet or less, wait at least 45 minutes prior to depositing concrete in beams, girders, brackets, column capitals, or slabs supported thereon.
- C. Beams, girders, brackets, column capitals, and haunches shall be considered as part of the floor or roof system and shall be placed monolithically therewith.
- D. Where cold joints will result and this joint will be below the finished water surface, provide and install a waterstop in the joint.

3.09 EXPANSION JOINTS - GENERAL

- A. Provide premolded joint filler of sufficient width to completely fill the joint space.
- B. If a waterstop is in the joint, accurately cut premolded joint filler to butt tightly against the waterstop and the side forms.
- C. At locations where joint sealant is to be applied, precut premolded joint filler the required depth.
- D. Form cavities for joint sealant with either precut, premolded joint filler or smooth, accurately-shaped material that can be removed.
- E. Thoroughly vibrated concrete along the joint form to produce a dense, smooth surface.
- F. Repair surface irregularities along the joint sealant cavity due to improper concrete consolidation or faulty form removal with an approved compound compatible with the joint sealant in a manner that is satisfactory to the sealant manufacturer.

3.10 INSTALLATION OF BITUMINOUS TYPE OR CLOSED CELL FOAM TYPE PREMOLDED JOINT FILLER

- A. Drive nails at about 1 foot on centers through the filler to provide anchors into the concrete when it is placed.

- B. Place premolded joint filler in the forms in the proper position before concrete is poured.
- C. Install premolded joint filler in walks (to provide expansion and contraction joints at not more than 20-foot intervals), at changes in direction at intersections, and at each side of driveway entrances.

3.11 POURABLE JOINT FILLER - GENERAL

- A. Install pourable joint fillers in accordance with the manufacturer's instructions.
- B. Thoroughly clean joints by sandblasting concrete surfaces of each side of joint from plastic waterstop to top of joint, dry the joint, and remove dust and foreign material; prime before pouring the filler.
- C. Avoid damaging waterstop by sandblasting operations.
- D. Primer compatible with filler material.

3.12 RUBBER ASPHALT JOINT FILLER

- A. Heat rubber asphalt filler material in a double-walled boiler and place in the joint by means of a nozzle.
- B. Prevent spillage outside of the joint.
- C. Begin pouring joint filler at the bottom of the horizontal joint and proceed upwards in a manner that will preclude the possibility of trapping air in the joint.
- D. Use masking tape at each side of joint to assist in cleaning all spillage.

3.13 CONTROL JOINTS IN FLOOR SLABS

- A. Form tongue-and-groove construction joints with keyway in bulkhead forms.
- B. Key horizontal joints the full length of the member.
- C. Key width shall occupy the interior one-third section, and depth of the key shall be 2 inches.

3.14 STEEL EXPANSION JOINT DOWELS

- A. Install parallel to wall or slab face and in true horizontal position by securing tightly in forms with rigid ties.
- B. Orient dowels to permit joint movement.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide reinforcing steel and welded wire fabric.
- B. Conform to "Placing Reinforcing Bars", Recommended Practices, Joint Effort of CRSI-WCRSI, prepared under the direction of the CRSI Committee on Engineering Practice.
- C. Notify Engineer when reinforcing is ready for inspection and allow sufficient time for this inspection prior to casting concrete.

1.02 RELATED SECTIONS

- A. Section 03 47 00 – Site Cast-in-Place Concrete.

1.03 REFERENCES

- A. American Concrete Institute, 22400 West Seven Mile Road, Detroit, Michigan 48219.
 - 1. ACI-318 - Building Code Requirements for Reinforcing Concrete.
- B. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.
 - 1. ASTM A185 - Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
 - 2. ASTM A497 - Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
 - 3. ASTM A615 - Specification for Deformed and Plain Billet-Steel for Concrete Reinforcement.
- C. American Welding Society, 550 North West LeJeune Road, Miami, Florida 33126.
 - 1. AWS D1.4 - Structural Welding Code; Reinforcing Steel.
- D. Concrete Reinforcing Steel Institute, 933 North Plum Grove Road, Schamburg, Illinois 60195.
 - 1. CRSI-MSP-1 - Manual of Standard Practice.

1.04 SUBMITTALS

- A. Submit the following in accordance with Specifications:
 - 1. Bending lists.
 - 2. Placing drawings.
 - 3. Shop drawings.

- B. Shop Drawings:
 - 1. Bars for footings, including dowels, shall not be fabricated and shipped without prior review of Shop Drawings by the Engineer.
 - 2. Otherwise, Shop and Placing Drawings shall include reinforcing placing plans and details indicating size, location, arrangement, placing sequence, etc., and shall conform to ACI 315.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Steel:
 - 1. Deliver with suitable hauling and handling equipment.
 - 2. Tag for easy identification.
 - 3. Store to prevent contact with the ground.
- B. Unloading, storing, and handling of bars shall conform to CRSI publication "Placing Reinforcing Bars".

PART 2 - PRODUCTS

2.01 DEFORMED REINFORCING BARS

- A. Deformed billet-steel bars conforming to ASTM A615, Grade 60.

2.02 WELDED WIRE FABRIC

- A. Conform to ASTM A185 or A497.

2.03 ACCESSORIES

- A. Tie wire: 16-gage, black, soft-annealed wire.
- B. Bar supports: proper type for intended use.
- C. Bar supports in beams, columns, walls, and slabs exposed to view after stripping: Small rectangular concrete blocks of same color and strength of concrete that is being placed around them.
- D. Concrete supports: for reinforcing concrete placed on grade.
- E. Conform to requirements of "Placing Reinforcing Bars" published by CRSI.

PART 3 - EXECUTION

3.01 REINFORCING STEEL

- A. Clean metal reinforcement of loose mill scale, oil, earth and other contaminants.

- B. Straightening and rebending reinforcing steel:
 - 1. Do not straighten or rebend metal reinforcement.
 - 2. Where construction access through reinforcing is a problem, use bundle or space bars instead of bending.
 - 3. Submit details and obtain Engineer's review prior to placing.
- C. Protection, spacing, and positioning of reinforcing steel: Conform to the current edition of the ACI Standard Building Code Requirements for Reinforced Concrete (ACI 318), reviewed placing drawings and design drawings.
- D. Location Tolerance: Conform to the current edition of "Placing Reinforcing Bars" published by Concrete Reinforcing Steel Institute and to the Details and Notes on the Drawings.
- E. Splicing:
 - 1. Conform to Drawings and current edition of ACI Code 318.
 - 2. Stagger splices in adjacent bars.
- F. Tying deformed reinforcing bars: Conform to current edition of "Placing Reinforcing Bars" published by Concrete Reinforcing Steel Institute and to details and notes on Drawings.
- G. Field Bending:
 - 1. Field bending of reinforcing steel bars is not permitted when rebending will later be required to straighten bars.
 - 2. Consult with Engineer prior to pouring if there is a need to work out a solution to prevent field bending.

3.02 REINFORCEMENT AROUND OPENINGS

- A. Place an equivalent area of steel around pipe or opening and extend on each side sufficiently to develop bond in each bar.
- B. See Drawings for bar extension length each side of opening.
- C. Where welded wire fabric is used, provide extra reinforcement using fabric or deformed bars.

3.03 WELDING REINFORCEMENT

- A. Welding shall not be permitted unless Contractor submits detailed Shop Drawings, qualifications, and radiographic nondestructive testing procedures for review by Engineer.
 - 1. Obtain results of this review prior to proceeding.
 - 2. Basis for submittals: Structural Welding Code, Reinforcing Steel, AWS D1.4, published by American Welding Society, and applicable portions of ACI 318, current edition.
 - 3. Test 10 percent of welds using radiographic, nondestructive testing procedures in accordance to the above referenced codes.

3.04 PLACING WELDED WIRE FABRIC

- A. Conform to ACI 318 and to current Manual of Standard Practice, Welded Wire Fabric, by Wire Reinforcement Institute regarding placement, bends, laps, and other requirements.

- B. Placing:
 - 1. Extend fabric to within 2 inches of edges of slab.
 - 2. Lap splices at least 1-1/2 courses of fabric and a minimum of 6 inches.
 - 3. Tie laps and splices securely at ends and at least every 24 inches with 16-gage black annealed steel wire.
 - 4. Place welded wire fabric at the proper distance above bottom of slab.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Furnish and install reinforcement and associated items required for cast-in-place concrete.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
 - 1. Furnish Shop Drawings for review by Architect, on reinforcing steel including special details, bending diagrams, schedules, bar lists, placing diagrams, and accessories. In addition to provisions in General Conditions, submit reinforcing Shop Drawings prepared by or under supervision of registered professional engineer. Reproduction (in any form) of Contract Drawings are not to be used for Shop Drawings. Furnish two prints and one sepia reproducible of Shop Drawings to Architect for review. Submit related shop drawings together. Partial submittals will not be accepted.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 QUALITY ASSURANCE

- A. Qualifications of Workmen: Provide foreman at all times during execution of this portion of the Work, thoroughly familiar with type materials being installed, referenced standards, and requirements of this work, and who shall direct work performed under this Section.
- B. Codes and Standards:
 - 1. In addition to complying with pertinent codes and regulations, comply with pertinent recommendations contained in "Manual of Standard Practice for Detailing Reinforced Concrete Structures", publication ACI 315 of the American Concrete Institute.
 - 2. Where provisions of pertinent codes and standards conflict with requirements of this Section more stringent provisions govern.

PART 2 - PRODUCTS

2.01 CONCRETE REINFORCEMENT

- A. Concrete Reinforcement Materials: New, free from rust, and complying with following reference standards:
 - 1. Bars for Reinforcement: "Specifications for Deformed Billet-Steel Bars for Concrete Reinforcement", ASTM A-615, grade 60 unless otherwise shown.
 - 2. Wire Fabric: ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
 - 3. Supports, Spacers, and Chairs: Types which will hold reinforcement in position shown in accordance with requirements of ACI CODE-318 except as specified.

2.02 OTHER MATERIALS

- A. Provide metal accessories, including spacers, chairs, ties, and devices necessary for properly assembling, placing, spacing, and supporting reinforcement (including welded wire fabric at 2" from top of slab) in place. Provide materials, not specifically described but required for complete and proper installation of concrete reinforcement, as selected by Contractor subject to approval of Architect.

PART 3 - EXECUTION

3.01 SITE CONDITIONS

- A. Inspection:
 - 1. Carefully inspect installed work of other trades and verify work is complete to point where this installation may properly commence.
 - 2. Verify that concrete reinforcement may be installed to comply with pertinent codes and regulations, reviewed Shop Drawings, and original design.
- B. Discrepancies:
 - 1. In event of discrepancy, immediately notify Architect.
 - 2. Do not proceed with installation in areas of discrepancy until discrepancies have been fully resolved.

3.02 BENDING

- A. General: Fabricate reinforcement to comply with reviewed Shop Drawings. Do not use bars with kinks and bends not shown on Drawings or on reviewed Shop Drawings. Do not bend and straighten steel in manner that will injure material.
- B. Assembly: Tack-welding not acceptable for assembly of reinforcement without specific approval of the Structural Engineer. When permitted by Engineer all welding shall conform to reinforcing steel welding code (AWS D.12.1) of the American Welding Society.

3.03 PLACING OF REINFORCEMENT

- A. Placing:
 - 1. Support and wire together reinforcing bars to prevent displacement by

construction loads and placing of concrete. On ground and where necessary, supporting Normal Weight concrete blocks may be used. Provide at flat formwork, metal or plastic coated bar chairs and spacers. Provide galvanized, stainless steel or plastic coated accessories where concrete surface will be exposed to weather in finished structure and where rust would impair architectural finishes.

2. Lap welded wire fabric minimum of 12" in structural slabs and minimum of 6" in slabs-on-grade. Support mesh in final position in all slabs. Lifting of mesh into final position is not permitted.
 3. Do not bend bars after embedded in concrete.
- B. Cleaning Reinforcement: Remove loose, flaky rust, mill scale, mud, oil, and related coatings that will destroy and reduce bond during concrete placement.
- C. Splices: Splice where shown on Drawings or reviewed Shop Drawings.
- D. Concrete Reinforcement Protection: If not detailed otherwise, where concrete is deposited against ground, reinforcement shall have minimum of 3" concrete between it and the ground. If concrete surfaces after removal of forms are to be in contact with ground or exposed to weather, protect reinforcing with minimum of 2" of concrete for bars larger than No. 5 and 1-1/2" for No. 5 bars and smaller. Provide minimum 3/4" concrete covering for reinforcing in slabs and 1-1/2" minimum cover in beams at surfaces not exposed directly to ground or weather.

END OF SECTION 03 20 00

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PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Cast-in-place, reinforced concrete required. Provisions of this Section are applicable to structural concrete at building as well as to site improvement work.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
 - 1. Design Mix: Prior to placement of concrete, submit concrete mix designs proposed by the concrete supplier for class of concrete, including recent test results substantiating the quality of concrete produced by each mix.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 QUALITY ASSURANCE

- A. Qualifications of Workmen:
 - 1. Provide foreman at all times during execution of this portion of the Work, thoroughly trained and experienced in placing type concrete specified and who shall direct work performed under this Section.
 - 2. Finishing of Exposed Surfaces of Concrete: Use thoroughly trained and experienced journeyman concrete finishers.
- B. Codes and Standards:
 - 1. In addition to complying with pertinent codes and regulations, comply with pertinent recommendations of "Building Code Requirements for Structural Concrete", publication ACI CODE-318 of latest issue of the American Concrete Institute.
 - 2. American Concrete Institute, ACI PRC-302.1, latest issue, Guide to Concrete Floor and Slab Construction.
 - 3. Where provisions of pertinent codes and standards conflict with requirements of this Section more stringent provisions govern.
 - 4. ACI SP-66 - ACI Detailing Manual.
 - 5. ACI 301 - Standard Specifications for Structural Concrete.
 - 6. ACI SPEC-301-20: Specifications for Concrete Construction.

1.05 LABORATORY TESTING

- A. All required testing will be performed by testing laboratory selected by Owner. Cost for laboratory services for concrete tests and mix designs paid by Contractor. Material for tests furnished by Contractor.
- B. Contractor shall submit three (3) copies of certified laboratory test reports to Architect for review.
- C. Testing Procedures:
 - 1. Material Testing: Laboratory to re-check at plant materials as often as necessary to produce concrete of specified strength and consistency including:
 - (a) Fine aggregate.
 - (b) Coarse aggregate.
 - (c) Cast-in-place concrete.
 - 2. Concrete Slump: 6" with allowable variation of plus or minus 1 inch.
 - 3. Quality Control: As work progresses testing laboratory personnel shall conduct tests of concrete in accordance with following procedures:
 - (a) Secure composite samples from the same batch complying with ASTM C 172.
 - (b) Perform one (1) slump test for each set of strength test cylinders complying with ASTM C 143.
 - (c) Make one (1) strength test (4 specimens) for each 40 cubic yards and at least one (1) set for each day's pour.
 - (d) Mold four (4) strength test specimens from each sample complying with ASTM C 31 and protect and cure under standard moisture and temperature conditions in accordance with Section 7 of above ASTM method.
 - (e) Test two (2) specimens at seven (7) days complying with ASTM C 39. If specimens for a particular batch test at or above required strength for that batch, it is not necessary to test the remaining specimens. Hold the remaining specimens for an additional ninety (90) days in case future testing is required. If the specimens tested at seven (7) days do not meet or exceed the desired strength requirements, the remaining two (2) specimens will be tested at twenty-eight (28) days. Average strength of two (2) specimens from each group tested is basis for acceptance or rejection of concrete. If tested strength falls below strength specified at twenty-eight (28) days, Architect has the right to order the removal and replacement of defective concrete at Contractor's expense. If Contractor wishes to obtain test cores from in-place concrete, cost of coring, testing and patching will be paid by Contractor.
 - 4. Flatness: Variation in flatness within a 10' area shall not exceed 1/8" +/-.

1.06 REFERENCES

- A. Publications listed below form a part of this specification to extent referenced.
 - 1. ACI 117-10: Standard Specifications for Tolerances for Concrete Construction and Materials
 - 2. ACI 211.1-91(R2009): Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
 - 3. ACI 211.2-98(R2004): Standard Practice for Selecting Proportions for Structural Lightweight Concrete

4. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
5. ASTM C1059 - Standard Specification for Latex Agents for Bonding Fresh To Hardened Concrete.
6. ASTM C1602 - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
7. ASTM C260 - Standard Specification For Air-Entraining Admixtures For Concrete.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Portland Cement: Conform to ASTM "Standard Specifications for Portland Cement", C150, Type I. Use one brand of cement. Mix shall contain at least 470 lb. of Portland Cement per cubic yard of concrete. Use 520 lb of cement if freeze thaw deicing chemicals used or required by conditions.
- B. Aggregates: Conform to ASTM "Standard Specifications for Concrete Aggregates", C33. Provide aggregate of natural sand and gravel or prepared from stone or gravel, free from adherent coatings. Maximum size of pieces 1", except for footings and foundation walls which may be 1-1/2" maximum size.
- C. Water: ASTM C1602. Clean and free from injurious amounts of oils, acids, alkalis, organic materials, and deleterious substances. **Non-potable water will not be used in concrete mixing.**
- D. Fly ash will NOT be allowed. [except at below grade applications. DO NOT USE in architecturally exposed concrete, particularly at floor conditions.
- E. Air Entrainment: ASTM C260 and ASTM C494. Comply with current building code.

2.02 CONCRETE STRENGTHS

- A. Cast-in-place Concrete: Designed to develop 3,500 psi minimum compressive strength at 28 days, unless noted otherwise on Structural Drawings. ***Refer to Division 32, EXTERIOR IMPROVEMENTS for strengths required for various concrete site improvements.***

2.03 GROUT

- A. Non-Shrink, Non-Metallic, Flowable Grout meeting ASTM C1107/CRD C621 (structural steel grouting, base plates, anchor bolts, tuck pointing):
 1. Con-Spec CS-100
 2. W.R. Meadows Sealtight CG-86™
 3. Master® Builders Solutions MasterFlow 110AN
 4. L&M DURAGROUT™
 5. SikaGrout 212
 6. Kaufman Products SureGrout

7. Euclid N.S. Grout
8. Dayton Superior 1107 Advantage Grout
9. Approved equal.

2.04 CONCRETE FLOOR SEALER

- A. Furnish and apply to concrete surfaces shown on finish schedule as "Sealed Concrete", polyurethane concrete sealer:
 1. Spec Cote Urethane by Dayton Superior. Primer to be Spec Cote WB High Performance Water-Based Epoxy Coating.
 2. Approved equal.
- B. Surface Preparation: Concrete floor should be sound clean and dry and free of oil, dirt, grease, paint, laitance, and the typical membrane forming curing compounds. The concrete should be at least 28 days old. Floors should be mechanically prepared i.e., shot-blast, sandblast, to result in a International Concrete Repair Institute (ICRI) Concrete Surface Profile (CSP) of between CSP #1-2, or the texture of medium grit sandpaper to ensure proper adhesion. If oils or grease are present chemical degreasers should be used to thoroughly degrease concrete before shot-blasting.
- C. Minimum of two (2) applications are required.
- D. Provide clear color for all applications.

2.05 UNDERSLAB DRAINAGE FILL

- A. Crushed stone or washed gravel, uniformly graded from 1 inch minimum to 3/4 inch maximum size.

2.06 OTHER MATERIALS

- A. Provide materials, not specifically described but required for complete and proper installation of cast-in-place concrete, selected by Contractor subject to approval of Architect.

PART 3 - EXECUTION

3.01 MIXING AND PLACING CONCRETE

- A. Preparation: Clean equipment for transporting concrete. Remove debris, water, and ice from places to be occupied by concrete. Remove laitance and unsound material from hardened concrete before additional concrete is added.
- B. Mixing: Ready-mixed concrete, mixed and delivered in accordance with following

- requirements only of ASTM C 94.
1. Tolerances in Slump,
 2. Measuring Materials,
 3. Batching Plant,
 4. Mixers and Agitators,
 5. Mixing and Delivery,
 6. Use of Non-Agitating Equipment
 7. Inspection.
- C. Conveying: Convey concrete from mixer to place of deposit by methods that prevent separation and loss of materials.
- D. Placing:
1. Deposit as nearly as practicable in final position to avoid segregation due to re-handling and flowing. Place at rate to assure concrete is plastic and flows readily into spaces between bars. Do not use concrete contaminated by foreign material or re-tempered concrete.
 2. When placing is started, carry a continuous operation until placement of panel or section is completed.
- E. Hot Weather Concreting: Place, handle, and cure concrete complying with ACI SPEC-305.1.
- F. Cold Weather Concreting: Provide adequate equipment for handling concrete materials and protecting concrete during freezing and near freezing weather. Concrete materials, reinforcements, forms, and ground in contact with concrete to be free of frost, snow, and ice. Details of approved procedures are available in ACI SPEC-306.1. Contractor to keep accurate thermometer on job where the work is proceeding.
- G. Porous Backfill: Crushed stone or gravel graded from 25 mm to 20 mm (1 inch to 3/4 inch).

3.03 PROTECTION OF ADJACENT SURFACES

- A. Contractor responsible for any work soiled and stained by dripping cement, water, or concrete. Protect same with tarpaulin or similar devices while pouring concrete.

3.04 CONSOLIDATION

- A. Consolidate concrete by vibration, spading, rodding, or forking. Work around reinforcement, embedded items and into corner of forms. Over-vibrating and use of vibrators to transport concrete within forms not allowed. When consolidating by vibration, keep spare vibrator on job site during concrete placing. Use vibrators of length to extend within 6 inches of bottom of freshly poured concrete, vibrator being raised with each succeeding pour.

3.05 CONCRETE CURING AND FINISHING

- A. **Curing Period:** Cure concrete for minimum period of 7 days at a temperature above 50° F. by one of approved methods listed below. Protect fresh concrete from heavy rain, flowing water, mechanical injury and from injurious action of sun. Comply with ACI 306.1 for cold-weather protection, and follow recommendations in ACI 305R for hot-weather protection during curing. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.
- B. **Potable Water Curing:** If cured with water, keep concrete wet by mechanical sprinklers or by any approved method which will keep surface continuously wet.
- C. **Evaporation Retarder:** Waterborne, monomolecular film forming, manufactured for application to fresh concrete. Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions prevail. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. **Curing Compounds: NO CHEMICAL CURING COMPOUNDS ALLOWED.**
- E. **Waterproofing Paper or Opaque Polyethylene Film:** Conform to ASTM C 171. Cover concrete immediately following final finishing operation. Anchor securely, seal edges or apply in manner to prevent moisture escaping from concrete.
- F. **Curing Blanket:** AASHTO M-182, Class II, ASTM C-171 burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- G. **Concrete Patching:** Immediately after stripping forms, examine surfaces. Patch honeycombing, defective joints, voids, tie holes, and defects before concrete is thoroughly dry. However, make no attempt to correct or fill any honeycomb spots, or any other defects until they have been examined by Architect and approval obtained as to correction to be employed. Finish of patch to match adjoining surface.
- H. **Concrete Finishes (ACI 301, latest edition):**
 - 1. Interior General: Floor slabs, including topping slabs, to be smooth and steel troweled to hard dense surface (non-burnished), except where required to be depressed. Rough float finish depressed surface. Protect concrete floors during construction period.
 - 2. Exterior: Pads, Steps, Stairs, Slabs and other surfaces to receive light-medium broomed finish for non-slip surface.

3.06 FLOOR SLOPE TO DRAINS

- A. Slope floors to drain outlets. Low spots where pools of water can stand on finished floors are not acceptable. Slope to drains 1/8" per lineal foot unless otherwise marked.
- B. Slope floors uniformly from perimeter walls and partitions to drain outlets (unless otherwise indicated).
- C. When multiple drains are shown in a room, space equally. Create dedicated area per drain outlet and slope floor uniformly from area perimeter to drain outlet (unless otherwise indicated).

END OF SECTION 03 30 00

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PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Grinding and Polishing of interior concrete slab.
 - 2. Application of reactive surface densifier.
 - 3. Progressive polishing of slab surface.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Accessibility Requirements: Comply with applicable requirements of the Americans with Disabilities Act Standards for Accessible Design (ADASAD) for Buildings and Facilities; Final Guidelines, revisions, and updates for static coefficient of friction for walkway surfaces.
 - 2. Environmental Requirements: Comply with current Federal and local toxicity and air quality regulations and with Federal requirements on content of lead, mercury, and other heavy metals. Do not use solvents in floor polish products that contribute to air pollution.
- B. Mock Up: Prior to commencement of work, prepare mock up for evaluation of surface preparation techniques and application workmanship.
 - 1. Designate 250 square feet for mock up of system specified, using same materials, tools, equipment, and procedures intended for actual surface preparation at location determined by the General Contractor. Include properly prepared slab joints. Include slab edges adjoining existing partitions/walls.
 - 2. Notify Architect a minimum 7 days prior to date and time when mockups will be performed and completed.
 - 3. Demonstrate proposed range of aesthetic effects and workmanship.
 - 4. Obtain approval of mockups before proceeding with work.
 - 5. Maintain mockups during construction in undisturbed condition as a standard for

judging completed work. Approved mockups may become part of the completed work if acceptable.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in original, factory sealed, unopened, new containers (drums) bearing manufacturer's name and label intact and legible, with the following information:
 - 1. Name or title of material.
 - 2. Manufacturer's standard container (drum) numbers.
 - 3. Application instructions.
- B. Dispense penetrating liquid densifier only from factory sealed and numbered containers (drums).
- C. Maintain record of container (drum) numbers received and used during floor treatment.
- D. Storage:
 - 1. Store materials in protected and well-ventilated area at temperatures between 40 and 90 degrees F unless otherwise required by manufacturer.
 - 2. Keep containers sealed until ready for use.
 - 3. Do not use materials beyond manufacturer's shelf life limits.
- E. Handling: Protect materials during handling and application to prevent damage or contamination.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Limit and control damage from excessive dust caused by surface preparation and polishing.
- B. Limit and control damage from moisture.
- C. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation and other conditions affecting product performance.
- D. All replaced concrete shall be cured a minimum of 28 days or until such point equipment can be put on slab without displacing aggregate.

1.07 SEQUENCING AND SCHEDULING

- A. Comply with approved schedule for sequence of operations for grinding and polishing operations.

1.08 WARRANTY

- A. Installer shall furnish a 5 year labor warranty from the date of installation for acid stain

coloring and a 1 year labor warranty for dye coloring process. Hardener / Densifier manufacturer shall furnish a minimum 10 year material limited warranty from the date of installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with project requirements, provide products and equipment by:
 - 1. American Concrete Concepts, 600 South German Lane, Suite 2, Conway, AR 72034, 479-202-4417.
 - 2. Glossy Floors Arkansas, 997 Happy Trails Drive (D-10), Rogers, AR 72756, 479-270-5000.
 - 3. ModernCrete Concrete Design, 2339 Kramer Lane, Austin, TX 78758, 512-331-5555.
 - 4. Approved Equal.

2.02 CONCRETE FINISH

- A. Cream Finish **PC-1**: Cream paste will be present. Dependent on how concrete is finished, chatter marks, trowel marks and imperfections will be present within the concrete.

2.03 SHEEN LEVEL

- A. Level 1 - Matte Sheen (400 grit): Overhead lighting reflected looking across floor. Looking straight down, no clarity of overhead lighting.

2.04 EQUIPMENT

- A. Contractor to furnish minimum three grinding/polishing machines (HTC 800, CPS 320 or similar) in full operating condition during the duration of work.
 - 1. Planetary, counter rotating variable speed floor grinder (3 or 4 head).
 - 2. Minimum 700 pounds of downward pressure.
- B. Dust extraction system, pre-separator, and squeegee attachments with minimum flow rating of 322 cubic feet per minute.
- C. Generators are required to provide power. The Polished Concrete Contractor is to provide a minimum of two, each capable of running two classic (HTC 800 or similar) grinding machines concurrently to expedite work.
- D. Allowable Grinding Heads:
 - 1. Metal Bonded Diamonds:
 - a. Grit Size: 40, 80, or 150.
 - b. Use of metal bonded diamonds shall be for removal of existing epoxy coating only, unless approved in writing prior to alternate use.
 - 2. Resin Bonded, Phenolic Diamonds
 - a. Grit Size: Raptor L-1, Raptor L-2, 100, 200, 400, or 800.

3. Grinding/Polishing Pads for Edges:
 - a. Grit Size: 60, 100, 120, 200, 400, 800, 1500, and 3000.
- E. Hand grinder with dust extraction attachment and pads.
- F. High speed propane burnisher:
 1. Minimum 27 inch head generating pad speeds of 1,500 RPM or higher, as verified with tachometer.
- G. Diamond Impregnated Pads
 1. Twister Diamond Cleaning System Pads, by HTC.
 2. Diamond Polishing Pads, by Norton.
 3. SpinFlex Diamond Polishing Pads, by CPS.
- H. Applicator pad:
 1. Professional Mighty Mop 077, by Quickie.
 2. 24" Microfiber Wet Room Pad, by Rubbermaid.

2.05 PRODUCTS

- A. Joint Filler
 1. Polyurea joint filler as specified in Section 07 92 00.
- B. Penetrating Hardener/Densifier: Clear liquid reactive lithium-silicate based.
 1. Retroplate 99 by Advanced Floor Products.
 2. Consolideck LS, by Prosoco.
 3. Approved equal by other manufacturer specified herein.
- C. Protective Surface Treatment (Stain Guard):
 1. RetroGaurd 99 by Advanced Floor Products.
 2. Consolideck LS Guard, by Prosoco.
 3. Approved equal by other manufacturer specified herein.
- D. Concrete Colorant: Ameripolish Solvent Based Dye or Approved System Equal. Colors as selected by the Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine slab in the presence of the certified applicator, identifying all defects. Correct conditions detrimental to timely and proper work.
- B. Do not proceed until unsatisfactory conditions are corrected as noted below.

3.02 SLAB PREPARATION

- A. Close areas to traffic during and after floor finish application for time period recommended by product manufacturer(s).

- B. Clean Substrate: Removal of surface contaminants to ensure penetration of reactive surface densifier. No hazardous, flammable, toxic or solvent based cleaning materials are permitted.
 - 1. Remove dust and loose material by brushing, sweeping, and vacuuming.
 - 2. Remove curing, sealing and coating agents, oil, breaking compound residue, wax, and grease by mechanically scraping off heavy deposits. Remove remaining residues using Wax and Curing Compound Remover.
 - 3. Remove deep-set oil and grease stains.
 - 4. Remove paint residue.
 - 5. Remove grease and general soiling with cleaner/degreaser diluted as recommended by manufacturer in an auto scrubber.
 - 6. Remove mildew by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water.
 - 7. Thoroughly rinse floor surface to remove soap residue and contaminants.
 - 8. Squeegee dry.
- C. Fill slab joints.
- D. Repair all slab defects.
- E. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and contaminants.
- F. Protect surrounding and adjacent surfaces in accordance with floor finish manufacturer's written recommendations. Do not apply tape to the floor. If floor is damaged by tape installation or removal, repair damage.
- G. Grind slab surface with 40, 80 or 150-grit metal-bonded diamond grinding heads to achieve the sand aggregate finish / deep aggregate exposure required by the architect.
- H. Progressively polish slab surface with 100 or 200-grit resin-bonded, phenolic diamond heads. Clean slab with wet auto scrubber between polishing passes.
- I. Polish slab with 400 grit resin-bonded, phenolic diamond heads.
- J. Apply dye per plan layout and per manufacturer's instructions.
- K. Clean dye residue per manufacturers instructions.
- L. Apply reactive surface densifier per manufacturer's instructions.
- M. Polish slab with 800 and 1500 grit resin-bonded, phenolic diamond heads.
- N. Apply protective surface treatment per manufacturer's instructions. Draw out material to thin film with applicator pad.
- O. Slowly burnish slab with 400, 800 or 1,500 grit diamond impregnated pad.
 - 1. Burnisher, pad and pace of forward movement shall combine to develop a minimum floor surface temperature of 91° F directly below the burnishing pad, as measured by the operator during installation.

- P. Progressive edge grinding will be necessary along all vertical abutments.

3.03 FINISH REQUIREMENTS

- A. Gloss: Final surface gloss shall be a Specified Overall Gloss Value (SOGV) of not less than 45 and Minimum Local Gloss Value (MLGV) of 30 as measured using a Horiba IG-320 Gloss Checker.
- B. Slip Resistance: Measured static coefficient of friction (SCOF) shall be not less than 0.50 as measured in accordance with ASTM C 1028.
- C. Leave work complete and ready for final inspection by Architect.

3.04 PROTECTION

- A. General Contractor shall protect areas to receive polished concrete finish at all times during construction to prevent oils, dirt, metal, excessive water, paint and other potentially damaging materials from affecting the finished concrete surface. Protective measures listed below shall begin immediately after completion of and polishing.
 - 1. Inform all subcontractors and trades that slab must be protected at all times.
 - 2. Protect slab surface from moisture for 72 hours to prevent re-emulsification of surface treatment prior to cure.
 - 3. Diaper all hydraulic equipment to avoid staining.
 - 4. Allow no pipe cutting machines on the finished slab.
 - 5. Do not place wood pallets directly on slab surface for 72 hours. Use face down carpet to separate moisture in wood from contact with concrete surface.
 - 6. Do not place steel on the finished slab to avoid rust staining.
 - 7. Prevent contact with acids and acidic detergents.
 - 8. Require use of drop cloths during all painting. Immediately wipe clean spilled paint.

END OF SECTION 03 35 43

PART 1 - GENERAL**1.01 WORK INCLUDED**

- A. Cast-in-place concrete, including formwork.

1.02 REFERENCES

- A. American Concrete Institute, Box 19150, Redford Station, Detroit, Michigan 48219 (latest revision).
1. ACI 211.1: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
 2. ACI 211.2: Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
 3. ACI 211.3: Standard Practice for Selecting Proportions for No-Slump Concrete.
 4. ACI 304R: Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 5. ACI 304.2R: Placing Concrete by Pumping Method.
 6. ACI 304.3R: High Density Concrete: Measuring, Mixing, Transporting and Placing.
 7. ACI 304.4R: Placing Concrete with Belt Conveyors.
 8. ACI 305R: Hot Weather Concreting.
 9. ACI 306R: Cold Weather Concreting.
 10. ACI 309: Standard Practice for Consolidating of Concrete.
 11. ACI 309.1R: Behavior of Fresh Concrete During Vibration.
 12. ACI 309.2R: Identification and Control of Consolidation-Related Surface Defects in Formed Concrete.
 13. ACI 318: Building Code Requirements for Reinforced Concrete.
 14. ACI 347: Recommended Practice for Concrete Formwork.
- B. American Society of Testing for Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103 (latest revision).
1. ASTM C31: Making and Curing Concrete Test Specimens in the Field.
 2. ASTM C33: Specification for Concrete Aggregates.
 3. ASTM C42: Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 4. ASTM C143: Test for Slump of Portland Cement Concrete.
 5. ASTM C150: Specifications for Portland Cement.
 6. ASTM C172: Sampling Freshly Mixed Concrete.
 7. ASTM C173: Test for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 8. ASTM C231: Test for Air Content of Freshly Mixed Concrete by the Pressure Method.
 9. ASTM C260: Specification for Air-Entraining Admixtures for Concrete.
 10. ASTM C309: Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

11. ASTM C494: Specification for Chemical Admixtures for Concrete.
 12. ASTM E329: Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.
- C. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."
- D. Local Codes and Ordinances: Wherever provisions of the Standard Building Code or the local current ordinances are more stringent than the above referenced Specifications and Standards, the local codes and ordinances shall govern.

1.03 SUBMITTALS

- A. Submit the following:
1. Product Data: Submit manufacturer's product data for reinforcement and forming accessories, patching compounds, curing compounds, and other materials.
 2. Shop Drawings: Submit for review prior to Installation, Shop Drawings of all reinforcing steel, including bar cutting lists, typical bar bend diagrams, construction of forms including jointing, reveals, and location and pattern of form tie placement.
 3. Design Mix: Prior to placement of concrete, the Contractor shall submit a design mix showing the proportions and compressive strength obtained from the concrete at 7 and 28 days. The design mix shall include a complete list of materials including type, brand, source, and amount of; cement, fly ash, ground slag, coarse aggregate, fine aggregate, water, air content and admixtures, if applicable. The mix design shall be submitted to the Engineer at least ten (10) days prior to the start of operations. Placement of concrete shall not begin until the mix design is approved in writing by the Engineer.

1.04 QUALITY ASSURANCE/ACCEPTANCE

- A. Inspection: Engineer shall have access and rights to inspect batch plants, cement mills, and facilities of suppliers, manufacturers, and subcontractors providing products specified.
- B. Batch Plant:
1. Certification: Current certification that weighing scales have been tested and are within tolerances as set forth in National Bureau of Standards Handbook No. 44.
 2. Equipment: Semi-automatic or fully automatic.
- C. Evaluation and acceptance of concrete shall conform to ACI 318.
- D. The Contractor shall engage a testing laboratory acceptable to Owner and Engineer to perform material evaluation tests and to design concrete mixes. All testing shall be paid for by the Contractor.
- E. The mixing or alternate use of cement from different manufactures will not be permitted. The source of any materials shall not be changed without the written approval of the Engineer.

- F. If the cement furnished produces erratic results under field conditions incident to the placing of the concrete, or in regard to the strength of the finished product, or in the time of the initial or final set, the Contractor shall, without notice from the Engineer, cease the use of that source of cement.
- G. Should a change in sources be made, or admixtures added or deleted from the mix, a new design mix must be submitted to the Engineer for approval.
- H. The Contractor is responsible for product quality control during handling, blending, mixing, transporting, and placement operations, and for necessary adjustments in proportioning of the materials to produce an acceptable mix. The Contractor shall perform all applicable quality control sampling and testing required to ensure that the completed concrete complies with all requirements and specifications. The Contractor shall furnish all personnel, equipment, and facilities necessary to perform the required sampling and pay for testing.
- I. The Contractor shall be responsible for ensuring that all concrete cylinders, including those made for determination of quality acceptance, are properly cured while at the jobsite.
- J. Field Sampling and Testing:
 - 1. Field samples shall be made and cured in accordance with ASTM C31 for each concrete strength, at the rate of 4 test cylinders and one slump test for each 50 cubic yards of concrete from each days pour. Make air content check for each set of test cylinders in accordance with ASTM C173 or ASTM C231. Air content and slump shall be checked and recorded at both truck discharge and point of placement for pumped concrete from the first load each day and every 50 cubic yards thereafter.
 - 2. Test Cylinders: One at 7 days, two at 28 days, and reserve the remaining cylinder for testing after a longer period as required by the Engineer if the 28 day tests do not meet or exceed the required strength.
 - 3. The taking of samples from small pours of 10 cubic yards or less may be omitted at the discretion of the Engineer.
 - 4. Additional Test Slumps: Every 25 cubic yards, recording location for report.
 - 5. When early form removal is requested, field cure cylinders will be tested at 7 days or less to determine sufficient strength.
- K. Testing: Where average strength of any group of 3 cylinders falls below the minimum comprehensive strength, or an individual cylinder falls more than 500 psi below minimum compressive strength specified, the Contractor will be required to have a certified laboratory core the concrete and test it in accordance with ASTM C42. Specimens shall be selected by the Engineer from location in structure represented by test specimen or specimens which failed. At the discretion of the Engineer, Swiss hammer testing may or may not be used to aid in determination of acceptable concrete.
 - 1. Specimens shall be secured, prepared, and tested in accordance with ASTM C42, within a period of 60 days after placement of concrete.
 - 2. Concrete will be deemed approved meeting the strength requirements of this Section if it meets the strength requirements of ACI 318.

3. The cost of cutting specimens from the structure, patching the resulting holes, and making laboratory analysis shall be at the sole expense of the Contractor.
 4. Holes from which the cored samples are taken shall be packed solid with no slump concrete proportioned in accordance with ACI 211. Patching shall have the same design strength as the specified concrete.
 5. Should laboratory analysis indicate that the proper concrete mix has not been used, all concrete poured where inappropriate mix was used shall be subject to rejection, before, during, or after the pour.
 6. If any of the specimens cut from the structure fail to meet the requirements of ACI 318, the Engineer shall have the right to require the defective concrete to be replaced, at the Contractors sole expense, and at no additional cost to the Owner.
- L. Sampling: In addition, the slump test specified in this Section, the Contractor shall keep a cone and rod apparatus on the Project site for random testing of batches. When concrete does not meet the specified slump requirements, and when directed by the Engineer, the Contractor will immediately perform a slump test in accordance with ASTM C143. Concrete not meeting the slump requirements shall be removed from the Project site.
- M. The Contractor shall provide an opportunity for the Engineer to observe all quality control sampling and testing procedures.

PART 2 - PRODUCTS

2.01 CEMENT

- A. Portland cement: ASTM C150 Type I.

2.02 WATER

- A. Clean and free from oil, acid, alkali, salt, organic matter, or other deleterious substances.
- B. Potable.

2.03 CONCRETE AGGREGATES

- A. General: Natural aggregates, well graded, free from deleterious coatings and organic materials conforming to ASTM C33 (latest revision).
1. Import non-reactive aggregates if local aggregates are reactive. (Appendix XI-ASTM C33).
 2. Wash aggregates uniformly before use.
 3. Other aggregate gradations can be approved by Engineer.
- B. Fine Aggregates:
1. Clean, sharp, natural or manufactured sand, free of loam, clay, lumps, or other detrimental materials and conforming to ASTM C33.
 2. Less than 2 percent passing the No. 200 sieve.
 3. Maximum size 1-1/2 inches.

- C. Course Aggregates:
 - 1. Natural gravel, crushed gravel, crushed stone, or combination of these materials.
 - 2. Less than 15 percent float or elongated particles (long dimension >5 times short dimension).
 - 3. Less than 0.5 percent passing the No. 200 sieve.

2.04 CONCRETE AIR-ENTRAINING ADMIXTURES

- A. Manufacturer:
 - 1. Air-Mix or Perma-Air by the Euclid Chemical Co.
 - 2. Sealtight Air Entraining Admixture by W.R. Meadows of Texas.
 - 3. Master Builders, MB-VR.
 - 4. Or approved equal.
- B. ASTM C260; nontoxic after 30 days.
- C. Use only the specified non-corrosive non-chloride accelerator. Calcium chloride is not permitted.
- D. Provide for concrete exposed to freezing and thawing, required to be watertight or placed during cold weather. Air Content: 5 to 6 percent.

2.05 ADMIXTURES

- A. Water-Reducing Admixture: Conforming to ASTM C494, Type A:
 - 1. Eucom WR-75 by the Euclid Chemical Company.
 - 2. Pozzolith 200N by Master Builder.
 - 3. Plastocrete 160 by Sika Chemical Corporation.
- B. Water-Reducing Retarding Admixture: Conforming to ASTM C494, Type D:
 - 1. Eucom Retarder-75 by the Euclid Chemical Company.
 - 2. Pozzolith 100XR by Master Builder.
 - 3. Plastiment by Sika Chemical Company.
- C. High-Range Water-Reducing Admixture (Superplasticizer): Conforming to ASTM C494, Type F or G:
 - 1. Eucom 37 by Euclid Chemical Company.
 - 2. Rheobuild 1000 by Master Builders.
 - 3. Sikament by Sika Chemical Company.
- D. Non-Corrosive Non-Chloride Accelerator Admixture: Conforming to ASTM C494 Type C or E:
 - 1. Accelguard 80 by Euclid Chemical Company.
 - 2. Or approved equal.
 - 3. Manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least 1 year's duration) using an acceptable accelerated corrosion test method using electrical potential measures.

- E. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions.
- F. Certification: Submit written conformance to the requirements and chloride ion content of the admixture to Engineer prior to mix design review.

2.06 FORMS

- A. Unexposed Finish Concrete: Plywood, lumber, metal or other acceptable material approved by the Engineer. Lumber shall be dressed on at least 2 edges and 2 sides for a tight fit if used.
- B. Form Coatings: Commercial formulation from coating compound with maximum VOC of 350 mg/l that will not bond, stain, or adversely affect concrete surfaces in contact with and will not impair succeeding treatments of concrete surfaces.
- C. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent deflection and spalling of concrete upon removal. Units provided shall not leave any metal closer than 1-1/2 inch to exposed surface. Provide ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.

2.07 BONDING AGENT

- A. Manufacturer: Sonnebond by Sonneborn; or approved equal.
- B. Submit product specifications and manufacturer's specific instructions for application on this Project for Engineer's approval.
- C. Product must meet Project requirements with regard to surface, pot life, set time, vertical or horizontal application, forming restrictions, or other stated requirements.

2.08 BOND BREAKER

- A. Manufacturers:
 - 1. Williams Tilt-Up Compound, Williams Distributors Inc., Seattle, Washington.
 - 2. Silcoseal 77, Superior concrete Accessories, Franklin Park, Illinois.
 - 3. Or Equal.
- B. Nonstaining type.
- C. Provide positive bond prevention.
- D. Submit copies of manufacturer's data, recommendations, and instructions for specific use on this Project for review.

2.09 CURING COMPOUND

- A. Liquid Membrane-Forming Curing Compound: ASTM C309, Type I, Class A. Moisture loss not more than 0.005 gr./sq. cm. applied at 200 square feet per gallon.
 - 1. Conspec, Conspec Cure & Seal.
 - 2. Sonneborn, Kure-N-Seal.
 - 3. Master Builders, MasterKure.
 - 4. Or approved equal.

2.10 BONDING AND REPAIR MATERIALS

- A. Rewettable Bonding Compounds:
 - 1. Polyvinyl acetate type.
 - 2. Manufacturer:
 - a. Euco Weld by the Euclid Chemical Co.
 - b. Weldcrete by the Larsen Co.
 - c. Sonnocrete by Sonneborn.
 - d. Daraweld C by W. R. Grace.
 - 3. Use only in areas not subject to moisture.
- B. Non-Rewettable Bonding Compounds:
 - 1. Polymer modified type.
 - 2. Manufacturer:
 - a. Euco-Bond by the Euclid Chemical Co.
 - b. Or approved equal.
- C. Bonding Admixture:
 - 1. Latex, non-rewettable type.
 - 2. Manufacturer:
 - a. SBR Latex or Flex-Con by the Euclid Chemical Co.
 - b. Daraweld C by W. R. Grace.
- D. Patching Mortar:
 - 1. Free flowing or gel consistency.
 - 2. Polymer modified cementitious mortar.
 - 3. Manufacturer:
 - a. Euco Thin Coat or Concrete Coat by the Euclid Chemical Co. for horizontal repairs.
 - b. Verticoat by the Euclid Chemical Co. for vertical or overhead repairs.
 - c. Sikatop 121 or 122 by the Sika Chemical Co. for horizontal repairs.
 - d. Sikatop 123 by the Sika Chemical Co. for vertical or overhead repairs.
- E. Underlayment Compound:
 - 1. Free-flowing, self-leveling, pumpable cementitious base compound.
 - 2. Manufacturer:
 - a. Flo-Top by the Euclid Chemical Co.
 - b. Or approved equal.

- F. Repair Topping:
 - 1. Self-leveling, polymer modified high strength topping.
 - 2. Manufacturer: Thin Top SL by the Euclid Chemical Co.

PART 3 - EXECUTION

3.01 DESIGN OF CONCRETE MIX

- A. Submit mix design on each class of concrete for review, include standard deviation analysis or trial mixture test data.
- B. Proportion mix design in accordance with ACI 318, Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures".
- C. If trial batches are used:
 - 1. Prepare mix design by independent testing laboratory.
 - 2. Achieve an average compressive strength 1200 psi higher than the specified strength, or 1400 psi for specified concrete strengths over 5000 psi.
 - 3. Certified copies of laboratory trial mix reports and cylinder tests shall be submitted to Engineer by the testing laboratory for approval.
- D. Do not place concrete prior to receipt of Engineer's written approval of mixes and cylinder test results.
- E. Design mix and perform tests to meet the requirements as specified.
- F. Slump: 2-4"
- G. Water/Cement Ratio:
 - 1. Watertight concrete exposed to fresh water and freeze/thaw: 0.50 max.
 - 2. Air entrained concrete exposed to fresh water: 0.50 max.
- H. Combined Aggregate Gradings:
 - 1. Aggregates for concrete shall be proportioned in accordance with "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete." ACI 211.1.
 - 2. Maximum aggregate size: Do not exceed one-fifth the narrowest dimension between sizes of forms or 3/4 of the clear space between reinforcing bars, 1-1/2 inch maximum.

3.02 MIXES

- A. Strength: Concrete minimum strength at 28 days shall be 4000 psi or as noted elsewhere.
- B. Mix Designs:
 - 1. Prepare design mixes for each type of concrete, in accordance with ACI 301 and ACI 318, except as otherwise specified.

- C. Conform to ACI 304 current edition for measuring, mixing, transporting and placing concrete.
- D. Concrete Mix Adjustments: Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, and as approved by Engineer. Laboratory test data for revised mix design and strength results shall be submitted to and approved by Engineer prior to using in Work.

3.03 FORMS

- A. Coordinate with other trades whose work may be located within or below concrete.
- B. Coordinate installation of joint materials and vapor retarders with placement of forms and reinforcing steel.
- C. Notify Engineer 1 full working day prior to erection of forms for inspection.
- D. Cleaning and Tightening:
 - 1. Clean forms thoroughly and adjacent surfaces to receive concrete.
 - 2. Remove chips, wood, sawdust, dirt or other debris immediately prior to concrete placement.
 - 3. Retighten forms after concrete placement to eliminate leaks.
- E. Design:
 - 1. Design, erect, support, brace, and maintain formwork in accordance with:
 - a. Building Codes Requirements for Reinforced Concrete (ACI 318).
 - b. Recommended Practice for Concrete Formwork (ACI 347).
 - c. Construction Industry Standards (OSHA 2207).
 - 2. Design formwork to be readily removable without impact, shock, or damage to concrete surfaces and adjacent materials.
- F. Reuse of Forms: Do not reuse forms unless they are in new and undamaged condition.
- G. Chamfer exposed corners and edges 3/4 inch unless otherwise specified or shown on Drawing. Use wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- H. Preparation of Form Surfaces: Coat the contact surfaces of forms with a form-coating compound where applicable prior to placement of reinforcement.
- I. Other Trades: Provide openings in concrete form work to accommodate Work of other trades. Determine size and location of openings, recesses, and chases for other trades providing such ties. Accurately place and securely support items built-in to form.
- J. Form Tolerances: Construct forms to sizes, shapes, lines, and dimensions shown, work in finished structures.

- K. Removal of Forms:
 - 1. Do not disturb forms until concrete is sufficiently strong to withstand possible injury.
 - 2. Do not remove shoring until member has acquired sufficient strength to support its weight and the load upon it.
 - 3. Do not remove forms until the concrete has attained 67 percent of 28 day strength or a minimum of 4 days. Use a method of form removal which will not cause overstressing of the concrete.

3.04 FORM TIES

- A. Place in uniform patterns on exposed surfaces.
- B. Number and placement sufficient to withstand pressures and limit deflection of forms to acceptable limits.

3.05 PLACING CONCRETE - GENERAL

- A. Do not place concrete without Engineer being present.
- B. Allow other trades reasonable time to complete portions of work which must be completed before concrete is placed.
- C. Notify Engineer at least 1 full working day in advance before starting to place concrete to permit inspection of forms, reinforcing, sleeves, conduits, boxes, inserts, or other work required to be installed in concrete.
- D. Review curing methods with Engineer and verify curing materials and equipment are at Project site.
- E. Placement shall conform to requirements and recommendations of ACI 304 and ACI 318, except as modified in these Specifications.
- F. Place concrete as soon as possible after leaving mixer in layers not over 1.5 feet deep:
 - 1. Without segregation or loss of ingredients.
 - 2. Without splashing forms or steel above.
- G. Do not use concrete truck chutes, pipes, finishing tools, etc., constructed of aluminum.
- H. Before depositing concrete:
 - 1. Remove debris from space to be occupied by concrete.
 - 2. Dampen:
 - a. Gravel fill beneath slabs on ground.
 - b. Sand where vapor barrier is specified.
 - c. Wood forms.
 - 3. Verify reinforcement is secured in position.
- I. Before placing concrete, clean and inspect form work, reinforcing steel, and items to be embedded or cast-in-place. Notify other trades prior to placement of concrete to permit

the installation of their Work. Coordinate the installation of joint materials and vapor barriers with placement of forms and reinforcing steel.

- J. Conveying:
1. Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent the separation or loss of materials.
 2. Conveying equipment shall be capable of providing a supply of concrete at the site of placement without interruptions sufficient to permit loss of plasticity between successive increments.
 3. Provide equipment for chuting, pumping, and pneumatically conveying concrete of proper size and design to insure a practically continuous flow of concrete at the point of delivery and without segregation of the materials.
 4. Keep open troughs and chutes clean and free from coatings of hardened concrete.
 5. Do not allow concrete to drop freely more than 10 feet. Equipment and methods used for conveying are subject to the approval of Engineer.

3.06 ADDITION OF WATER AT PROJECT SITE

- A. Do not add water to concrete at Project site if slump is within specified range.
- B. With the Engineer's approval, add water to concrete arriving at Project site with a slump less than the specified range, provided it can be demonstrated that the specified water-cement ratio will not be exceeded.
- C. All concrete shall be 4000 psi at 28 days with a maximum cement water ratio of .45 unless noted otherwise on Design Drawings.

3.07 CONSOLIDATION AND VISUAL OBSERVATION

- A. Concrete shall be consolidated with internal vibrators having a frequency of at least 800 vpm, with amplitude required to consolidate concrete in the section being placed.
- B. At least one standby vibrator in operable condition shall be at the placement site prior to and during placing concrete.
- C. Consolidation equipment and methods shall conform to ACI 309 "Recommended Practice for Consolidation of Concrete".
- D. Vibrator operator is required to see the concrete being consolidated to ensure good quality workmanship; or Contractor shall have a person actually observe the vibration of the concrete and will advise the vibrator operator of changes needed to assure complete consolidation.
- E. Do not use vibrators to transport concrete in forms.

3.08 PLACING CONCRETE IN HOT WEATHER

- A. Comply with the requirements of ACI 305.
- B. Fog spray forms, reinforcing steel, and subgrade just before placing concrete.
- C. Make every effort to maintain concrete temperature:
 - 1. Temperature of concrete shall be below 90 degrees F at time of placement, cool the ingredients before mixing by use of chilled water.
 - 2. Concrete batches with temperature in excess of 90 degrees F will be rejected.
 - 3. Coordinate timing and testing with Engineer and Construction Materials Testing when placing concrete on extreme weather days (above 90 degrees F).
 - 4. Cancel/reschedule concrete placement when it becomes impossible to maintain concrete temperatures below 90 degrees F.
- D. Place concrete promptly upon arrival at Project and vibrate immediately after placement.
- E. Protect and cure exposed surfaces by one of the following:
 - 1. Continuous water curing.
 - 2. Moisture-cover curing.

3.09 PLACING CONCRETE IN COLD WEATHER (ACI 306R)

- A. Preparation:
 - 1. Comply with the requirements of ACI 306.
 - 2. Additives for the sole purpose of providing freeze protection shall not be used.
 - 3. Arrangements for covering, insulating, housing, or steam heating newly-placed concrete shall be made in advance of placement and shall be adequate to maintain temperature and moisture conditions recommended.
- B. Placement:
 - 1. Surfaces to be in contact with concrete shall be free of snow, ice, and frost and shall be above 40 degrees F.
 - 2. Do not place concrete on frozen subgrade.
 - 3. Placement of insulating material, tarpaulins, or other movable coverings shall follow closely the placing of concrete so that only a few feet of concrete are exposed to outside air at anytime.
- C. Curing and Protection:
 - 1. Keep concrete continuously moist and covered and maintain concrete temperature at a minimum of 50 degrees F for 7 days; temperature shall be uniform throughout concrete. If high early strength concrete is used, this temperature requirement may be reduced to 3 days.
 - 2. It is recommended forms be left in place for the entire period of protection; use insulated blankets or other approved method on slab surfaces.
 - 3. Limit rapid temperature changes at end of protection period to avoid thermal cracking.

3.10 PATCHING - GENERAL

- A. Prior to starting patching work, except as specified, obtain Engineer's approval of proposed patching techniques and mixes.

3.11 REPAIR OF DEFECTIVE AREAS

- A. Definition: Concrete in place that does not conform to specified design strength, shapes, alignments, and elevations as shown on Drawings and contains surface defects.
- B. Evaluation and acceptance of concrete shall conform to ACI 318.
- C. With prior approval of Engineer, as to method and procedure, repair defective areas in conformance with ACI 301, Chapter 9, except that the specified bonding compound shall be used.
- D. Surface Repairs:
 - 1. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Owner.
 - 2. Honey-combed areas and rock pockets:
 - a. Repair immediately after removal of forms.
 - b. Prepare no-slump concrete mortar and test so that, when dry, patching mortar will match surrounding color and strength.
 - c. Cut out to solid concrete or minimum of 1-inch depth.
 - d. Make edges for cuts perpendicular to the concrete surface.
 - e. Thoroughly clean and dampen with water.
 - f. Apply bonding compound.
 - g. Compact no-slump concrete into patch, and finish to blend with adjacent finished concrete.
 - h. Cure in same manner as adjacent concrete.
 - 3. High Areas: Grind after concrete has cured at least 14 days.
 - 4. Low Areas:
 - a. Repair during or immediately after completion of surface finishing operations.
 - b. Cut out low areas and replace with fresh concrete of same type and class as original concrete.
 - c. Finish repaired areas to blend into adjacent concrete.
 - 5. Defective Areas:
 - a. Cut out and replace with fresh concrete of same type and class as original concrete.
 - b. Finish repaired areas to blend into adjacent concrete.
 - 6. Make structural repairs with prior approval of Engineer, as to method and procedure, using the specified epoxy adhesive or epoxy mortar. Where epoxy injection procedures must be used, use an approved low viscosity epoxy made by the manufacturers previously specified.
 - 7. Level floors for subsequent finishes by use of specified underlayment material.
 - 8. Where required, level exposed floors by use of the specified self-leveling repair topping.
 - 9. Repair methods not specified above may be used, subject to approval of Engineer.

3.12 BLOCKOUTS AT PIPES OR OTHER PENETRATIONS

- A. Submit proposed blockouts for review in accordance with Specifications.

3.13 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for no less than 7 days. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301. Avoid rapid drying at end of final curing period.
- B. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as specified herein.
 - 1. Provide moisture curing by keeping concrete surface continuously wet by covering with water, by water-fog spray, or by covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4 inch lap over adjacent absorptive covers.
 - 2. Provide moisture-cover curing by covering concrete surface with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 3. Provide curing and sealing compound on interior slabs left exposed and to exterior slabs and walks, as follows:
 - a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - b. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- C. Curing Formed Surfaces:
 - 1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed.
 - 2. If forms are removed, continue curing by methods specified above, as applicable.
- D. Curing Unformed Surfaces:
 - 1. Cure unformed surfaces; i.e., slabs and other flat surfaces by application of appropriate curing compound.
 - 2. Final cure concrete surfaces to receive finish flooring by moisture-retaining cover, unless otherwise directed by Engineer.

3.14 SURFACE FINISHES

- A. As-Cast Finish:
 - 1. For formed concrete surfaces not exposed-to-view in the finished work or by other construction, unless otherwise indicated.
 - 2. This is concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

- B. Smooth Form Finish:
 - 1. For formed concrete surfaces exposed-to-view, or that will be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, i.e.; waterproofing, damp-proofing, painting or other similar system.
 - 2. This is cast-in-place concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams.
 - 3. Repair and patch defective areas with fins or other projections completely removed and smoothed.

- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise specified or shown on Drawings.

- D. Float Finish: Apply float finish to slab surfaces to receive trowel finish and other finishes specified.
 - 1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units.
 - 2. Check and level surface plane to tolerances of Ff 18 - Fl 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to uniform, smooth, granular texture.

- E. Grout Cleandown Finish:
 - 1. After repairing defects, saturate surface thoroughly and keep saturated during grouting operations.
 - 2. Use a grout consisting of 1 part cement, 1-1/2 to 2 parts of fine sand and sufficient water for a thick creamy consistency.
 - 3. Apply by brush, trowel or rubber float to completely fill air bubbles and holes.
 - 4. Float vigorously with a wood, sponge-rubber or cork float immediately after applying grout. Excess grout shall be scraped off with a sponge-rubber float.
 - 5. After grout has been allowed to stand undisturbed to allow some loss of plasticity, but not damp appearance, the surface should be rubbed with a clean, dry burlap to remove all excess grout. All air holes shall be filled but no visible film of grout shall remain after the rubbing.

- F. Trowel Finish: After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of Ff 20 - fl 17. Grind smooth surface defects which would telegraph through applied floor covering. Apply where exposed-to-view, and where slab surfaces are to be covered other than finish coating system.
- G. Non-Slip Broom Finish:
1. Finish concrete as specified, except only trowel the surface once.
 2. Finish surface by drawing fine-hair broom lightly across surface.
 3. Brooming:
 - a. Broom in same direction and parallel to expansion joints.
 - b. Inclined slab: Broom perpendicular to slope. Texture shall be as approved by the Engineer from sample panels.
 4. Provide this finish to sidewalks.
- H. Class 2, Rubbed Finish in accordance with Standard Specifications for Highway Construction, Section 802.20, Arkansas Department of Transportation, Edition (latest edition) and this Section:
1. After removal of forms, rubbing of concrete shall be start as soon as its condition will permit.
 2. Immediately before starting this Work, concrete shall be thoroughly saturated with water. Sufficient time shall have elapsed before wetting down to allow the mortar used in the pointing of rod holes and defects to thoroughly set.
 3. Surfaces to be finished shall be rubbed with a medium coarse carborundum stone using a small amount of mortar on its face.
 4. Mortar shall be composed of cement and fine sand mixed in proportions used in the concrete being finished.
 5. Rubbing shall be continued until form marks, projections, and irregularities have been removed, voids filled, and a uniform surface has been obtained.
 6. Paste produced from rubbing shall be left in place at this time.
 7. After concrete above the surface being treated has been cast, the final finish shall be obtained by rubbing with a fine carborundum stone and water. Rubbing shall be continued until the entire surface is smooth texture.
 8. Finish will not be acceptable if a uniform texture and color have not been achieved. Should the finish not be acceptable, the surface shall be given a sprayed finish or other approved finish that is satisfactory to the Engineer.
 9. After final rubbing is completed and the surface is dried, it shall be rubbed with burlap to remove loose power and left free from all unsound patches , paste, powder, and objectable marks.
 10. Apply this finish to exposed retaining wall surfaces.
- I. Class 3, Textured Coating Finish in accordance with Standard Specifications for Highway Construction, Section 802.19, Arkansas Department of Transportation, Edition (latest edition) and this Section:
1. Material provided for textured coating finish shall be a commercial paint type texturing product produced specifically for this purpose, and shall consist of a

- synthetic non-alkyd resin containing mica, perlite, non-biodegradable fibers, and durable tinting pigments. The material shall be listed on the QPL. Material shall be approved by Engineer.
2. Unless otherwise specified in the Contract, the color of the textured coating finish shall be concrete gray, equal or close to Shade 36622 of the Federal Color Standard 595 B. The exact shade shall be selected by the Owner.
 3. Surfaces to be coated shall be free of efflorescence, laitance, flaking, coatings, dirt, oil, and other foreign substances.
 4. The sprayed finish shall not be applied over surfaces cured with membrane curing compound until 30 days has elapsed from application of the membrane.
 5. Prior to application of the finish, the surfaces shall be free of moisture, as determined by sight and touch, and in a condition consistent with manufacturer's published recommendations.
 6. The finish shall be applied at a rate as recommended by the manufacturer and as approved by the Engineer.
 7. The finish shall be applied with heavy duty spray equipment capable of maintaining a constant pressure as necessary for proper application.
 8. Completed finish shall be tightly bonded to the structure and shall present a uniform appearance and texture equal to or better than the required for rubbed finish.
 9. If necessary, an additional coat or coats shall be applied to produce the desired surface texture and uniformity.
 10. Upon failure to adhere positively to the structure without chipping or cracking, or to attain the desired surface appearance, the coating shall be removed from the structure and the surface given a rubbed finish, or another approved finish satisfactory to the Engineer.

3.15 WATER LEAKAGE TESTS - WATER HOLDING STRUCTURES

- A. Subject water holding structures to leakage tests after concrete has been cured and obtained its design strength and before backfill, brick facing, or other Work that will cover exposed faces of walls is begun.
- B. Fill basins to be subjected to leakage tests with water to normal liquid level line.
- C. After basin has been kept full for 48 hours, it will be assumed, for purposes of the test, that moisture absorption by the concrete in the basin is complete.
- D. Valves and gates to the structure shall then be closed, and the change in water surface measured for a 24-hour period.
- E. During test period, examine exposed portions of the structure and mark visible leaks or damp spots; such leaks or damp spots shall be later patched or corrected in a manner acceptable to Engineer.

3.16 MISCELLANEOUS ITEMS

- A. Filling Holes:
 - 1. Fill in holes and openings left in concrete for the passage of Work by other trades after their Work is in place.
 - 2. Mix, place, and cure concrete to blend with in-place construction. Provide other miscellaneous concrete filling required to complete Work.
- B. Non-Shrink Grout Application: Grout base plates, equipment bases, clarifier base, and other location indicated with specified non-shrink grout. Provide non-metallic type where grout is exposed.

3.17 PROTECTION

- A. No Work or walking on finished surfaces will be allowed for 16 hours after the concrete is placed.
- B. Provide plywood or other acceptable protective cover at all traffic areas throughout the job.
- C. Protect exposed concrete floors, steps, and walks from paint and other materials or equipment which may blemish or damage these surfaces.

END OF SECTION

PART 05
METALS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Furnish and install miscellaneous metal items required and specified. Provide miscellaneous bolts, anchors, supports, braces, and connections necessary for completion of Work.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
 - 1. Submit Shop Drawings on miscellaneous metal items for review by Architect, prior to fabrication. Include type, grade, class of metal and sizes, details of fabrication, methods of assembling, connections to supporting construction, reinforcement, and location of hardware.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 REFERENCES

- A. American Institute of Steel Construction (AISC):
 - 1. Specifications for the Design, Fabrication and Erection of Structural Steel for Building
- B. American National Standards Institute (ANSI):
 - 1. ANSI A14.3, "Ladders, Fixed, Safety Requirements."
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM A36, "Structural Steel."
 - 2. ASTM A53, "Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe."
 - 3. ASTM A123, "Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products."
 - 4. ASTM A153, "Zinc Coating (Hot-Dip) on Iron and Steel Hardware."
 - 5. ASTM A307, "Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength."
 - 6. ASTM A446, "Specification for Sheet Steel, Zinc-Coated by the Hot-Dip Process."
 - 7. ASTM A500, "Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes."
 - 8. ASTM A568, "Specification for General Requirements for Steel, Carbon and High-Strength Low Alloy Hot-Rolled Sheet and Cold Rolled Sheet."

9. ASTM A627, "Specification for Homogeneous Tool-Resisting Steel Bars for Security Applications.
 10. ASTM A780, "Practice for Repair of Damaged Hot-Dipped Galvanized Coatings."
 11. ASTM B221, "Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube."
- D. American Welding Society (AWS):
1. AWS D1.1 - Structural Welding Code.
- E. Steel Structures Painting Council Specification (SSPC):
1. Steel Structures Painting Manual.

1.05 QUALITY ASSURANCE

- A. Qualifications of Welders: Use certified welders and the shielded arc process for welding performed in connection with work of this Section.
- B. Codes and Standards: In addition to complying with pertinent codes and regulations, comply with:
1. "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction.
 2. "Code for Welding in Building Construction" of the American Welding Society.
- C. Conflicting Requirements: In event of conflict between pertinent codes and regulations, requirements of the referenced standards, and these specifications, provisions of more stringent govern.
- D. Design, engineer, fabricate and install handrails and railing systems to comply with requirements of ASTM E985 for structural performance based on testing performed in accordance with ASTM E 894 and E 935. Conform to the current version of the IBC.
- E. Handrails, guardrails, and their supports to be designed for 50 lbs per linear foot, applied in any direction at the top of the top rail, and a concentrated load of 200 lb applied in any direction at any location along the top of the rail. The uniform load and concentrated loads are not to be applied simultaneously. Other components, including guardrail infill and bottom rails, are to be designed for 100 lbs acting on a projected area of 1 square foot, including the open space between components. The effects of this load are not to be combined with the load on the top rail.
- F. ASTM E 985 - For railing - related definitions and structural performance criteria.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Steel plates, angles, and other structural shapes shall conform to ASTM A36.
- B. Steel pipe shall conform to ASTM A53, Grade B, Schedule 40.

- C. Galvanized steel pipe and tube shall conform to ASTM A53.
- D. Steel Tubing shall conform to ASTM A500.
- E. Sheet Steel, Galvanized: ASTM A446.
- F. Sheet and Strip Steel, Hot Rolled: ASTM A568.
- G. Extruded Aluminum: ASTM B221.
- H. Anchors and Fasteners for Aluminum: Stainless steel.
- I. Welding Materials: AWS D1.1; type required for materials being welded.
- J. Anchors
 - 1. Threaded Type Concrete Inserts: Galvanized malleable iron or cast steel capable of receiving 3/4 inch diameter machine bolts.
 - 2. Slotted Type Concrete Inserts: Welded box type fabricated with minimum 1/8 inch thick galvanized pressed steel plate with slot to receive 3/4 inch diameter square head bolt and knockout cover.
 - 3. Expansion Shield for Masonry Anchorage: FS FF-2-325.
 - 4. Toggle Bolts: FS FF-B-588.
- K. Fasteners
 - 1. Bolts, Nuts and Washers for Exterior Locations: ASTM A307, galvanized in accordance with ASTM A153.
 - 2. Bolts, Nuts and Washers for Interior Locations: ASTM A307, Grade A, regular hexagon head.
 - 3. Bolts, Round Head: ANSI B-18.5
 - 4. Wood Screws, Flat Head Carbon Steel: ANSI B-18.6.1.
 - 5. Plain Washers, Helical Spring Type Carbon Steel: FS FF-W-84.

2.02 FABRICATION

- A. Fabricate steel items according to approved shop drawings and to applicable portions of AISC Specifications. Conceal welds where possible; grind exposed welds smooth and flush with adjacent finished surface. Ease exposed edges to small uniform radius.
- B. Pre-assemble products in shop to greatest extent possible. Disassemble units to extent necessary for shipping and handling. Clearly mark units for re-assemble and installation.
- C. For exposed to view fabrications, use materials which are smooth and free of surface blemishes including pitting, seams marks, roller marks, roller trade names and roughness. Remove blemishes by grinding or by welding and grinding, prior to cleaning, treating and application of surface finishes including zinc coating.
- D. Fabricate items with joints tightly fitted and secured.

- E. Fit and shop assemble in largest practical sections for delivery to Project site.
- F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of structure, except where specifically noted otherwise.
- G. Make exposed joints butt tight, flush and hairline.
- H. Fabricate anchorage and related components of same material and finish as metal fabrication, unless indicated otherwise.

2.03 ROUGH HARDWARE

- A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 sections.
- B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

2.04 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports for applications indicated or which are not a part of structural steel framework, as required to complete work.
- B. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 - 1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.
 - a. Except as otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inch x 8 inches long.

2.05 FINISHES, GENERAL

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Finish metal fabrications after assembly.
- C. Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process compliance with the following requirements:
 - 1. ASTM A153 for galvanizing iron and steel hardware.
 - 2. ASTM A123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick and heavier.

- D. Preparation for Shop Priming: Prepare un-coated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
1. Interiors (SSPC Zone 1A): SSPC-SP3 “Power Tool Cleaning”:
 2. Apply shop primer to un-coated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 “Paint Application Specification No. 1” for shop painting.
 3. Lead free, alkyd primer: Manufacturer's standard.

2.06 ACCESS DOORS

- A. Manufacturer: Milcor Limited Partnership, 1150 North Cable Road, Lima, OH 45805, 1-800-528-1411, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- E. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches

those adjacent.

3.02 CLEANING

- A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touch-up of field painted surfaces.
 - 1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

END OF SECTION 05 50 00

PART 06
WOODS, PLASTICS AND COMPOSITES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Includes: Provide rough carpentry, and installation of items specified in other Sections, normally installed by carpenters. Section specifies wood blocking, framing, sheathing, furring, nailers, sub-flooring, rough hardware, and light wood construction.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.
- C. Shop Drawings: Show fabrication and installation details for trusses.
 - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
 - 2. Indicate sizes, stress grades, and species of lumber.
 - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
 - 6. Show splice details and bearing details.

1.04 QUALITY ASSURANCE

- A. Material Grading: Identify hardboard, particleboard, lumber, and plywood by affixing grademark, stamp, or related identifying marks indicating material grades, rules or standards under which they are produced, and complying with rule or standard under which the material is produced. Use certified inspection agency certified by the Board of Review, American Lumber Standards Committee, to grade lumber species. In lieu of piece grade-marking, a certificate of inspection from an agency certified by the Board of Review, American Lumber Standards Committee may be furnished for precut lumber. Applicable grading rules are as follows:
 - 1. Douglas Fir, White Fir, and Cedar: "Standard Grading and Dressing Rules for West Coast Lumber" as published by the West Coast Lumber Inspection Bureau.

2. Ponderosa and Western White Pine: "Grading Rules for Western Lumber", published by the Western Wood Products Association.
 3. Southern Yellow Pine: "Standard Grading Rules for Southern Pine Lumber" as published by the Southern Pine Inspection Bureau.
 4. Redwood: "Standard Specifications for Grades of California Redwood Lumber" as published by Redwood Inspection Service.
- B. Plywood: Conform to U. S. Product Standard PS 1 issued by the National Bureau of Standards. Stamp or brand each standard size panel to show type and grade of panel. When used structurally, plywood to meet performance standards for its type as described in Product Standard PS 1 for Douglas Fir plywood. Furnish material identified as to species, grade, and glue type by an approved agency or independent testing laboratory with appropriate affixed grade-marks on each panel. Provide in addition to above requirements, exterior type plywood for permanently exposed plywood in outdoor applications.
- C. Qualifications of Workmen: Provide sufficient skilled workmen and carpenter foreman present at all times during execution of this portion of the Work, thoroughly familiar with type construction involved, materials and techniques specified.

1.05 PRODUCT HANDLING

- A. Protection:
1. Store materials to ensure proper ventilation and drainage. Protect against damage and weather.
 2. Deliver materials to job site and store, in safe area, out of the way of traffic, and shored off ground surface.
 3. Identify framing lumber as to grades and store grades separately.
 4. Protect metal products with adequate weatherproof outer wrappings.
 5. Use extreme care in off-loading lumber to prevent damage, splitting, and breaking materials.
- B. Replacements: In event of damage, immediately make repairs and replacements necessary to approval of Architect at Contractor's expense.

PART 2 - PRODUCTS

2.01 LUMBER

- A. Provide lumber for structural carpentry using following species provided grade for each is not lower than minimum shown:
- | | | |
|----|---------------------------------------------|--------------|
| 1. | Pine, Southern Yellow - SPIB Rules (KD) | No. 2 Common |
| 2. | Fir, Douglas - WCLIB Rules | Standard |
| 3. | Fir, White - WCLIB Rules | Standard |
| 4. | Pine, Western White - WWPA Rules | Standard |
| 5. | Redwood - RIS Rules Construction Heart | |
| 6. | Cedar, Western Red, & Incense - WCLIB Rules | Standard |
- B. Lumber (except where otherwise noted): Surfaced 4 sides unless, in addition to being

dressed, it has been notched, ship-lapped, or patterned.

- C. Lumber Dimensions: Are nominal.
- D. Structural Performance: Metal-plate-connected wood trusses shall be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
 - 1. Design Loads: As indicated.
 - 2. Maximum Deflection under Design Loads:
 - a. Roof Trusses: Vertical deflection of 1/360 of span.
- E. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.
- F. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.02 FIRE-RETARDANT AND PRESERVATIVE TREATED LUMBER

- A. Manufacturers: Provide wood treatment by or under license from Chemical Specialties, Inc., One Woodlawn Green, Suite 250, 200 E. Woodlawn Road, Charlotte, NC 28217. ASD. Tel: (800) 421-8661, or approved equal by one of the following companies:
 - 1. Osmose, Inc., 1016 Everee Ln., Griffin, GA 30224
 - 2. Arch Wood Protection, Inc., 1955 Lake Park Dr., Ste. 250, Smyrna, GA 30080
 - 3. Hoover Treated Wood Products, Inc., 154 Wire Rd., Thomson, GA 3082
- B. Fasteners and Connectors: For treated wood and where wood is in ground contact, subject to high relative humidity, or exposed to weather, provide steel fasteners with hot-dip galvanized coating per ASTM A153/A153M; provide steel connectors with hot-dip galvanized coating per ASTM A653, Class G185 sheet with 1.85 ounces of zinc coating per square foot.
- C. Wood Preservative Treatment:
 - 1. ACQ Preserve.
 - a. Use 0.25 lb/cu ft (4.0 kg/cu m) retention.
 - b. Kiln dry after treatment to 19 percent maximum moisture content for lumber and 18 percent for plywood.
 - c. Treat wood in the following locations:
 - 1) In contact with roofing, flashing, or waterproofing.
 - 2) In contact with masonry or concrete.
 - 3) Within 18 inches (450 mm) of grade.
 - 4) Exposed to weather.
 - 5) Other locations indicated.
- D. Fire-Retardant Treatment:
 - 1. Lumber: Comply with AWWA C20 .
 - 2. Plywood: Comply with AWWA C2 7, Type A.
 - 3. Surface Burning Characteristics: UL FRS rating; flame spread and smoke developed ratings of 25 or less in a test of 30 minutes' duration.
 - 4. Treatment: D-Blaze®.

2.03 PLYWOOD

- A. Plywood (not otherwise specified or noted on the Drawings): Douglas Fir or Southern Yellow Pine panels, C-D grade for concealed applications and A-C grade for exposed applications, meeting U.S. Product Standard PS 1.

2.04 HARDWARE

- A. Provide rough hardware required for proper installation of carpentry work. Furnish hot-dipped galvanized, nails, spikes, screws, bolts, ply clips and similar items using proper types and ample sizes to fasten and hold the various members securely in place.
- B. Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
- C. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

2.05 METAL CONNECTOR PLATES

- A. Fabricate connector plates to comply with TPI 1.
- B. Hot-Dip Galvanized-Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.
 - 1. Use for interior locations unless otherwise indicated.
- C. Hot-Dip Heavy-Galvanized-Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preserved-treated lumber and where indicated.
- D. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 316, and not less than 0.035 inch thick.
 - 1. Use for exterior locations [, **wood-preserved-treated lumber,**] [**fire-retardant treated lumber,**] and where indicated.

2.06 BLOCKING

- A. Provide solid wood blocking system capable of sustaining loads as listed within these documents, including drawings. Do not cut or bend metal studs, or cut wood studs, to achieve flush fit to face of studs. Blocking is to span between vertical studs and be fire resistant where applicable. Verify with architect any condition or loading requirement not listed. 2x solid blocking or two layers of 5/8" or 3/4" plywood, depending on required loads and clearances, may be used at contractor option. Coordinate any electrical and

audio visual components, including back-boxes and conduit, with respective contractors.

1. Attach blocking between studs for support of surface mounted items.
 - a. Plumbing fixtures.
 - b. Toilet partitions.
 - c. Wall cabinets.
 - d. Toilet accessories
 - e. Hardware.
 - f. Architectural woodwork.
 - g. Grab bars.
 - h. Handrails and railings.
 - i. Signage.
 - j. Other items requiring backing for attachment.

2.07 OTHER MATERIALS

- A. Provide materials, not specifically described but required for a complete and proper installation using new material, suitable for the intended use, and subject to approval of Architect.

PART 3 - EXECUTION

3.01 WORKMANSHIP

- A. Carpentry: Produce joints true, tight, and well nailed. Lay out, install and fit wood framing, furring, stripping, and blocking as required by conditions encountered.
- B. All Work: Plumb, level, and brace with sufficient nails, spikes, and bolts required to ensure secure attachment and rigidity.
- C. Any piece of work or carpentry material with defects that prevent it from serving its intended purpose satisfactorily, including crooked, warped, bowed, or otherwise defective material, even if within the limits of grade specified, will be rejected. Replace with an acceptable piece.

3.02 TEMPORARY ENCLOSURES AND PROTECTION

- A. Provide temporary enclosures at door, window, and related openings in exterior walls, as necessitated by weather and adverse conditions. Maintain enclosures in good repair and remove when no longer needed. Protect door and window frames.

3.03 STUD WALLS AND PARTITIONS

- A. Sole Plates: Single 2" thick members for walls and partitions.
- B. Studs (unless otherwise called for): 2 x 4's spaced 16" maximum o.c., doubled at sides and heads of openings, tripled at corners and placed to provide end nailing for sheathing. Toenail studs to sole plates with two 8d nails on each face side of each stud. Lay out studs so one occurs at each joint in plywood paneling and gypsum board.
- C. Top Plates: Double 2" thick members for walls and partitions.

- D. Provide plates of same width as studs to form continuous horizontal ties. Provide suitable splice plates at ends of sole plates, securely nailed in place. Nail lower members of top plates to studs and corner posts with two 16d nails at each stud and post. Nail upper and lower members of top plates together with 10d nails spaced 16" o.c.. Use two 10d nails at ends of upper members, and arranged so no joint in an upper member occurs over joint in lower member. Provide trusses and lintels over openings in walls and bearing partitions. Splices in plates not permitted over openings where a plate forms part of lintel.
- E. Provide one row of horizontal blocking between studs, near mid-height of wall. Furnish blocking of same width as studs.
- F. Provide additional blocking for anchorage of wall or ceiling mounted items as follows:
 - 1. Attach blocking between studs for support of surface mounted items.
 - a. Plumbing fixtures.
 - b. Toilet partitions.
 - c. Wall cabinets.
 - d. Toilet accessories
 - e. Hardware.
 - f. Architectural woodwork.
 - g. Grab bars.
 - h. Handrails and railings.
 - i. Signage.
 - j. Other items requiring backing for attachment.
- G. Anchor plates and sills of interior partitions to concrete slab with "Ramset", or approved equal, power-driven drive pins. Use No. 3330 drive pins. Set drive pins not less than 2" from edge of concrete. Spacing of drive pins not to exceed 4 feet on centers with drive pins at ends of all sections of plate.

END OF SECTION 06 10 00

PART 07
THERMAL AND MOISTURE PROTECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Furnish and install insulation and related items specified.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 PRODUCT HANDLING

- A. Protection:
1. Deliver materials to job site and store in safe dry place with labels intact and legible at time of installation.
 2. Protect building insulation materials before, during, and after installation. Protect installed work and materials of other trades.
- B. Replacements: In event of damage, immediately make repairs and replacements necessary to approval of Architect and at Contractor's expense.

1.05 REFERENCES

- A. Concealed Installations: Flame Spread rating of not more than 75 and a smoke developed rating of not more than 450 when tested in accordance with ASTM E84.
- B. Exposed Installations: Flame Spread rating of not more than 25 and a smoke developed rating of not more than 450 when tested in accordance with ASTM E84.

1.06 QUALITY ASSURANCE

- A. Mock-Up: Provide a mock-up of materials for use for review of workmanship. Accepted mock-ups may remain in place.

- B. Preconstruction Meeting: Convene a minimum of two weeks prior to commencing work of this section. Agenda shall include materials proposed for use, sequence of construction and coordination with installation of adjacent and covering materials.

PART 2 - PRODUCTS

2.01 RIGID PERIMETER INSULATION BOARD

- A. Where indicated as "Perimeter Insulation" at turn-down slab transitions, provide 2" thick Styrofoam™ Brand Square Edge Extruded Polystyrene (XPS) Foam Insulation Shiplap, Owens Corning® FOAMULAR® 250, or approved equal. Insulation Minimum R-Value is to meet ASHRAE 90.1-2022 for heated Slab-On-Grade Floors of R-15 for 24 inches.
1. Sopra-XPS by Soprema.US, 800-356-3521.
 2. Dupont™ Styrofoam™ Brand Cavitymate™ Ultra Extruded Polystyrene Insulation.
 3. Kingspan GreenGuard® Type IV XPS Insulation Board.
- B. Installation is to be per manufacturer's published recommendations.

2.03 BATT INSULATION

- A. Fiberglass Building Insulation Manufacturers:
1. Certainteed, 800-233-8990
 2. Johns Manville, 800-866-3234
 3. Knauf Insulation, 800-825-4434
 4. Owens Corning Fiberglass, 888-834-2371
- B. Material: Formaldehyde-free Fiberglass type bearing the UL Classification marking as to fire resistance conforming to Federal Specification HH-I-521F, and ASTM C-665:
1. Un-faced, Type I in walls
- C. Product: Thermafiber® UltraBatt™ Mineral Wool Insulation; unfaced.
1. Formaldehyde-Free (FF) Option.
 2. R-Value: R-15 as applicable for wood stud wall construction.
 3. Surface Burning Characteristics: Tested in accordance with ASTM E84, Unfaced: Flame Spread 5 and Smoke Developed 5.

2.04 ACOUSTICAL INSULATION

- A. In partitions, provide un-faced Owens-Corning Pink Next Gen™ Fiberglas™ Sound Attenuation Batts (SAB) or approved equal complying with ASTM C 665, Type I and ASTM E 136. Flame spread rating shall not exceed 25 and smoke developed shall not exceed 50 when tested complying with ASTM E 84. Approved equal manufacturers:
1. Certainteed **NoiseReducer™** Sound Attenuation and Acoustical Ceiling Batts.
 2. Knauf Insulation EcoBatt® Insulation with ECOSE® Technology.
 3. Johns Manville Unfaced or ComfortTherm® Batts and Rolls.
 4. ROCKWOOL Safe'n'Sound® Fire & Soundproof Insulation available in 3" and 6" thicknesses. Mineral wool batt insulation conforms to ASTM C167.

2.07 LINER ROOF INSULATION SYSTEM

- A. Acceptable Liner System is Skyliner FP Insulation System from Bay Insulation Systems, 920-406-4000, or approved equal. System to achieve R-value of R-30 (R19+R11), Exposed Purlin Area 0%, and continuous 1" x 3.5" Thermal Spacers.
 - 1. Thermal Spacers: 45 PSI @ 10% deflection with minimum R-6 value as manufactured by Sealed "N" Safe Continuous Insulation System, 888-340-4767, or approved equal. Spacers must comply with design performance of specified Metal Roof Panel System and meet ASHRAE 90.1-2010.
 - 2. Fabric Description: Woven, HDPE Scrim premium, low-permanence vapor retarder attached underneath the purlin, secured by a 1" x .023 metal banding grid continuous in each direction. Provide adhesive, fasteners and clips required for a complete installation of the system. Fabric and grid color to be white.
 - 3. Insulation: Meet Standard NAIMA 202-96 (R) certified flexible fiberglass insulation for use in metal buildings.
- B. OSHA Fall Protection (FP): Contractor to meet fall protection requirements for construction workers doing work while on a roof.

2.09 METAL BUILDING INSULATION FACING

THIS CAN BE MANY DIFFERENT FACER TYPES - CHECK WITH DESIGNER

- A. Manufacturer's of Metal Building Insulation Facing: Subject to compliance with requirements, provide products from the following:
 - 1. "Gymguard"; Lamtec Corporation, 1-800-852-6832, or approved equal.
- B. Facing is to be composed of 0.0015" white metalized polypropylene film laminated to a fiberglass/polyester blend fabric with a fire resistive adhesive. The resulting facing shall have a water vapor transmission rate of 0.02 US perm (ASTM E96, Procedure A), and a mullen burst of 250 psi. Tensile strength shall be 195# in the machine direction and 150# in the cross-machine direction.
- C. Surface Burning Characteristics: Not to exceed 25 flame spread and 50 smoke developed when tested in accordance with UL 723 test or ASTM E84 method.

2.14 FIRE RESISTIVE JOINT SYSTEMS IN RATED ASSEMBLIES

- A. Thermafiber Safing Insulation - Type SAF

2.15 FIRE STOPPING OF THROUGH PENETRATIONS IN RATED ASSEMBLIES

- A. Thermafiber Safing Insulation - Type SAF

2.04 UNBONDED LOOSEFILL INSULATION

- A. Provide PROPINK® L77 PINK® Fiberglas™ Insulation conforming to ASTM C764 Type I (pneumatic application) by Owens Corning Insulating Systems, LLC, 1-800-GET-PINK, or approved equal. Minimum Initial Installed Thickness to be 13.25 inches to achieve R-38 value in accordance with ASTM C687.
 - 1. Approved equals:

- a. EcoFill® Wx Blowing Insulation as manufactured by Knauf Insulation.
 - b. INSULMAX® Blow-IN Cellulose Insulation.
 - c. Sanctuary® Cellulose Blow-in or Spray-Applied Insulation.
- B. Conform to the following current versions:
1. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C.
 2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 3. ASTM C1104 - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
 4. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.

2.16 OTHER MATERIALS

- A. Provide materials including fasteners and retainers, not specifically described but required for complete and proper installation of building insulation, selected by Contractor subject to approval of Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection: Carefully inspect installed work of other trades and verify that work is complete to point where this installation may properly commence.
- B. Discrepancies: Do not proceed with installation in areas of discrepancy until discrepancies are fully resolved.

3.02 INSTALLING BATT AND BLANKET INSULATION

- A. Install vapor barriers flat against framing members, without buckles or wrinkles and secure in place to avoid leakage in air borne water vapor.
- B. After piping and wiring is in place, install and support blanket and batt insulation in position required, and coordinate with framing.
- C. Remove insulation and vapor barriers torn, displaced, water soaked, and damaged. Replace with new material.
- D. At attic applications constructed of wood trusses or conventional joists/rafters place two layers of horizontal blankets in a criss-cross pattern with the lower layer between truss bottom chords or ceiling joists, then place upper layer runs in other direction covering seams of bottom layer to achieve overall composite minimum R-Value.

3.03 INSTALLATION OF FOAMED-IN-PLACE INSULATION

- A. General: Install foamed-in-place insulation from interior, or as specified, prior to installation of interior finish work and after all masonry and structural concrete work is in place; comply with manufacturer's instructions.
- B. Installation: Fill all open cells and voids in hollow concrete masonry walls where shown on drawings. The foam insulation shall be pressure injected through a series of 5/8" to 7/8" holes drilled into every vertical column of block cells (every 8" on center) beginning at an approximate height of four (4) feet from finished floor level. Repeat this procedure at an approximate height of ten (10) feet above the first horizontal row of holes (or as needed) until the void is completely filled. Patch holes with mortar and score to resemble existing surface.

3.04 INSTALLING OTHER INSULATION

- A. Install materials not specifically set forth above in strict accordance with manufacturer's instructions.

END OF SECTION 07 21 00

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PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide vapor barrier and installation accessories for installation under concrete slabs.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.
- C. Quality control/assurance:
 - 1. Summary of test results per paragraph 9.3 of ASTM E1745.
 - 2. Manufacturer's samples and literature.
 - 3. Manufacturer's installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.
 - 4. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.
 - 5. Contact vapor barrier manufacturer to schedule a pre-construction meeting and to coordinate a review, in-person or digital, of the vapor barrier installation.
 - 6. Vapor barrier manufacturer must warrant in writing (a) compliance with the designated ASTM E1745 classification, and (b) no manufacturing defects in the product for, at least, the Life of the Building.
 - 7. Manufacturer's verify in writing 20 years in the industry with no reported product failures.

1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM E1745- 17 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
 - 2. ASTM E1643-18a: Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- B. Technical Reference - American Concrete Institute (ACI):

1. ACI 302.2R-06: Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
2. ACI 302.1R-15: Guide to Concrete Floor and Slab Construction.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Liner shall have all of the following qualities:
 1. Maintain permeance of less than 0.01 Perms as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
 2. Other performance criteria:
 - a. Strength and Longevity: ASTM E1745.
 - b. Thickness: 15 mils minimum
 3. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1.
 4. Warranty: (a) compliance with the designated ASTM E1745 classification, and (b) no manufacturing defects in the product for, at least, the Life of the Building.
- B. Vapor barrier product:
 1. Basis of Design: Stego® Wrap Vapor Barrier (15-mil) by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
- C. Approved Alternate Manufacturers:
 1. Griffolyn® Vaporguard® 15-mil manufactured by Reef Industries, 800-231-6074.
 2. Moistop Ultra 15 by Fortifiber, (800) 773-4777.
<https://www.fortifiber.com/product/moistop-ultra-15/>
 3. **No Other Substitutions allowed.**

2.03 ACCESSORIES

- A. Seams:
 1. Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com
- B. Sealing Penetrations of Vapor barrier:
 1. Stego Mastic by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com
 2. Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com
- C. Perimeter/terminated edge seal:
 1. Stego Crete Claw (textured tape) by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com
 2. Stego Term Bar by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com
 3. StegoTack Tape (double-sided sealant tape) by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com
 4. One-sided seaming tape is not a recommended method of sealing at the terminated edge.

- D. Penetration Prevention:
 - 1. Beast Foot by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com
- E. Vapor Barrier-Safe Hand Screed System
 - 1. Beast Screed by Stego Industries, LLC, (877) 464-7834 www.stegoindustries.com

PART 3 - EXECUTION

3.01 PREPARATION

- A. Ensure that subsoil is approved by Architect or Geotechnical Engineer.
 - 1. Level and compact base material.
- B. Contact vapor barrier manufacturer to schedule a pre-construction meeting and to coordinate a review, in-person or digital, of the vapor barrier installation.

3.02 INSTALLATION

- A. Install vapor barrier in accordance ASTM E1643.
 - 1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
 - 2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, water stops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
 - a. Seal vapor barrier to the entire slab perimeter using manufacturer's textured tape with a surface that creates a mechanical seal to freshly-placed concrete, per manufacturer's instructions.
 - 3. Overlap joints 6 inches and seal with manufacturer's seam tape.
 - 4. Apply seam tape/textured tape/double-sided tape to a clean and dry vapor barrier.
 - 5. Seal all penetrations (including pipes) per manufacturer's instructions.
 - 6. Avoid the use of stakes driven through vapor barrier by utilizing screed and forming systems that will not leave punctures in the vapor barrier.
 - 7. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.

END OF SECTION 07 26 16

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PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide combination wall sheathing, water-resistive barrier, and air barrier panel system, including accessories required for proper completion of work.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Capable of demonstrating that all wood procurement operations are conducted in accordance with procedures and policies of the Sustainable Forestry Initiative (SFI) Program.
- B. Code Compliance: Comply with requirements of the following:
 - 1. International Code Council (ICC), ICC-ESR1474 (ZIP System Wall Sheathing).
 - 2. International Code Council (ICC), ICC-ESR2227 (ZIP System Tape).
 - 3. Florida Building Code Compliance: Provide sheathing complying with Florida Building Code product and installation requirements for locations outside of high velocity wind zone.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Outdoor Storage: Comply with manufacturer's recommendations.
 - 1. Set panel bundles on supports to keep off ground.
 - 2. Cover panels loosely with waterproof protective material.
 - 3. Anchor covers on top of stack, but keep away from sides and bottom to assure adequate air circulation.
 - 4. When high moisture conditions exist, cut banding on panel stack to prevent edge damage.

1.08 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sheathing system that fail due to manufacturing defects within specified warranty period.
 - 1. Construction Period Warranty: Manufacturer shall warrant the panels and tape for weather exposure for a period of 180 days from installation.
 - 2. System Limited Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

2.02 WOOD PANEL PRODUCTS

- A. Oriented Strand Board: DOC PS 2-10.
- B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated. Thickness shall satisfy minimum and maximum requirements for referenced performance category.
- C. Factory mark panels to indicate compliance with applicable standard.

2.03 COMBINATION WALL SHEATHING, WATER-RESISTIVE BARRIER, AND AIR BARRIER

- A. Oriented-Strand-Board Wall Sheathing: With integral water-resistive barrier, Exposure 1 sheathing.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Huber Engineered Woods LLC; ZIP System Wall Sheathing or a comparable product by one of the following:
 - a. Georgia Pacific ForceField® Weather Barrier System.
 - 2. Span Rating, Panel Grade and Performance Category: Not less than 24/16;_Rated Sheathing; 7/16 Performance Category.
 - 3. Edge Profile: Square edge.
 - 4. Provide fastening guide on top panel surface with pre-spaced fastening symbols for 16-inches and 24-inches on centers spacings.
 - 5. Performance Standard: DOC PS2-10 and ICC-ES ESR-1474.
 - 6. Factory laminated integral water-resistive barrier facer.
 - 7. Perm Rating of Integral Water-Resistive Barrier: 12-16 perms.
 - 8. Assembly maximum air leakage of 0.0072 cfm/sq. ft. infiltration and 0.0023 cfm/sq. ft. exfiltration at a pressure differential of 1.57 psf.
 - 9. Exposure Time: Designed to resist weather exposure for 180 days.

2.04 FASTENERS

- A. General: Provide fasteners of size and type that comply with requirements specified in this article by the authority having jurisdiction, International Building Code, International Residential Code, Wood Frame Construction manual, and National Design Specification.
 - 1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.

2.05 MISCELLANEOUS MATERIALS

- A. Self-Adhering Seam and Flashing Tape: Pressure-sensitive, self-adhering, cold-applied, proprietary seam tape consisting of polyolefin film with acrylic adhesive.
 - 1. Basis-of-Design Product: Subject to compliance with requirements provide Huber Engineered Woods; ZIP System Tape or a comparable product by one of the following:
 - a. Georgia Pacific ForceField® Weather Barrier System.
 - 2. Thickness: 0.012 inch (0.3 mm).
 - 3. Width: 3.75 inch (95.3 mm) or 6 inch (152.4 mm) as required.
 - 4. Code Compliance: Comply with requirements of authorities having jurisdiction and ICC Evaluation Service, Inc. "AC148 - Acceptance Criteria for Flexible Flashing Materials."
 - 5. International Code Council (ICC), ICC-ES2227 (ZIP System Tape).
 - 6. American Architectural Manufacturer's Association; AAMA 711.
- B. Liquid-Applied Flashing Membrane: Gun-grade, cold-applied, silyl-terminated polyether (STPE) liquid flashing membrane compatible with sheathing/weather barrier and self-adhering seam and flashing tape, and tested as part of an assembly meeting performance requirements. Follow manufacturer's recommendation for integration with ZIP System Tape.
 - 1. Basis-of-Design Product: Subject to compliance with requirements provide Huber Engineered Woods; ZIP System Liquid Flash or a comparable product by one of the following:
 - a. Georgia Pacific ForceField® Weather Barrier System.
 - 2. Hardness, Shore A, ASTM C 661: 40 to 45
 - 3. Total Solids: 99 percent
 - 4. Tensile Strength, ASTM D412: 75 psi

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too

small to use with minimum number of joints or optimum joint arrangement.

- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. ICC-ES ESR-1539 or NES NER-272 for power-driven fasteners.
 - 2. Chapter 23 in ICC's "International Building Code."
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Only mechanically attached and drainable EIFS and exterior insulation should be used with ZIP System wall sheathing.

3.02 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in American Wood Council, "ASD/LRFD Manual for Engineered Wood Construction," 2012 edition for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Wall Sheathing:
 - a. Nail or staple to wood framing.
 - b. Screw to cold-formed metal framing.
 - c. Space panels 1/8 inch apart at edges and ends.
 - d. Install fasteners 3/8 inch to 1/2 inch from panel edges.
 - e. Space fasteners in compliance with requirements of authority having jurisdiction.

3.03 SHEATHING JOINT TREATMENT

- A. Seal sheathing joints according to sheathing manufacturer's written instructions.
 - 1. Apply ZIP System proprietary seam tape to joints between sheathing panels.
 - 2. Utilize ZIP System tape gun or hard rubber roller provided by manufacturer to ensure tape is completely adhered to substrates.
 - a. When using ZIP System Liquid Flash to seal sheathing joints, follow

manufacturer's recommendations for sealing panel seams.

3.04 FLEXIBLE FLASHING INSTALLATION

- A. Apply ZIP System Tape flexible flashing or ZIP System Liquid Flash liquid applied flashing membrane where indicated to comply with manufacturer's written instructions.
 - 1. After flexible flashing tape has been applied, roll surfaces with a hard rubber to ensure that flashing is completely adhered to substrates.
 - 2. Width of Flexible Flashing: 6 inch.
 - a. Apply liquid-applied flashing membrane at penetrations, gaps, and cracks to form continuous weathertight surface. Apply liquid membrane according to manufacturer's written instructions. Follow manufacturer's recommendation for integration with ZIP System Tape.

END OF SECTION 07 27 23

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PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Furnish all labor, material, tools, equipment and services required and in accord with provisions of Contract Documents.
- B. Completely coordinate with work of all other trades.
- C. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.
- C. Submit roofing manufacturer's inspection report after each of the three (3) required warranty inspections. Report must contain the following:
 - 1. A detailed description of all non-conforming work.
 - 2. Manufacturer's recommended method of correction.
 - 3. Color photographic documentation of non-conforming work.
 - 4. Color photographic documentation of subsequent accepted work.
 - 5. Drawings, Diagrams or Detail furnished by the inspector at the job site visit.
 - 6. Instructions and conditions for re-inspection and/or issuance of warranty.

1.04 QUALITY ASSURANCE

- A. Applicable Standards:
 - 1. SMACNA: "Architectural Sheet Metal Manual", Sheet Metal and Air Conditioning Contractors National Association, Inc.
 - 2. LGSI: "Light Gage Structural Institute"
 - 3. AISC: "Steel Construction Manual", American Institute of Steel Construction.
 - 4. AISI: "Cold Form Steel Design Manual", American Iron and Steel Institute (1996 Edition).
 - 5. UL580: "Tests for Uplift Resistance of Roof Assembles", Underwriters Laboratories, Inc.

6. FM: "Test Requirements for Class 1 panel roofs", Factory Mutual Research Corporation.
7. UL2218: Class 4 Impact Resistance Rating
8. ASTM E 1592-95: "Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference", American Society for Testing and Materials.
9. ASTM E 1680: "Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems, American Society for Testing and Materials.
10. ASTM E 1646: "Standard Test Method for Water Penetration Through Exterior Metal Roof Panel Systems, American Society for Testing and Materials.
11. ASTM A 792-83-AZ50 (Painted) & ASTM A792-83-AZ55 (Bare Galvalume Plus®): "Specifications for Steel Sheet, Aluminum-Zinc Alloy Coated by the Hot Dip Process, General Requirements (Galvalume®)", American Society for Testing and Materials.
12. ASTM E 1514-98 (2017): "Standard Specification for Structural Standing Seam Steel Roof Panel Systems", American Society for Testing and Materials.
13. ASTM E 408-71: Standard Test Method for Total Normal Remittance of Surfaces Using Inspection- Meter Techniques. (Energy Star for Roof Products).
14. ASTM E 903-96 Standard Test Method for Solar Absorptions, Using Integrating Spheres. (Energy Star for Roof Products)
15. ANSI/SPRI/FM 4435/ES-1-11 "Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems", and NRCA Guidelines for Complying With Building Codes Using ANSI/ SPRI ES-1. Provide shop drawings, to include wood blocking, to meet this standard or certified third party test data for gravel stop, fascia profiles and coping. Refer to the drawings for design wind load parameters. Include wind loads for roof area perimeters and corners on submittals.

B. Manufacturer's Qualifications:

1. Manufacturer has experience in manufacturing metal roof systems of this nature. Panels specified in this section shall be produced in a factory environment (not with a portable roll former) with fixed-base roll forming equipment and in line leveling, assuring the highest level of quality control. A letter from the manufacturer certifying compliance will accompany the product material submittals.

C. Installation Contractor's Qualifications:

1. Installation contractor shall be an approved installer, certified by the manufacturer before the beginning of installation of the metal roof system.
2. Project foreman is the person having received certification by the manufacturer specific training in the proper installation of the selected metal roof system and will be present to supervise whenever material is being installed.
3. Provide certification letter that installation contractor has metal product installation experience immediately preceding the date upon which work is to commence.

1.05 PRE-INSTALLATION CONFERENCE

- A. Prior to installation of roofing system, conduct a pre-installation conference at the project site.

- B. Attendance: Owner, Architect, Contractor, Project Superintendent, and Certified Installer.
- C. Agenda:
 - 1. Roofing details and agenda
 - 2. Critical work sequencing and review of phasing plan
 - 3. Inspection sequencing

1.06 WARRANTY

- A. Manufacturer Warranties:
 - 1. Panel Material: Furnish manufacturers 25 year warranty covering the panel against rupture, structural failure, or perforation.
 - 2. Panel Coating: Furnish manufacturer's 40-year warranty panel coating warranty covering cracking, checking, and peeling, and 30 year warranty covering fade and chalk.
 - 3. Metal Roof Weathertightness Warranty:
 - a) Manufacturer's Joint Source Weathertightness Warranty
 - (1) Warranty term: 20 years commencing on date of substantial completion.
 - (2) Total manufacturer's liability: NRL (No Repair Limit) / SF.
 - (3) Warranty must cover: Wind Speeds up to 75 mph.
 - (a) Pipes must be centered in pan or a pipe curb must be used. Pipe must be flashed with an EPDM dektite.
- B. Installer Warranty: Installer to provide warranty agreeing to repair or replace metal roof panels, trim, or accessories that fails due to poor workmanship or faulty installation.
 - 1. Warranty term: 2 years commencing on date of substantial completion.

1.07 PRODUCT HANDLING

- A. Protection: Protect roofing materials before, during, and after installation. Protect installed work and materials of other trades.
- B. Replacements: In event of damage, immediately make repairs and replacements necessary to approval of Architect and at Contractor's expense.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Provide systems by MBCI or equivalent system by one of the following manufacturers:
 - 1. AEP Span
 - 2. Berridge
 - 3. Exceptional Metals
 - 4. McElroy Metal
 - 5. Metal Sales
 - 6. PAC-Clad

2.02 VERTICAL LEG STANDING SEAM METAL ROOF SYSTEM

- A. Smooth MBCI "SuperLok", 2 inch high x 3/8" to 1/2" inch wide rib x 16" wide panel.
- B. Metal Roof System Style: Vertical leg, concealed fastener, standing seam, utilizing male and female rib configurations, with factory applied hot-melt mastic in female rib, continuously locked together by an electrically powered mechanical seaming device during installation.
- C. Gage: 24 gage
- D. Substrate: ASTM A792, AZ50 Galvalume steel sheet, minimum yield of 50,000 PSI.
- E. Clip: Two piece floating clip, 18 gauge base, 24 gauge top, with factory applied mastic.
 - 1. UL-90 rated - Underwriters Laboratories.
- F. Finish: Finish to be Kynar 500 based polyvinylidene fluoride (PVDF) coating, 70% resin formulation. Color to be selected by Architect from manufacturer's complete line.
 - 1. Primer is applied to 0.20 - 0.30 mils DFT (Dry Film Thickness) and the topcoat at 1.0 - 1.2 mils DFT. Color to be Slate Gray subject to architect final approval.
- G. Snow Retention System:
 - 1. Provide 1" Sno Blockade™ Snow Retention System by Sno Gem, (1-888-766-4367) with the Sno Gem Sno Cube™ attachment bar system and "Blockade Plate™ for sliding snow and ice, spaced as recommended by manufacturer. Provide clamp style to coordinate with roof seam profile being proposed. Provide installation details to Architect for review prior to installation.
 - 2. Finish: Components to match the same paint finish color as the metal roof panels.
 - 3. Approved Equal Manufacturers:
 - a. S-5! ColorGard by Metal Roof Innovations, Ltd., 888-825-3432.

2.03 MISCELLANEOUS MATERIALS

- A. Fasteners:
 - 1. All self-tapping/self-drilling fasteners, bolts, nuts, self-locking rivets and other suitable fasteners shall be designed to withstand specified design loads.
 - 2. Use long life fasteners for all interior and exterior metal roof system applications.
 - 3. Provide fasteners with a factory applied coating in a color to match metal roof system application.
 - 4. Provide neoprene washers under heads of exposed fasteners.
 - 5. Locate and space all exposed fasteners in a true vertical and horizontal alignment. Use proper torque settings to obtain controlled uniform compression for a positive seal without rupturing the neoprene washer.

2.04 ACCESSORIES

- A. Provide all components required per the metal roof system manufacturer's approved shop drawings for a complete metal roof system to include panels, panel clips, trim/flashing,

fascias, ridge, closures, sealants, fillers and any other required items.

1. All outside closures will be fabricated from Pre-Painted Galvalume sheet steel of the same gauge, finish and color as the panels.
2. All tape seal is to be a pressure sensitive, 100 percent solids, polyisobutylene compound sealing tape with a release paper backing. Provide permanently elastic, non-sagging, non-toxic, non-staining tape seal approved by the metal roof system manufacturer.
3. All joint sealant is to be a one-part elastomeric polyurethane sealant approved by the metal roof system manufacturer.

2.05 FABRICATION

- A. Material shall be in-line leveled prior to roll forming panel profile.
- B. Where possible, roll form panels in continuous lengths, full length of detailed runs.
- C. Standard panel length shall be no more than 50 feet long.
- D. Fabricate trim/flashing and accessories to detailed profiles. If not detailed, submit standard profiles available for selection by Architect.
- E. Fabricate trim/flashing from same material as panel.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examination: Inspect installed work of other trades and verify that such work is complete to a point where this work may continue. Verify that installation may be made in accordance with approved shop drawings and manufacturer's instructions. This specifically includes verifying that secondary structural members and/or decking are installed to meet UL and building code requirements. Coordinate with metal roof system manufacturer to insure that reduced clip spacings at eave, rake, ridge and corner areas are accommodated.
- B. Discrepancies: In event of discrepancy, notify the architect. Do not proceed with installation until discrepancies have been resolved.

3.02 INSTALLATION

- A. Install metal roof system so that it is weather-tight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion and contraction.
- B. Install metal roof system in accordance with manufacturer's instructions and shop drawings.
- C. Provide concealed anchors at all panel attachment locations.

- D. Install panels plumb, level and straight with seams and ribs parallel, conforming to design as indicated.

3.03 CLEANING, PROTECTION

- A. Dispose of excess materials and remove debris from site.
- B. Clean work in accordance with manufacturer's recommendations.
- C. Protect work against damage until final acceptance. Replace or repair to the satisfaction of the architect (owner), any work that becomes damaged prior to final acceptance.
- D. Touch up minor scratches and abrasions with touch up paint supplied by the metal roof system manufacturer.
- E. Do not allow panels or trim to come in contact with dissimilar metals such as copper, lead or graphite. Water run-off from these materials is also prohibited. This specifically includes condensate from roof top A/C units.
 - 1. Separate dissimilar metals from each other by painting each metal surface in area of contact with a bituminous coating, or by applying adhesive polyethylene underlayment to each metal surface, or by permanent separation as recommended by manufacturer.

END OF SECTION 07 41 13

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Extent of metal panels is shown on the drawings and indicated by provisions of this section.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.
- C. Samples for Initial Selection: For each product specified. Provide representative color charts of manufacturer's full range of colors.
- D. Samples for Verification: Provide 12-inch (300 mm) section of panel(s) showing finishes. Provide 12-inch (300 mm) long pieces of trim pieces and other exposed components.

1.04 QUALITY ASSURANCE

- A. Installer must have minimum of three years successful experience with installation of metal panels of type and scope equivalent to work of this section.
- B. Except as otherwise shown or specified, comply with applicable recommendations and details of "Architectural Sheet Metal Manual" by SMACNA. Conform to dimensions and profiles shown. Manufacturer to provide trained metal craftsmen to supervise installation.
- C. Comply with ASTM E1592-94 - Structural performance of sheet metal siding by uniform static air pressure difference.

1.05 WARRANTY

- A. Provide manufacturer's guarantee for exterior color finish for panels for a period of 25 years against blistering, peeling, cracking, flaking, checking, chipping and excessive color change and chalking. Color change not to exceed 5 NBS units (per ASTM D-2244.64T) and chalking not less than rating of 8 per ASTM D-659.
- B. Panel Manufacturer: Furnish manufacturer's standard warranty to cover material for repairs to stop leaks resulting from natural deterioration of any component of the assembly including all flashing and trim installed as a part of the system. A specimen of the warranty shall be submitted for Architect's review prior to starting application. Warranty is to be in effect from Final Acceptance Date.
- C. Furnish written guarantee signed by installer guaranteeing the installation of the panels to remain intact and free from leaks for two years following substantial completion date.

1.06 PRODUCT HANDLING

- A. Protection: Protect materials before, during, and after installation. Protect installed work and materials of other trades.
- B. Replacements: In event of damage, immediately make repairs and replacements necessary to approval of Architect and at Contractor's expense.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: CENTRIA, Concept Series Metal Wall Panels. Provide basis of design product, or comparable product approved by Architect prior to bid.
 - 1. CENTRIA Architectural Systems; Moon Township, PA 15108-2944. Tel: (800)759-7474. Tel: (412)299-8000. Fax: (412)299-8317. Email: info@CENTRIA.com. Web: www.CENTRIA.com.
- B. Comparable product manufacturers:
 - 1. Atas
 - 2. Berridge
 - 3. Exceptional Metals
 - 4. McElroy Metal
 - 5. Metal Sales
 - 6. PAC-Clad Petersen Aluminum Corp.
 - 7. MBCI

2.02 SYSTEM DESCRIPTION

- A. Metal Wall Panels over Multi-Component Framed Wall System: Single-skin concealed fastener metal wall panels applied as exterior rainscreen cladding over wall framing

specified in Division 05 Section "Cold-Formed Metal Framing" with exterior sheathing specified in Division 06 Section "Sheathing", an applied membrane that provides air, moisture, and water vapor control specified in Division 07 Section "Air Barriers", and insulation within the framing specified in Division 07 Section "Thermal Insulation". Metal wall panel installation specified in this Section includes [secondary metal subgirt framing and] mounting clips for panel attachment.

1. Air, moisture, and water vapor control membrane is provided under Division 07 Section "Air Barriers."

2.03 PANEL MATERIALS

- A. Metallic-Coated Steel Face Sheet: Coil-coated, ASTM A 755/A 755M.
 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Class Z275), structural steel.
 2. Aluminum-zinc alloy-coated (Galvalume) Steel Sheet: ASTM A 792/A 792M, Class AZ50 Grade 50 (Class AZM150, Grade 275), structural steel quality.
 3. Face Sheet: Minimum 0.024 inch/24 gage (0.60 mm) nominal un-coated thickness.
 4. Surface: Smooth.

2.04 CONCEALED FASTENER METAL WALL PANELS

- A. Metal Wall Panels, General: Factory-formed, concealed fastener panels with interconnecting side joints, fastened to supports with concealed fasteners, with factory-applied sealant in side laps when required to meet performance requirements.
- B. Four-rib profile with recessed flat pan between ribs MWP-1:
 1. Basis of Design Product: CENTRIA, CS-660.
 2. Panel Coverage: 16 inches (406 mm).
 3. Panel Height: 0.875 inch (22 mm).
- C. Exposed Coil-Coated Finish System:
 1. Fluoropolymer Two-Coat System: 0.2 mil primer with 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 620.
 - a. Basis of Design: CENTRIA Fluorofinish.
- D. Color:
 1. Exterior Surface: As selected by Architect from manufacturer's standard colors.
 2. Interior Surface: Manufacturer's standard primer color.
- E. Exposed Coil-Coated Finish System:
 1. Fluoropolymer Two-Coat System: 0.2 mil primer with 0.8-mil 70 percent PVDF fluoropolymer color coat, AAMA 621.
 - a. Basis of Design: CENTRIA Fluorofinish.

2.05 METAL WALL PANEL ACCESSORIES

- A. Metal Wall Panel Backup System: Refer to Division 07.

- B. Metal Wall Panel Accessories, General: Provide complete metal wall panel assembly incorporating trim, copings, fasciae, parapet caps, soffits, sills, inside and outside corners, and miscellaneous flashings. Provide manufacturer's factory-formed clips, shims, flashings, lap tapes, and closure strips for a complete installation. Fabricate and install accessories in accordance with SMACNA Manual.
- C. Extruded Trim: Manufacturer's complementary aluminum extrusions for head, jamb, sill, base, flush, reveal, inside and outside corner, endwall, and expansion joint details. Finish to match metal wall panels.
 - 1. Basis of Design: CENTRIA, Microline Extrusions.
- D. Mitered Corners: Structurally-bonded horizontal interior and exterior trimless corners matching metal wall panel material, profile, and factory-applied finish, fabricated and finished by metal wall panel manufacturer.
 - 1. Welded, riveted, fastened, or field- fabricated corners do not meet the requirements of this specification.
 - 2. Basis of Design: CENTRIA, MicroSeam Corners.
- E. Formed Flashing and Trim: Match material, thickness, and color of metal wall panel face sheets.
- F. Sealants: Type recommended by metal wall panel manufacturer for application, meeting requirements of Division 07 Section "Joint Sealants."
- G. Flashing Tape: 4-inch wide self-adhering butyl flashing tape.
- H. Fasteners, General: Self-tapping screws, bolts, nuts, and other acceptable fasteners recommended by panel manufacturer. Where exposed fasteners cannot be avoided for miscellaneous applications, supply corrosion-resistant fasteners with heads matching color of metal wall panels by means factory-applied coating.
- I. Concealed Clips: Galvanized steel, 0.06 inch/16 ga. (1.52 mm) nominal thickness, designed to allow unimpeded thermal movement of panel and configured to hold panel minimum 1/2 inch (12.7 mm) from substrate.

2.06 ENDLAPS

- A. Pre-punch endlaps and provide an 18 gauge pre-punched backup plate and a 16 gauge pre-punched cinch strap for proper placement of fasteners.
- B. Apply mastic between the panels and secure with self tapping fasteners through the cinch strap, panels and backup plate to form a compression joint.

2.07 FASTENERS

- A. Provide manufacturer's recommended Lifetime self-drilling exposed fastening method.
 - 1. Panel Fasteners For panel to panel and panel to purlin connections to be No. 12-14 by 1 in. self-drilling, self tapping, hex head, plated steel screws with a 5/8

- in. OD formed steel washer and a neoprene sealing washer.
 - a. Alternate Fasteners - For panel to purlin connections, 1/4 - 14 HHAB self-tapping, plating steel screws, with a separate 5/8 in. OD dome shaped steel washer and a neoprene sealing washer may be used.
 - b. No. 14-10HHA, self-tapping, plating steel screws, with a separate, 5/8 in. OD dome shaped steel washer and a neoprene sealing washer may be used.
- 2. Spacing, for panel - to - purlin connections to be 12 in. on center beginning 2 - 1/2 in. from center line on one side of each major rib. Spacing at end lap to be in a 5 - 7 - 5 - 7 in. pattern beginning 2 - 1/2 in. from the center line on both sides of each major rib.
- 3. Fastener for panel to purlin connection to be 1-1/4 in. long when insulation is greater than 4-1/2 in. Spacing for panel - to - panel connections to be 20 in. on center with a fastener located in line with the purlin fasteners

2.08 SEALANTS AND CLOSURES

- A. Factory applied sidelap sealant is to be non-drying synthetic polymer based, designed for metal to metal concealed joints.
- B. Field applied panel end sealant is to be extruded polymeric butyl tape.
- C. Manufacture outside closures from same material as wall panel.
- D. Manufacture inside closures from 18 gauge metal or neoprene.

2.09 FLASHING, TRIM AND ACCESSORIES

- A. Flashing shall not compromise the integrity of the wall system by constricting movement due to thermal expansion and contraction.
- B. Finish to be Kynar 500 based polyvinylidene fluoride (PVDF) coating, 70% resin formulation to match wall panels.
 - 1. Primer is applied to 0.20 - 0.30 mils DFT (Dry Film Thickness) and the topcoat at 1.0 - 1.2 mils DFT.
- C. Panel manufacturer to supply flexible membranes if applicable.
- D. Manufacture all trim and flashing from Galvalume sheet steel.
- E. All penetrations shall be flashed by panel installer and become a part of the panel manufacturer's weathertightness warranty.

2.10 SOFFIT PANELS

- A. Provide 24 gauge panels with Concealed Fastening System, Model No. FW-120-2 in a smooth finish as manufactured by MBCI or approved equal. Finish coating to be Signature 300®, 70% Kynar 500 in range of standard colors. Provide 20% perforated soffit area uniform about the perimeter of the building. Provide 20-Year warranty for the

Galvalume substrate.

- B. Provide panels with male and female side configurations to form a locking assembly when joined to adjacent panels. Provide manufacturer's standard concealed attachment method.
- C. Finish to be Kynar 500 based polyvinylidene fluoride (PVDF) coating, 70% resin formulation. Color to be selected by Architect from manufacturer's standard line.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine metal wall panel substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal wall panels.
- B. Wall Substrate: Confirm that wall substrate is within tolerances acceptable to metal wall panel system manufacturer.
 - 1. Maximum deviations acceptable:
 - a. 1/4-inch in 20 feet (6.4 mm in 6 m) vertically or horizontally from face plane of framing.
 - b. 1/2-inch (12.7 mm) across building elevation.
 - c. 1/8-inch in 5 feet (3.2 mm in 1.5 m).
- C. Framing: Inspect framing that will support metal wall panels to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable framing members at recommended spacing to match installation requirements of metal wall panels.
- D. Air/Moisture Barriers: Confirm that work has been completed, inspected, and tested as required.
- E. Openings: Verify that window, door, louver and other penetrations match layout on shop drawings.
- F. Advise GC, in writing, of out-of-tolerance work and other deficient conditions prior to proceeding with metal wall panel system installation.
- G. Correct out of tolerance work and other deficient conditions prior to proceeding with insulated composite backup panel installation.

3.02 SECONDARY FRAMING INSTALLATION

- A. Secondary Metal Framing: Install secondary metal framing components to tolerances indicated, as shown on approved shop drawings. Install secondary metal framing and other metal panel supports per ASTM C 1007 and metal wall panel manufacturer's recommendations.

3.03 METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels in accordance with approved shop drawings and manufacturer's recommendations. Install metal wall panels in orientation, sizes, and locations indicated. Anchor metal wall panels and other components securely in place. Provide for thermal and structural movement
- B. Attach panels to metal framing using recommended clips, screws, fasteners, sealants, and adhesives indicated on approved shop drawings.
 - 1. Fasteners for Steel Wall Panels: Stainless-steel for exterior locations and locations exposed to moisture; carbon steel for interior use only.
 - 2. Fasten metal wall panels to supports with concealed clips at each joint at location, spacing, and with fasteners recommended by manufacturer. Install clips to supports with self-tapping fasteners.
 - 3. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
 - 4. Dissimilar Materials: Where elements of metal wall panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.
- C. Joint Sealers: Install joint sealants where indicated on approved shop drawings.

3.04 ACCESSORY INSTALLATION

- A. General: Install metal wall panel accessories with positive anchorage to building and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install related flashings and sheet metal trim per requirements of Division 07 Section "Sheet Metal Flashing and Trim."
 - 2. Install components required for a complete metal wall panel assembly, including trim, copings, corners, lap strips, flashings, sealants, fillers, closure strips, and similar items.
 - 3. Comply with performance requirements and manufacturer's written installation instructions.
 - 4. Provide concealed fasteners except where noted on approved shop drawings.
 - 5. Set units true to line and level as indicated.

3.05 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a service representative authorized by metal wall panel manufacturer to inspect completed installation. Submit written report.
- B. Correct deficiencies noted in manufacturer's report.

3.06 CLEANING AND PROTECTION

- A. Remove temporary protective films. Clean finished surfaces as recommended by metal wall panel manufacturer. Clear weep holes and drainage channels of obstructions, dirt, and sealant. Maintain in a clean condition during construction.

- B. Replace damaged panels and accessories that cannot be repaired by finish touch-up or minor repair.

END OF SECTION 07 42 13

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Furnish and install metal flashing and sheet metal work specified.
 - 1. Flashing and Counter-flashing
 - 2. Gutter and Downspout
 - 3. Drip Edge
 - 4. Trim
 - 5. Other work indicated and required by project

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 QUALITY ASSURANCE

- A. Job Supervision: Applicator of work in this Section to furnish competent, qualified foreman present and in charge at all times work is performed.
- B. Applicable Standards:
 - 1. ANSI/SPRI/FM 4435/ES-1-11 "Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems", and NRCA Guidelines for Complying With Building Codes Using ANSI/ SPRI ES-1. Provide shop drawings, to include wood blocking, to meet this standard or certified third party test data for gravel stop, fascia profiles and coping. Refer to the drawings for design wind load parameters. Include wind loads for roof area perimeters and corners on submittals.
 - 2. Refer to the current edition of the "Architectural Sheet Metal Manual" of the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA). Use as applicable standard for method and quality of work under this Section where not specifically otherwise shown in Contract Documents. Manufacturer to provide trained metal craftsmen to supervise installation.
 - 3. ASCE 7: Minimum Design Loads for Buildings and Other Structures.

1.05 WARRANTY

- A. Provide manufacturer's guarantee for exterior color finish for a period of 20 years against blistering, peeling, cracking, flaking, checking, chipping and excessive color change and chalking. Color change not to exceed 5 NBS units (per ASTM D-2244.64T) and chalking not less than rating of 8 per ASTM D-659.
- B. Guaranty: Guaranty sheet metal work installed under this Section against leakage or defects for 2 years after substantial completion date. Make good at Contractor expense leakage or defects occurring within this period.

PART 2 - PRODUCTS

2.01 SHEET METAL

- A. G-60 Galvalume Steel: Aluminum-zinc alloy coating AZ50, meeting ASTM A792. Keep Galvalume dry during transit, in storage, and at work site.
 - 1. At locations where flashing is visible from outside building, finish to be Kynar 500® based polyvinylidene fluoride (PVDF) coating, 70% resin formulation in color to be selected by Architect from manufacturer's complete line.
 - a. Primer is applied to 0.20 - 0.30 mils DFT (Dry Film Thickness) and the topcoat at 1.0 - 1.2 mils DFT.
 - b. Approved equal: Hylar 5000®.
 - 2. Provide mill finish at locations not visible from outside building or public view.
- B. G-90 Bare Galvanized Steel: Conform to ASTM A525 General Requirements and to ASTM A526, Commercial Quality for hot-dip galvanizing (HDG) process. Zinc coating weight not less than 1-1/4 ounces per square foot nor more than 1-1/2 ounces per square foot of surfaces covered and conforming to ASTM A90, Table X1.1, measurement.
- C. Aluminum Sheet: Provide 3003-0 alloy for flashings. For all other sheet metal work furnish 3003-14 alloy.
 - 1. Factory finish with oven cured Kynar 500® based polyvinylidene fluoride (PVDF) coating, 70% resin formulation in color to be selected by Architect from manufacturer's complete line.
 - a. Primer is applied to 0.20 - 0.30 mils DFT (Dry Film Thickness) and the topcoat at 1.0 - 1.2 mils DFT.
 - b. Approved equal: Hylar 5000®.
- D. Soft Temper Sheet Metal: Lead sheet, F.S. QQ-L-201, Grade B, 4 lb. per sq. ft.
- E. Gauge of Metal:
 - 1. Metal components of a roof assembly: 24 gauge (USS .025") minimum
 - 2. Scuppers, guttering, downspouts and splash pans: 22 gauge (USS .0312") minimum. Gutter straps to be 18 gage.
 - 3. Through-Wall Flashing: 26 gauge minimum

2.02 GUTTER SYSTEM

- A. Provide accessories for complete installation including end pieces, caps, elbows, outlet tubes, and basket type strainers.

1. Gutter: 6" Half Round with reverse bead front lip; .027 gauge. Provide end caps.
 2. Downspout: 4" Round Plain Smooth .032 aluminum with round elbows.
 3. Half Round Outlet: Used inside the 6" gutter where the 4" downspout is connected to the gutter.
- B. Manufactured from Galvalume sheet steel in minimum 10 foot lengths, tapered and notched to provide a 1" telescoping lap joint. Seal watertight, and secure with 1/8" rivets, or join sections with flat locked soldered seams.
- C. Space gutter hangers and braces not more than 36" apart and secure with screws, bolts or approved clips. Brackets to be of compatible material to gutter, with matching finish and color.
- D. Slope gutter 1" in 20 feet to down spout to avoid ponding.
- E. Make leaders (downspouts) with 1-1/2" telescoped joints or full length without joints. Set leaders plumb, clear of walls. Secure with straps not over 6 feet apart and space so one is near top and another near bottom.
- F. Finish: Kynar 500 based polyvinylidene fluoride (PVDF) coating, 70% resin formulation in color to be selected by Architect from manufacturer's standard line.

2.03 ACCESSORIES

- A. Fasteners: All metal counter flashing and parapet cap flashing shall be attached with galvanized or cadmium plated screws with neoprene washers. Nails, screws and rivets used at other locations are to be the appropriate type for the purpose as described in the latest edition of the SMACNA Design Manual.
- B. Solder for Lead: ASTM B 32, 50% tin and 50% lead used with rosin flux.
- C. Roofing Cement: F.S. SS-C-153, Type I, Class A (summer grade) or Class B (winter grade) as applicable.
- D. Bitumastic Coating: F.S. TT-C-494, MIL-C-18480, or SSPC - Paint 12, cold applied solvent type bitumastic coating for application in dry film thickness of 15 mils per coat.

2.04 FABRICATION

- A. Fabricate all metal flashing, counter-flashing, trim and related items to comply with profiles and sizes required. Fabricate to comply with the latest edition of the SMACNA "Architectural Sheet Metal Manual", metal manufacturer's recommendations, and recognized industry practices.
- B. For continuous running work, fabricate with expansion joints in flashing, spaced sufficiently close to prevent flashing damage and failure in resistance to water penetration. Form flashing to fit substrate in each application.
- C. Where sheet metal is required and no material or gauge is indicated on the Drawings, furnish and install highest quality and gauge commensurate with the referenced

applicable standard, (SMACNA Manual, latest edition).

2.05 OTHER MATERIALS

- A. Provide materials, not specifically described but required for complete and proper installation of flashing and sheet metal, of new materials, first quality of their respective kinds, and subject to approval of Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection: Prior to work of this Section, carefully inspect installed work of other trades and verify work is complete to point where this installation may properly commence.
- B. Discrepancies: Do not proceed with sheet metal installation in areas of discrepancy until discrepancies are resolved.

3.02 WORKMANSHIP

- A. General: Form sheet metal accurately to dimensions and shapes required, watertight and weather-tight, with angles and broken surfaces true, sharp, and in straight lines. Where intercepting other members, cope to an accurate fit and solder securely. Produce flat surfaces free from waves and buckles.
- B. Expansion: Allow a 3/8"-1/2" gap in coping caps between each section. Use 3-1/2" wide pre-finished 24 gage cover plate over joints.
 - 1. Set cover plates in visible bead of polyurethane sealant between the cap and cover plate. Wipe joints of excessive sealant.
 - 2. Attach cover plate at the front and back with hex head cadmium screws with neoprene washers, installed in the gap between the metal cap sections.
 - 3. Do not exceed maximum length of 10'-0" for cap, fascia and flashing sections. Furnish with factory formed slots or enlarged holes for fasteners.
- C. Paint metal in contact with mortar, concrete, and masonry materials with an alkali-resistant coating. Use heavy-bodied bituminous paint or approved equal.

END OF SECTION 07 60 00

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Furnish labor, materials, tools, and equipment required to completely close (with caulking compound or sealant) all joints to give a finished appearance. Items to be caulked or sealed include but are not limited to the following:
1. Hollow metal frames.
 2. Exterior doors, louvers, windows and any other openings in exterior walls.
 3. Interior fixed glass.
 4. Penetrations by piping, conduit and similar items.
 5. Plumbing fixtures.
 6. Millwork.
 7. Flooring, including saw-cut concrete slab-on-grade.
 8. Paving and sidewalk joints.
 9. Dissimilar finishes.
 10. Joints shown on drawings or specified to be caulked or sealed.
 11. All joints or gaps between similar or dissimilar materials that do not receive closure trim are to be caulked/sealed with the appropriate material as listed in Part 2 of this Section.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.
- C. Installer qualifications.
- D. Contractor certification.
- E. Manufacturer's installation instructions for each product used.
- F. Cured samples of exposed sealants for each color.
- G. Manufacturer's Literature and Data:
1. Primers
 2. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

- H. Manufacturer warranty.

1.04 REFERENCES

- A. ASTM E84 (UL 723): Surface Burning Characteristics
- B. ASTM E814 (UL 1479) and ULC-S115: Standard Test Method for Fire Tests of Through-Penetration Fire Stops
- C. ASTM E1966 (UL 2079): Standard Test Method for Fire-Resistive Joint Systems
- D. ASTM E90: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

1.05 QUALITY ASSURANCE

- A. Qualifications of Applicators: Use workmen thoroughly skilled and specially trained in techniques of caulking, and completely familiar with manufacturer's published recommendations for caulking material used.
- B. Rejection of Installed Caulking: Lack of skill by caulking installers is sufficient ground for Architect to reject installed caulking and to require its removal and complete recaulking at Contractor's expense.
- C. Guarantee: Guarantee caulking materials and workmanship, in writing for 2 years after substantial completion date. Repair at Contractors expense any defects developing within guarantee period.
- D. Submit manufacturer's product data sheets and color selection information for every brand and type of sealant, caulk and accessory item proposed for use on this project.
- E. Refer to Underwriters Laboratories, Inc. (UL) Volume 2 with Hourly Ratings for Joint Systems, Through-Penetration Firestop Systems and Electrical Circuit Protective Systems and Duct Assemblies.

1.06 PRODUCT HANDLING

- A. Protection: Protect caulking materials before, during, and after installation. Protect installed work and materials of other trades. In event of damage, immediately make repairs and replacements necessary at Contractor's expense.
- B. Storage: Store caulking materials and equipment under conditions recommended by manufacturer. Do not use materials stored for period of time exceeding maximum recommended material shelf-life.

1.07 JOB CONDITIONS

- A. Inspection: Carefully inspect installed work of trades and verify work is complete to point where this installation may properly commence.

- B. Discrepancies: Do not proceed with installation in areas of discrepancy until discrepancies are fully resolved.
- C. Do not install sealants under adverse weather conditions, or when temperatures are not within manufacturer's recommended limitations for installation. Install sealants only when forecasted weather conditions are favorable for proper care and development of high early bond strength.

1.08 MOCK-UP

- 1. Provide a mock-up of each type of sealant using materials, colors, and techniques approved for use on the project. Approved mock-ups may be incorporated into the Work.

PART 2 - PRODUCTS

2.01 MATERIALS FOR CAULKING AND SEALING

- A. Select caulking materials for specific locations complying with manufacturer's recommendations. Provide caulking, sealant and accessory items in color(s) selected to match adjacent materials or as selected by Architect from manufacturer's complete line.
- B. Silicone Sealant: Single component, non-sag, gun grade product meeting ASTM C920, Type S, Grade NS, Class 25.
 - 1. Silicone Sealant 790/791/795 by Dow-Corning Corp.
 - 2. Spectrum 1 by Tremco
 - 3. 890 FTS/864 NST by Pecora Corporation
 - 4. Approved Equal
- C. Mildew-Resistant Silicone Sealant: Single component, non-sag, gun grade product meeting ASTM C920, Type S, Grade NS, Class 25.
 - 1. Silicone Sealant 786 by Dow-Corning Corp.
 - 2. Sanitary 1700 by GE.
 - 3. Approved equal.
- D. Acrylic Latex Caulk (interior only): General purpose, gun grade, non-sag, paintable, non-staining latex sealant complying with ASTM C834.
 - 1. AC-20 + Silicone by Pecora.
 - 2. Acrylic Latex by Tremco.
 - 3. Approved equal.
- E. Acoustical Sealant: General purpose, gun grade, non-sag, paintable, non-staining latex sealant complying with ASTM C834.
 - 1. SHEETROCK® Brand Acoustical Sealant by U.S. Gypsum
 - 2. AC-20® FTR Acoustical and Insulation Sealant by Pecora Corporation
 - 3. STOPGAP by Auralex Acoustics
 - 4. Sashco Big Stretch Caulk

5. Green Glue Noiseproofing Sealant
 3. Approved equal.
- F. Polyurethane Sealant (for vertical surfaces): Single component, non-sag, gun grade product meeting ASTM C920, Type S, Grade NS, Class 35.
1. MasterSeal® NP 1™ (formerly Sonolastic® NP 1™).
 2. Vulkem 921 by Mameco.
 3. Dynatrol I by Pecora.
 4. Dymonic by Tremco.
 5. QSC-102 by Carlisle.
 6. Approved equal.
- G. Polyurethane Sealant (for horizontal surfaces): Single component, non-priming, self-leveling, pourable grade product meeting ASTM C920, Type S, Grade P, Class 25.
1. MasterSeal® SL 1™ (formerly Sonolastic® SL 1™).
 2. Vulkem 45 by Mameco.
 3. NR-201 by Pecora.
 4. THC-901 by Tremco.
 5. QSC-131 by Carlisle.
 6. Approved equal.

2.02 SEALANT BACKER RODS

- A. Sealant Backer Rod for general use except at floor and deck joints: Tremco Open Cell Polyurethane, or approved equal, open cell type as recommended by sealant manufacturer for compatibility with sealant.
- B. Sealant Backer Rod for use at horizontal floor and deck joints: MasterSeal® 920 by BASF, or approve equal closed cell type as recommended by sealant manufacturer for compatibility with sealant. MasterSeal® 921 by BASF may be used where appropriate.
- C. Provide rod sized and shaped to control joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back side, and provide a highly compressible backer to minimize possibility of sealant extrusion when joint is compressed.

2.03 MISCELLANEOUS MATERIALS

- A. Joint Cleaner Compound: Use type recommended by sealant and caulking compound manufacturer for joint surfaces to be cleaned.
- B. Joint Primer/Sealer: Use type recommended by sealant manufacturer for joint surfaces to be primed or sealed.
- C. Bond Breaker Tape: Use self adhesive polyethylene tape or plastic tape recommended by sealant manufacturer. Apply to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant.
- D. Joint Filler: W.R. Meadows, Sealtight Standard Cork, Expansion Joint Filler produced

from clean, selected, granulated cork bonded with a phenolic resin, or approved equal meeting ASTM D 1752, Type II.

2.04 GENERAL APPLICATION GUIDE

- A. Interior caulking, except joints with ceramic tile, metal, glass and aluminum: Acrylic Latex Caulk.
- B. Sound rated walls, partitions and ceilings: Acoustical Sealant.
- C. Interior and Exterior joints with metal, glass and aluminum: Silicone sealant.
- D. Joints with ceramic tile and plumbing fixtures: Mildew resistant Silicone sealant.
- E. Horizontal and Vertical building joints: Polyurethane sealant.
- F. Paving Joints: Refer to Division 32

PART 3 - EXECUTION

3.01 CHOICE OF CAULKING MATERIAL

- A. Use sealant and caulking materials best suited to the installation and recommended by caulking material manufacturer.

3.02 INSPECTION

- A. Installer must examine substrates, (joint surfaces) and conditions under which joint sealer work is to be performed. Do not proceed with joint sealer work until unsatisfactory conditions are corrected.

3.03 JOINT PREPARATION

- A. Clean joint surfaces immediately before installation of gaskets, sealants and caulking compounds. Remove dirt, insecure coatings, moisture and substrates which could interfere with gasket seal and bond of sealant or caulking compound. Etch concrete and masonry joint surfaces when recommended by sealant manufacturer. Roughen vitreous and glazed joint surfaces recommended by sealant manufacturer.
- B. Prime or seal joint surfaces where required, and when recommended by sealant manufacturer. Confine primer/sealer to areas of sealant bond. Do not allow spillage and migration onto adjoining surfaces.

3.04 INSTALLATION

- A. Comply with manufacturer's printed instructions except when more stringent requirements are specified, and except when manufacturer's technical representative directs otherwise.

- B. Set joint filler units at depth and position in joint as required to coordinate with other work, including installation of bond breakers, backer rods and sealants. Do not leave voids or gaps between ends of joint filler units.
- C. Install sealant backer rod except when required to be omitted or recommended to be omitted by sealant manufacturer for application required.
- D. Install bond breaker tape when required by manufacturer's recommendations to ensure liquid-applied sealants will perform as intended.
- E. Employ proven installation techniques, which ensure sealants are deposited in uniform, continuous ribbon without gaps or air pockets, and with complete "wetting" of joint bond surfaces equally on opposite sides. Except as otherwise required, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints occur between a horizontal surface and vertical surface, fill joint to form a slight cove, so joint will not trap moisture and dirt.
- F. Install liquid-applied sealant to depths required and as recommended by sealant manufacturer.
- G. Spillage: Do not allow sealants and compounds to overflow from joint confines or to spill onto adjoining work, or to migrate into voids of exposed finished. Clean adjoining surfaces to eliminate evidence of spillage without damaging adjoining surfaces.
- H. Recess edges of exposed joint fillers slightly behind adjoining surfaces, unless otherwise required, so compressed units will not protrude from joints.
- I. Acoustical Sealant Application: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
 - 1. Where sound rated walls and partitions are penetrated by pipe, conduit, duct, etc.; pack annular space with acoustical fiberglass insulation until flush with both faces of wall. Seal both sides and the entire annular space between the penetrating item and the wall board with acoustical sealant. Also, seal at top and bottom edges of acoustical walls and partitions where wall board abuts a horizontal surface. Joint is to be full and continuous from slab to gypsum board edge at bottom of gypsum board walls.
 - 2. Do not allow any rigid material or connection to bridge the separation between the acoustical construction and the penetrating item. Upon inspection, if bridging is found to exist, all sealed penetrations may be ordered removed and resealed at Contractor's expense.

3.05 CURE AND PROTECTION

- A. Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability. Cure and protect sealants in manner which will minimize increases in modules of elasticity and accelerated aging effects.

END OF SECTION 07 92 00

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**PART 08
OPENINGS**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide hollow metal doors, door frames and window frames required.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 REFERENCES

- A. ANSI A224.1 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
- B. ANSI A250.3 - Test Procedure and Acceptance Criteria for Factory-Applied Finish Painted Steel Surfaces for Steel Doors and Frames.
- C. ANSI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcements.
- D. ANSI/ISDI-104 -Water Penetration Performance Standard for Insulated Steel Door Systems.
- E. ANSI/ISDSI-103 - Acoustical Performance Standard for Insulated Steel Door Systems.
- F. ANSI/ISDSI-105 - Mechanical Performance Standard for Insulated Steel Door Systems.
- G. ANSI/SDI 100 - Recommended Specifications for Standard Steel Doors & Frames; Steel Door Institute.
- H. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- I. ASTM B 117 - Standard Method of Salt Spray (Fog) Testing.

- J. ASTM C 236 - Standard Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box.
- K. ASTM D 1735 - Standard Practice for Testing Water Resistance of Coating Using Water Fog Apparatus.
- L. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
- M. ASTM E 152 - Standard Methods of Fire Tests of Door Assemblies.
- N. ASTM E 283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- O. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure.
- P. NFPA 80 - Standard for Fire Doors and Windows.
- Q. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- R. SDI 105 - Recommended Erection Instructions for Steel Frames
- S. SDI 111 - Recommended Standard Details - Steel Doors and Frames.
- T. SDI 113 - Test Procedure and Acceptance Criteria for Apparent Thermal Performance for Steel Door and Frame Assemblies.
- U. SDI 114 - Test Procedure and Acceptance Criteria for Acoustical Performance for Steel Door and Frame Assemblies.
- V. SDI 116 - Test Procedure and Acceptance Criteria for Rate of Air Flow Through Closed Steel Door and Frame Assemblies.
- W. Warnock Hersey International Inc. (WHI) - Certification Listings.
- X. Uniform Building Code (UBC).
- Y. UL 10B - Standard for Fire Tests of Door Assemblies.
- Z. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Underwriters Laboratory Inc.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Member of Steel Door Institute (SDI) or Hollow Metal Manufacturers Association (HMMA).

- B. Use skilled workmen thoroughly trained and experienced and completely familiar with specified requirements and methods needed for proper performance of work of this Section.
- C. Codes and Standards:
 1. Manufacture labeled units in strict accordance with specifications and procedures of Underwriters Laboratories, Inc. Labels must be affixed to rated assemblies.
 2. In guarantee and Shop Drawings, apply and use definitions and nomenclature established in American National Standards Institute publication A 123.1 "Nomenclature for Steel Doors and Steel Door Frames."
 3. ANSI/SDI A250.8-2017 - Specifications for Standard Steel Doors and Frames.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Protection:
 1. Deliver, store, and handle hollow metal units to prevent damage and deterioration.
 2. Provide packaging of cardboard or containers, separators, banding, spreaders, and paper wrappings to completely protect hollow metal units during transportation and storage.
 3. Store units upright, in protected dry area, at least one inch off ground and with at least 1/4" air space between individual pieces. Protect primed and hardware surfaces.
 4. Protect installed work and materials of other trades.
 5. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4" spaces between stacked units to promote air circulation.
- B. Replacements: Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided finish items are equal in all respects to new work, otherwise, remove and replace damaged items as directed at Contractor's expense.

1.07 WARRANTY

- A. Provide Manufacturer's standard warranty, effective on date of purchase, against defects in product workmanship and materials; minimum 12 months for doors and frames.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Fabricate hollow metal items rigid, neat in appearance, and free from defects, warp, or buckle.
- B. Provide clean cut, straight and true molded members with well-formed and aligned miters.
- C. Dress exposed weld joints smooth for a seamless appearance at frames. **[and doors.]** Provide interlocking visible edge seams at door panel corners, not at middle of door edge.
- D. Door Clearances: Maximum 1/8" at jambs and heads, 1/8" at meeting edges of pairs of

doors, and 3/4" at bottom from finished floor line.

2.02 ACCEPTABLE MANUFACTURERS

- A. Provide hollow metal units by the following or other approved equal manufacturer:
 - 1. Amweld
 - 2. Ceco Door Products
 - 3. Curries Company
 - 4. Mesker Door
 - 5. Pioneer
 - 6. Republic

2.03 FACTORY PREPARATION

- A. Prepare units to receive hardware scheduled in "Hardware" Section of these specifications and in accordance with ANSI/DHI A 115.
- B. Cut, mortise, reinforce, drill, and tap units at factory, except drill and tap for surface applied hardware at job when hardware is applied.
- C. Prepare door frames for rubber silencers to be provided with frames.

2.04 SHOP PRIME COAT FOR FIELD FINISHED DOORS AND FRAMES

- A. Clean, treat, and prime exposed surfaces of hollow metal units, including galvanized surfaces. All exterior doors and frames shall be galvanized.
- B. Clean steel surfaces free of mill scale, rust, oil, grease, dirt, and foreign materials before applying paint.
- C. Apply shop coat of rust-inhibiting prime paint of even consistency to provide uniformly finished surface ready to receive finish paint.

2.05 WELDED DOOR FRAMES

- A. Construct exterior/interior welded door frames to the designs and gages specified:
 - 1. **Interior Door Frames:** Hot Dipped galvanized steel, ASTM A 653, ZF120, Class A40 coating, 18 gauge Heavy Duty (except where heavier gauge required), with no exposed face seams.
- B. Secure headers and jambs at corners by external welding of faces. Grind smooth to provide invisible joints.
- C. Provide frames with minimum of 3 anchors per jamb for adjoining wall construction and floor anchors for attachment at floor. Construct anchors using minimum 18 gauge steel.
- D. For frames that are to receive concealed closer(s) mounted in the head; provide a cover box to attach to the inside of the frame that will completely cover and protect the closer.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine areas and conditions for work of this Section. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Install hollow metal units in strict accordance with approved Shop Drawings and manufacturer's recommendations.
- B. Set frames accurately, plumbed, aligned, and securely anchored.
- C. Install finish hardware in strict accordance with manufacturers' recommendations. Eliminate hinge-bound conditions, making items operate smoothly with secure locking and latching.

3.03 ADJUST AND CLEAN

- A. Immediately after installation, sand smooth rusted and damaged prime coat. Apply compatible touch-up air-drying primer.
- B. Check and adjust operating finish hardware items, leaving hollow metal units undamaged and in proper operating condition.
- C. Excessive filing or grinding of strike plate will not be accepted. Filing and grinding not to exceed 1/8" in any direction.

3.04 RELOCATED ITEMS

- A. Carefully remove existing hollow metal doors, frames and hardware indicated to be relocated under this Contract. Securely reinstalling in new locations, plumb, in true alignment, with doors and hardware working properly.

END OF SECTION 08 11 13

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PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide wood doors, complete. Refer to Door Schedule for types and sizes.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 QUALITY ASSURANCE

- A. Markings: Furnish door with stamp, brand, or identifying mark indicating door quality and construction. Identifying mark or separate certification to include inspection organization name, identification of standard for door construction, and identity of plant to which stamp was issued.

1.05 REFERENCE STANDARDS

- A. American Society for Testing and Materials: (ASTM) E 152, "Fire Tests of Door Assemblies".
- B. Architectural Woodwork Institute (AWI) Quality Standards: Specifications and Quality Certification Program, Section 1300, "Architectural Flush Doors".
- C. U.S. Dept. of Commerce Commercial Standards: CS 236, "Mat-formed Wood Particle Board".
- D. Rated doors and frames must meet NFPA 80. **Affix metal plates to jamb side or top of door and frame stating the appropriate fire rating. Paper labels will not be accepted. Do not apply paint or stain over metal labels. Mask off the label before applying finish and remove masking after finish is dry.**

1.06 WARRANTY

- A. Warranty: Submit written agreement using door manufacturer's standard form, signed by manufacturer, contractor, and installer, agreeing to repair or replace defective doors which have warped (bow, cup or twist) or which show photographing of construction below in face veneers, or do not conform to NWMA and AWI tolerance limitations. Warranty period is for lifetime of installation.
- B. Limitation and Exclusions:
 - 1. Defects are not natural variations in color or texture of wood. Improper finishing is considered a defect.
 - 2. Warp not considered a defect unless it exceeds 1/4 inch in the plane of the door itself. Warp is distortion in the door itself and does not refer to relationship of door to frame. Term "warp" includes bow, cup and twist. Amount of warp in door is measured by placing a straight-edge on the suspected concave face of door at any angle (horizontally, vertically, diagonally), with door in installed position. Measurement of bow, cup, and twist is made at point of maximum distance between bottom of straight-edge and face of door.

1.07 PRODUCT HANDLING

- A. Protect wood doors during transit, storage and installation to prevent damage, soiling and deterioration. Comply with the "On-Site Care" recommendations of NWMA pamphlet "Care and Finishing of Wood Doors" and with manufacturer's instructions.
- B. Protection: Store doors in fully covered, well ventilated area. Protect from extreme changes in temperature and humidity.
- C. Replace damaged doors at Contractor's expense.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide doors manufactured by one of the following:
 - 1. Algoma
 - 2. Eggers
 - 3. Graham
 - 4. Marshfield
 - 5. Mohawk
 - 6. Oshkosh
 - 7. VT Industries

2.02 GENERAL

- A. Provide wood doors complying with applicable referenced standards for specified door kinds and door types.

1. ANSI/WDMA I.S. 1A, Extra Heavy Duty.
2. Adhesive: Type II.
3. Core: Structural composite lumber, except when mineral core is required for fire rating.

2.03 ACCESSORY COMPONENTS

- A. Provide wood veneer wrapped metal edges to match door facing at all concealed vertical rod devices. Provide matching hardwood edges at all non-rated doors.
- B. Provide solid wood glazing beads to match door facing at vision panels in non-rated doors and in sound rated doors.

2.04 SOLID CORE, ARCHITECTURAL FLUSH DOORS

- A. All Solid Core, Architectural Flush Doors are to be manufactured in strict accordance with AWI Section 1300. Furnish, 5-Ply doors with AWI 1300-T-6 Type #5 Edge and with core fully bonded to stiles and rails with Type I Adhesive.
- B. Face Veneers:
 1. Painted Finish: Provide "A" Grade per AWI 1300, minimum 1/50" thick face veneers using Premium Quality, Medium Density Overlay.
 2. Stained Finish: Provide "A" Grade per AWI 1300, minimum 1/50" thick face veneers using Premium Quality. Matched (pairs of doors to be Pair Matched), Slip-Running.
 - a. Veneer Cut:
 - 1) Plain Sliced Select White Birch

PART 3 - EXECUTION

3.01 FABRICATION

- A. Fabricate wood doors complying with Contract Drawings, with this Section and with the referenced standards for types specified.
- B. Prefit doors at factory with following clearances:
 1. 1/8" on top and hinge side
 2. 1/8" on lock edge of single doors
 3. 1/16" per leaf on pair meeting edges
 4. 1/2" from finished floor
 5. 3/4" max. from combustible floor
 6. 3/8" max. from non-combustible sill or threshold
 7. Bevel both edges of door (1/8" in 2"). Specific clearances to be shown on door schedule. Field trimming of fire doors will not be allowed.
 8. Seal and refinish edges that are field cut to match factory finish.
- C. Pre-machine doors for hardware as required by Hardware Schedule in Bid Documents and in accordance with requirements of AWI Section 1300. Hardware Schedule by hard-

ware supplier to be furnished complete with templates for all hardware requiring door preparation. Hollow metal frame schedule to be furnished and to include exact location and size of hardware preparation. No door machining to be required for any totally surface-mounted hardware.

3.02 FACTORY FINISH

- A. Factory finish doors in accordance with requirements of AWI Section 1500 for Custom finish.
 - 1. Finish System: AWI Section 1500, Conversion Varnish with custom stain color to be selected by architect.
 - a. Close Grain Woods:
 - Washcoat
 - Custom Stain
 - Sealer
 - Sand
 - Top Coat
 - Top Coat
 - b. Open Grain Woods:
 - Custom Stain
 - Sealer
 - Sand
 - Top Coat
 - Top Coat
 - 2. Apply factory finish to both faces and all edges including top and bottom of all doors.

3.03 INSPECTION

- A. Examine door frames and verify frames are correct type and have been installed for proper hanging of corresponding doors.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected in manner acceptable to Architect.
- C. Install doors only after completion of other work which would raise moisture content of doors or damage surface of doors.

3.04 INSTALLATION

- A. Fit, hang, and trim doors by openings.
- B. Seal cuts made on job immediately after cutting, using clear water-resistant varnish or sealer.
- C. Excessive filing or grinding of strike plate will not be accepted. Filing and grinding not to exceed 1/8" in any direction.

END OF SECTION 08 14 00

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PART 1 - GENERAL

1.01 SCOPE

- A. Provide aluminum doors, framing and hardware specified.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 QUALITY ASSURANCE

- A. Fabricate exterior door and frame units to withstand the wind pressure loading shown or, or if not shown, 20 lbs. per sq. ft. on the gross area of the frames, doors, panels and glass, acting inward and also outward.

1.05 WARRANTY

- A. Submit a warranty signed by the manufacturer, contractor, installer, agreeing to replace aluminum doors, windows, framing and glazing which fail in materials and workmanship within 2 years of the date of acceptance. Failure of materials or workmanship shall include, but not be limited to, failure in operation of doors, windows, and hardware, excessive leakage of air infiltration, excessive deflections, delamination of panels, deterioration of finish or metal in excess of normal weathering, and defect in accessories, weatherstripping, and other components of the work.
 - 1. Submit Standard 10-year warranty by manufacturer of polyvinylidene fluoride (PVDF and FEVE) Coating meeting AAMA 2604.

1.06 ADJUSTMENT

- A. After installation, make adjustments as necessary to insure proper operation of all hardware items.
- B. Door Opening Force: In accordance with the Americans With Disabilities Act (ADA), adjust all door hardware so that the maximum force required for pushing or pulling open

a door shall be as follows:

1. Fire doors shall have the minimum opening force allowable by the appropriate administrative authority.
 2. Exterior hinged doors: 8.5 lbf
 3. Interior hinged doors: 5.0 lbf
 4. These forces do not apply to the force required to retract latch bolts or disengage other devices that may hold the door in a closed position.
- C. Door Closer: If door is equipped with a closer, then the sweep period of the closer shall be adjusted so that from an open position of 70°, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers who produce products that may be submitted to Architect for review are:
1. Kawneer (Basis-of-Design)
 2. Oldcastle Building Envelope (OBE)
 3. Tubelite
 4. YKK AP America Inc.
 5. EFCO
 6. Approved equal

2.02 SWINGING GLASS DOORS

- A. Kawneer Model 350, or approved equal, medium width stile, single acting, sizes as indicated, complete with all hardware, except cylinders.

Material Standard: ASTM B 221; 6063-T6 alloy and temper.

1. The door stile and rail face dimensions of the 350 entrance door will be as follows:

Door	Vertical Stile	Top Rail	Mid Rail	Bottom Rail
350	3-1/2"	3-1/2"	NA	10" (to meet ADA)

2. Major portions of the door members to be 0.125" nominal in thickness and glazing molding to be 0.05" thick.

- B. Door Corner Warranty Period: Limited Warranty shall begin in no event later than six months from date of shipment. In addition, welded door corner construction shall be supported with a LIMITED LIFETIME WARRANTY for the life of the door under normal use.

- C. Finish:

1. Factory finish with oven cured Kynar 500 based polyvinylidene fluoride (PVDF) coating, 70% resin formulation in color to be selected by Architect from manufacturer's complete line.

- a. Primer is applied to 0.20 - 0.30 mils DFT (Dry Film Thickness) and the topcoat at 1.0 - 1.2 mils DFT.

2.03 ALUMINUM FINISHES

- A. Finish designations that are prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Factory Finishing:
 1. Kawneer Permafluor™ (70% PVDF), AAMA 2605, Fluoropolymer Coating. Color to be selected by the architect.

2.04 HARDWARE

- A. Provide hardware by Kawneer Co., or approved equal products from aluminum door and frame manufacturer's standard selections, subject to Architect's review.
 1. Push Bars: Refer to Hardware Schedule.
 2. Pulls: Refer to Hardware Schedule. **USE OFFSETS ON NARROW STILE DOORS; STRAIGHT PULLS DON'T WORK VERY WELL**
 3. Threshold: Refer to Hardware Schedule.
 4. Pivots: Manufacturer's standard, top and bottom offset pivots. Provide intermediate pivots if required due to door size/weight. **DO NOT PROVIDE CONTINUOUS HINGES IF SHOWN ON HARDWARE SCHEDULE!**
 5. Closers: Refer to Hardware Schedule.
 6. Locks: Refer to Hardware Schedule.
 7. Panic Devices: Refer to Hardware Schedule.
 8. Integrated Security Components: Refer to Hardware Schedule.
 9. Door Bottoms: Refer to Hardware Schedule.
 10. Cylinders: Refer to Hardware Schedule.
 11. Removable Mullions: Refer to Hardware Schedule.
- B. All exit devices, door closers, mullions, continuous hinges and cylinders will be furnished under Section 08 71 00 - Finish Hardware, and furnished to the aluminum door supplier for installation either at the factory or on site.
- C. Recommendation: Door frames should have fixed or surface-applied door stops to avoid any issues with installing electric strikes and door closers in lieu of snap-in type door stops.

2.04 FRAMING

- A. Door, Storefront, and Windows: Provide standard shapes and moldings of Kawneer Trifab® VersaGlaze® 451 and 451T glazed framing system or approved equal.
 1. Front Set
- D. Aluminum Sheet Breakmetal: Provide 3003-0 alloy.

2.05 ALUMINUM SUB-SILL FLASHING

- A. Aluminum window and framing supplier is to provide aluminum sub-sill flashing "pans" of same aluminum alloy as frames and of minimum .050" thickness. Form pans by turning up ends and interior side 1-1/2". Lap end splices minimum of 2". Provide in maximum length possible to minimize number of splices. Apply bituminous paint to concealed surfaces in contact with dissimilar metal, concrete or mortar. Set sub-sill in continuous bed of sealant and seal around all anchors penetrating sub-sill. Do not anchor window sill through sub-sill for openings 5' or less in width. For windows greater than 5' in width, anchor window sill through sub-sill at manufacturer required locations. Fill screw holes to full depth with sealant and install anchor. Apply 2 ribbons of sealant at 2" lap. Finish shall match aluminum frame.

2.07 ALUMINUM FLASHING MATERIAL

- A. Aluminum Sheet: Provide 3003-0 alloy for flashings.
- B. Finish:
 - 1. Factory finish with oven cured Kynar 500 based polyvinylidene fluoride (PVDF) coating, 70% resin formulation in color to be selected by Architect from manufacturer's complete line.
 - 1. Primer is applied to 0.20 - 0.30 mils DFT (Dry Film Thickness) and the topcoat at 1.0 - 1.2 mils DFT.

2.08 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for a complete, weathertight, and proper installation of doors, windows, and framing systems, subject to acceptance by the Architect.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in compliance with manufacturer's recommendations and accepted shop drawings. Set units plumb, level and true to line, without warp or rack of framing, windows, and doors. Anchor securely in place. Secure to structure with non-staining, non-corrosive shims, anchors, fasteners, spacers, and fillers. Use care in erection so as not to mar, abrade, or stain finished surfaces. Where aluminum is to be placed in contact with steel, concrete and other dissimilar surface, back paint the aluminum before erection with an acceptable bituminous paint.
- B. Seal frames with a Silicone approved sealant in color to match frames, making a neat fully weatherproof job. Refer to Section 07 92 00, and comply with requirements of that section.
- C. Protection: After erection, adequately protect by masking, light motor oil, vaseline or other acceptable covering all exposed parts of the work and the finish from damage by grinding and polishing machines and/or by plaster, lime, cement, acid or other harmful substances.

- D. Cleaning: After completion of all other work in the vicinity of the aluminum doors, windows, and framing, remove all masking, vaseline and/or other covering used to protect the work, and thoroughly clean the aluminum surfaces with soap and plain water or a petroleum product such as white gasoline, kerosene, or distillate. Do not use abrasive cleaning agents.

END OF SECTION 08 41 13

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PART 1 - GENERAL

1.01 WORK INCLUDED

- A. General Contractor is to assign "Hardware Groups" to doors as required for this project.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are located in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
 - 1. Hardware Schedule and Samples: Submit to Architect for approval complete list of finish hardware proposed for this work, giving manufacturer's name and catalog number for each item. Approval of hardware schedule is for type, operation, and finish. Contractor responsible for furnishing necessary hardware. After approval, supply 5 copies of hardware schedule to Architect for record (Digital submission is acceptable). Architect retains the authority to approve or reject any schedule. Approval based upon general quality of products submitted and compliance with specifications. Hardware supplier to furnish samples at Architect's request, of proposed substitute items. Samples will be held until completion of Project and then returned to supplier.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 QUALITY ASSURANCE

- A. Qualifications of Supplier: Have in his employ AHC member of the American Society of Hardware Consultants. Make AHC member available for consultation during course of construction at Contractor's expense.
- B. Review by AHC: Provide AHC at completion of the Work to check installation of finish hardware, make minor adjustments required, supervise hardware replacements required, and report to Architect on completeness of installation.

1.05 GUARANTEE

- A. Guarantee materials furnished are free from defects, blemishes, and workmanship, and perform satisfactorily for period of 1 year after Contract substantial completion date. Replace defective finish hardware within guarantee period at Contractor's expense.

1.06 PRODUCT HANDLING

- A. Packaging:
 - 1. Furnish finish hardware with each unit clearly marked and numbered to comply with Hardware Schedule.
 - 2. Pack each item complete with necessary pieces and fasteners.
 - 3. Properly wrap and cushion each item to prevent scratches during delivery and storage.
- B. Delivery: Deliver finish hardware to ensure orderly progress of the Work.

PART 2 - PRODUCTS

2.01 FASTENINGS

- A. General:
 - 1. Furnish finish hardware with necessary screws, bolts, and fasteners of suitable size and type to anchor hardware in position.
 - 2. Furnish fastenings where necessary with expansion shields, toggle bolts, sex bolts, and anchors approved by Architect, according to material which hardware is applied and manufacturer recommendations.
 - 3. Install blocking in walls to receive wall mounted door bumpers.

2.02 KEYING

- A. Coordinate lock keying with Architect and Owner. Construction Keying: Provide method independent of final keying system for securing building during construction.
- B. Final Keying System:
 - 1. Stamp keys "DO NOT DUPLICATE".
 - 2. Masterkey locks in one group with 6 master keys. Consult with Architect for keying requirements. Key groups and certain individual locksets differently.
 - 3. Deliver 2 keys for each lock plus 4 keys for each keyed alike set.
- C. All keys necessary for unlocking doors installed in means of egress shall be individually identified by both touch and sight in accordance with AFPC V1 809.75.

2.03 TEMPLATES

- A. Forward template information and physical hardware, if required, to related trades

requiring information for preparation of their products to fit finish hardware. Make template submission complying with latest recommended standards published by the Door and Hardware Institute. If physical hardware is required, ship via prepaid freight in sufficient time to prevent delay in execution of the Work.

2.04 DETAILS

- A. Check details of items for which hardware is furnished, and where finished shape or size of members receiving hardware will prevent or make unsuitable use of exact type specified, immediately notify Architect.

2.05 EXCLUSIONS

- A. Self adhesive type door/frame weatherstripping will not be allowed. Install extruded aluminum type with elastomeric gasket.

PART 3 - EXECUTION

3.01 ADJUSTMENT

- A. After installation make adjustments as necessary to insure proper operation of all hardware items.
- B. Door Opening Force: In accordance with the Americans With Disabilities Act (ADA), adjust all door hardware so that the maximum force required for pushing or pulling open a door shall be as follows:
 - 1. Fire doors shall have the minimum opening force allowable by the appropriate administrative authority.
 - 2. Exterior hinged doors: 8.5 lbf
 - 3. Interior hinged doors: 5.0 lbf
 - 4. These forces do not apply to the force required to retract latch bolts or disengage other devices that may hold the door in a closed position.
- C. Door Closers: If door is equipped with a closer, then the sweep period of the closer shall be adjusted so that from an open position of 70°, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

END OF SECTION 08 71 00

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PART 1 - GENERAL**1.01 DESCRIPTION**

- A. Work Included: Furnish and install glass and glazing materials and accessories for both factory and field glazed assemblies specified.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.
- C. Samples:
 - 1. Size: 305 mm by 305 mm (12 inches by 12 inches) of each type specified.
 - 2. Tinted glass.

1.04 QUALITY ASSURANCE

- A. Qualifications of Installers: Provide at least one person thoroughly trained and experienced in skills required, completely familiar with referenced standards and requirements of this work and to personally direct installation performed under this Section.
- B. Applicable Standards For Glass and Glazing Work: Conform to the "Manual of Glazing" of the Flat Glass Marketing Association, requirements of Federal Specification DD-G-451c and Safety Standard 16 CFR 1201 of the U.S. Consumer Products Safety Commission.
- C. Manufacturers: Fabrication processes, including low emissivity and reflective coatings, insulating, laminated, silk-screening and tempering shall be manufactured by a single manufacturer with a minimum of ten (10) years of fabrication experience and meet ANSI / ASQC 9002 1994.

1.05 APPLICABLE PUBLICATIONS

- A. ANSI Z97.1-14: Safety Glazing Material Used in Building Safety Performance Specifications and Methods of Test.
- B. ASTM C1036-21: Standard Specification for Flat Glass
- C. ASTM C1048-12: Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
- D. Code of Federal Regulations (CFR): 16 CFR 1201-10 Safety Standard for Architectural Glazing Materials.
- E. International Building Code - Chapter 24: Glass and Glazing

1.06 DELIVERY, STORAGE AND HANDLING

- A. Protection: Protect glass and glazing materials before, during, and after installation. Protect installed work and materials of other trades.
- B. Storage and Protection: Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun or other causes.
- C. Replacements: In event of damage, immediately make repairs and replacements necessary and at Contractor's expense.

PART 2 - PRODUCTS

2.01 GLASS TYPES

- A. No manufacturer logos are allowed on any glass, except as required by governing codes and standards. Provide certification to General Contractor that tempered, heat strengthened, annealed, laminated, etc. glass was used where required.
- B. Annealed float glass shall comply with ASTM C1036, Type I, Class 1 (clear), Class 2 (tinted), Quality-Q3.
- C. Heat-Strengthened float glass shall comply with ASTM C1048, Type I, Class 1 (clear), Class 2 (tinted), Quality Q3, Kind HS.
- D. Tempered float glass shall comply with ASTM C1048, Type I, Class 1 (clear), Class 2 (tinted), Quality Q3, Kind FT.
- E. Heat-treated glass with elastomeric coating complying with ASTM C1048, Condition C (other coated glass), Type I (transparent glass, flat), Quality Q3 (glazing select) and with other requirements as specified.
- F. GANA/GTA 89-1-31, "Specification for Environmental Durability of Fully Tempered or Heat-Strengthened Spandrel Glass with Applied Opacifiers", and with other requirements as specified.

- G. Provide type glass and thickness required and as follows:
1. **Clear Annealed Float Glass:** 1/4" thick unless otherwise shown.
 2. **Clear Tempered Float Glass:** 1/4" thick unless otherwise shown. Conform to Safety Standard 16 CFR 1201 of the Consumer Products Safety Commission.
 3. **"Low-E" Coating:** Vitro Architectural Glass Solarban® 60 (2) Optigray® + Clear, VLT 50, SHGC 0.30, Insulating Glass Unit (IGU) or approved equal.

2.02 HERMETICALLY SEALED INSULATING GLASS ASSEMBLIES

- A. Manufacturer is used in this section to refer to a firm that produces primary glass or fabricated glass as defined in the referenced standards.
1. Guardian Industries
 2. Oldcastle Glass
 3. Pilkington
 4. Viracon Architectural Glass
 5. Vitro Architectural Glass
 6. Approved equal
- B. Insulating glass units are certified through the Insulating Glass Certification Council (IGCC) to ASTM E 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.
- C. The following are assemblies comprised of the components listed above.
1. **"Low-E" Coated Tinted/Tempered Assembly:** 1" thick panels consisting of 1/4" clear tempered float glass on interior and 1/4" thick tinted tempered float glass on exterior with 1/2" air space and coating on #2 surface.
 2. **"Low-E" Coated Tinted/Heat-Strengthened Assembly:** 1" thick panels consisting of 1/4" clear annealed float glass on interior and 1/4" thick tinted float glass on exterior with 1/2" air space and coating on #2 surface.
 5. **Clear/Tempered Assembly:** 1" thick panels consisting of 1/4" clear tempered float glass on interior and 1/4" thick clear tempered float glass on exterior with 1/2" air space.
 6. **Clear/Annealed Assembly:** 1" thick panels consisting of 1/4" clear annealed float glass on interior and 1/4" thick clear annealed float glass on exterior with 1/2" air space.
 7. **Spacers:** Aluminum in Black Finish. Verify color selection with architect before fabrication.

2.03 FLAT GLASS

- A. Flat Glass:
1. Shall comply with ASTM C1036-21 Standard Specification for Flat Glass, Type 1, Class 1, (clear) or Class 2 (tinted, heat-absorbing and light-reducing) and Quality q3.

2. ASTM C 1048 Heat Treated Flat Glass, Kind HS or FT (remove ASTM Standard C 1048 if annealed glass), Condition A (un-coated), B (spandrel glass, one surface coated), or C (other coated glass).
 - a. Heated Treated Flat Glass to be by horizontal (roller hearth) process with inherent rollerwave distortion parallel to the bottom edge of the glass as installed.
 - b. Maximum peak-to-valley rollerwave 0.003" in the central area and 0.008" within 10.5' of the leading and trailing edge.
 - c. For clear or low-iron glass 1/4" to 3/8" thick without ceramic frit or ink, maximum + or - 100mD (millidiopter) over 95% of the glass surface.
 - d. Maximum bow and warp 1/32" per lineal foot.
 - e. All tempered architectural safety glass shall conform with ANSI Z97.1 and CPSC 16 CFR 1201.
 - f. For all fully tempered glass, provide heat soak testing conforming to EN14179 which includes a 2 hour dwell at 290°C±10°C.

2.04 GLAZING ACCESSORIES

- A. Provide glazing accessories required to complete glazing work that are compatible with various components of the glazing system(s), and subject to approval of Architect.
- B. Glazing Sealants: Provide Tremco "Proglaze", Bostik "Chem-Calk 2000", Pecora "836", Dow Corning Silicon 795, or approved equal. Color to be selected by Architect from manufacturer's standard line.
- C. Glazing Tapes: Provide Tremco "Pre-shimmed 440", Bostik "Chem Tape 60", Pecora "Shim-Seal", or approved equal. Color to be selected by Architect from manufacturer's standard line.
- D. Setting Blocks: Neoprene or other resilient blocks of 70 to 90 Shore A durometer hardness, adhesive backed on one face only and tested for compatibility with specified glazing sealants.
- E. Spacers: Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness and tested for compatibility with specified glazing sealants.
- F. Compressible Filler Rod: Closed-cell or waterproof jacketed foam of polyethylene, butyl rubber, neoprene, polyurethane or vinyl, tested for compatibility with specified glazing sealants, of 5 to 10 psi compression strength (25% deflection), recommended by sealant manufacturer for use in glazing channel to prevent sealant exudation from the channel.

PART 3 - EXECUTION

3.01 GLASS SIZES

- A. Measure sizes for glass from actual frames, doors and windows. Contract requires glass to be set in place, and Contractor assumes responsibility for correct sizes. Use sizes

shown on Drawings for estimating only as approximate dimensions.

3.02 GLAZING SURFACES

- A. Glaze only dry surfaces, free from dust or ice. Clean dirty surfaces with cloth saturated with turpentine or mineral spirits before glazing. Remove loose dirt particles and mortar from recesses prior to installation of glass and glazing materials.

3.03 SETTING GLASS

- A. Set glass to provide equal bearing for entire width of each pane. Contractor responsible for broken glass due to improper setting. Set using glazing stops furnished by door or fixed framing manufacturer unless otherwise shown or specified. Accurately set glass to fit frame, with all edges smooth. Sharp ragged edges are not acceptable. Cushion glass in fixed interior view windows with felt strips around entire perimeter.

3.04 CLEANING GLASS

- A. Contractor shall employ services of a professional window washer at completion of all work to wash glass which has been installed under this contract, removing all stains.
- B. Clean glass on both sides after painting operations are complete and dry. Do not use acid solutions or caustic soaps to clean glass.
- C. Do not use razor blades to clean glass. Any scratches on the glass caused by the cleaning process will be cause for the removal and replacement of the damaged glass at the Contractor's expense.

END OF SECTION 08 80 00

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PART 09
FINISHES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide metal supports and fastenings, gypsum board, and related accessories specified.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 QUALITY ASSURANCE

- A. Qualifications of Installers: Use only skilled and experienced gypsum drywall installers. Fully supervise at all times helpers and apprentices used for drywall work with thoroughly skilled gypsum drywall installers.
- B. Manufacturers' Recommendations: Manufacturers' recommended use of materials, fastenings, and methods of installation is basis for acceptance or rejection of drywall and cementitious backer units work where not specifically otherwise shown or detailed.

1.05 REFERENCE STANDARDS

- A. ASTM C475-15, Joint Compound and Joint Tape for Finishing Gypsum Board.
- B. ASTM E580 - Suspension Systems in Areas Requiring Seismic Restraint.
- C. ASTM C1396-14a, Standard Specification for Gypsum Board.
- D. ASTM C36/C36M-01, Standard Specification for Gypsum Wallboard
- E. ASTM C840-13, Standard Specification for Application and Finishing of Gypsum Board.
- F. ASTM C1178-18, Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.
- G. ASTM C1325-18, Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units. (Non-asbestos)

- H. ASTM C645-18, Standard Specification for Nonstructural Steel Framing Members.
- I. ASTM C754-04, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- J. Gypsum Association publications:
 - 1. GA-214-2021, "Levels of Finish for Gypsum Panel Products".
 - 2. GA-216-2021, "Application and Finishing of Gypsum Panel Products".
 - 3. GA-600, "Fire Resistance Design Manual".
 - 4. GA-800, "Materials Handling Manual".

1.06 PRODUCT HANDLING

- A. Protection: Protect gypsum drywall materials before, during, and after installation. Protect installed work and materials of other trades.
- B. Replacements: In event of damage, immediately make repairs and replacements necessary and at Contractor's expense.

PART 2 - PRODUCTS

2.01 GYPSUM MATERIALS

- A. **Manufacturers:** Use products and materials by one of the following manufacturers:
 - 1. United States Gypsum
 - 2. National Gypsum Company
 - 3. Georgia-Pacific Company
 - 4. Temple-Inland, Inc.
 - 5. Certainteed
 - 6. James Hardie Building Products
 - 7. Approved Equal
- B. **Finish:** In general, all gypsum board walls are to be taped and floated for a smooth finish. A slight egg-shell texture may be acceptable if approved by Architect prior to application. Heavy "knockdown" texturing is not acceptable.
 - 1. All screw and/or nail heads are to be floated smooth both above and below ceiling line.
 - 2. Refer to Drywall Finishing Council document titled, "Recommended Specification For Preparation of Gypsum Board Surfaces Prior To Texture Application. When subjected to critical lighting, a Level 5 gypsum board finish as defined in GA-214-2021 ("Levels of Finish for Gypsum Panel Products") is recommended.
 - 3. For Levels 3, 4, and 5, job-site mock-up(s) shall be used to determine acceptance of the finish within the building. The design professional shall specify the mockup procedure and mock-up construction details within the project documents, unless waived in writing. Finish joints, edges, corners, and fastener heads in accordance

with ASTM C840. Use **Level 4 finish for all finished areas open to public view**. Level 5 skim coating is required at areas exposed to severe lighting conditions, gloss, semi-gloss, or enamel paint applications. Refer to the drawings for specific area locations.

2.02 ACOUSTICAL INSULATION

- A. In partitions, provide un-faced Owens-Corning Sound Attenuation Batt (SABs) Insulation, or approved equal, complying with ASTM C 665, Type I and ASTM E 136. Flame spread rating shall not exceed 25 and smoke developed shall not exceed 50 when tested complying with ASTM E 84.

2.03 DIRECT CEILING SUSPENSION SYSTEMS

- A. Manufacturer: Chicago Metallic, or approved equal.
- B. System: Provide Chicago Metallic Drywall Furring System(s) as follows:
 - 1. Typical System: 640-C or 660-C as recommended by manufacturer.
 - 2. Fire Rated System: Fire front 650-C or 670-C as recommended by manufacturer.
- C. Provide all runners, tees, cross channels, cross tees, wall track, hanger wire and accessories required for a complete installation.
- D. Where ceiling is subject to wind uplift, provide adequate bracing above ceiling to prevent uplift.

2.04 FASTENERS

- A. Drywall Screws: Self-drilling type, 1" long for single layer application of gypsum board to metal studs and furring channels and of longer length for multiple layer installation.
- B. Powder-Actuated Fasteners: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- C. Nails (for application of gypsum board to wood): Annular ringed nails No. GWB-54, 1-1/4" long for single layer application.
- D. Furring Anchorages: 16-gage galvanized wire ties, manufacturer's standard wire-type clips, bolts, nails or screws as recommended by furring manufacturer and complying with C754.

2.07 PROTECTIVE COATING

- A. Galvanized steel studs, runners (track), rigid (hat section) furring channels, "Z" shaped furring channels, and resilient furring channels, with coating designation of G40 or equivalent.

2.08 ACCESSORIES

- A. Casing Bead: "Goldbond" No.500 galvanized steel by National Gypsum Co., or approved equal. Furnish and install metal reveal strips where shown and detailed.
- B. Corner Beads: 0.014 inch thick, hot dip galvanized steel with 1" flanges with 1/16" radius nose with large openings in flange similar to 5/8" diameter holes 7/8" on center.
- C. Control and Expansion Joints: "Sheetrock" zinc control joint No.093 by USG, or approved equal. Provide safing and/or acoustical insulation behind control joints as required for adjacent partition construction. Use fire rated control joints in partitions requiring a fire rating.

2.09 ACCESS PANELS AND FRAMES

- A. Manufacturer: Milcor Limited Partnership, 1150 North Cable Road, Lima, OH 45805, 1-800-528-1411, or approved equal.
- B. Ceiling Access Doors (in non-rated gypsum board ceilings): Provide Milcor style "DW", Model No. 3203-019, or approved equal. Provide 24" x 24" door size with screwdriver-operated, flush, cam-type locks. Furnish with factory prime coat.
- C. **Access Locations:** Install removable access panels directly below each valve, flow indicator, damper, air splitter or other utility requiring access that is located above ceilings, other than at acoustical panel ceilings, and that would otherwise not be accessible. Install access doors and panels permitting access to service valves, traps, dampers, clean-outs, and other mechanical, electrical and conveyor control items concealed in walls and partitions. Verify types, fastening and locations with architect during shop drawing review submission.
 - 1. When possible, avoid locating access panels in wet areas. When such locations cannot be avoided, provide moisture resistant assemblies.
 - 2. Install fire-rated access doors in fire-rated partitions and ceilings in accordance with NFPA 80.

2.10 OTHER MATERIALS

- A. Provide materials, not specifically described but required for complete and proper installation of gypsum drywall, selected by Contractor subject to approval of Architect.

PART 3 - EXECUTION

3.01 GENERAL PROVISIONS

- A. Comply with specified requirements, manufacturer's instructions and recommendations, and referenced standards.
- B. In cold weather, heat building to provide uniform temperature of 50° to 70° and provide

ventilation to eliminate excess moisture.

- C. Deliver materials to job in original unopened containers or bundles and store protected from damage and exposure to the elements.
- D. Provide casing beads where edges of gypsum board meet dissimilar materials.
- E. Cooperate with carpenters in placing of backing and blocking required for millwork, fixtures, fittings, and accessories.
- F. Make cut-outs in panels for pipes, fixtures and small openings. Make holes and cut-outs by method that will not fracture wallboard core or tear covering. Cut holes with accuracy so plates, escutcheons and trim cover edges.
- G. Seal cut edges, holes, and areas where wallboard covering is broken, with resistant sealer.
- H. Install trim in strict accordance with manufacturers' recommendations. Install trim plumb, level, and true to line with firm attachment to supporting members.
- I. At any change in direction of gypsum board, provide sufficient auxiliary framing, blocking or nailers to allow secure attachment along every edge of every individual piece of gypsum board. Do not leave any loose edges.

3.02 INSTALLATION OF METAL SUPPORT SYSTEMS

- A. Do not bridge building expansion joints with support system, frame both sides of joints with furring and other support as indicated.
- B. Ceiling Support Suspension System: Install in accordance with manufacturers recommendations.
- C. Wall/Partition Support System
 - 1. Install supplementary framing, blocking and bracing to support fixtures, equipment, services, heavy trim, furnishings and similar work which cannot be adequately supported on gypsum board alone.
 - 2. Isolate stud system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.
 - 3. Do not attach stud system to ductwork, piping, conduit, etc.
 - 4. Install runners (tracks) at floors, ceiling and structural walls and columns where gypsum drywall stud system abuts other work, except as otherwise indicated.
 - 5. Extend partition stud system through acoustical ceilings and elsewhere as indicated to the structural support and substrate above the ceiling as indicated. Install angle bracing at 4'0" on center from ceiling runner to structure above.
 - 6. Frame door openings with vertical studs securely attached by screws at each jamb either directly to frames or to jamb anchor slips on door frame; install runner track sections (for jack studs) at head and secure to jamb studs. Install angle bracing above ceiling to structural in each direction at strike side of door. Double studs at all door openings.

7. Provide runner tracks of same gage as jamb studs. Space jack studs same as partition studs.
8. Frame openings other than door openings in same manner as required for door openings; and install framing below sills of openings to match framing required above door heads. Opening for duct work, piping must allow clearance for insulation, dampers, etc. Provide double 20 gauge studs at both sides of door openings less than 4'-0" wide and triple 20 gauge studs at door openings greater than 4'-0" wide.
9. Install wall/partition support system to maximum tolerances of 1/8" in 12'-0" measured horizontally and vertically.
10. At rated partitions, provide "5 sided" gypsum board enclosures where items (i.e. toilet accessories, electrical items, fire extinguisher cabinets, etc.) penetrate the surface of the wall, in order to maintain fire resistive integrity of the wall. Provide necessary related blocking.
 - a. "5 sided" enclosures may be omitted where metal electrical back-boxes not exceeding 16 square inches occur at one side only of a wall within a single stud cavity.
 - b. In this case, provide fire stopping material described in Section 07 84 00 to completely encompass the back box and its annular space.
 - c. If 5 sided gypsum board enclosures are not to be provided at any fire rated partitions, all provisions for installation of electrical boxes in rated partitions as described by Underwriters Laboratories shall be adhered to AND prior approval shall be given in written form by the Architect.
11. Provide "5 sided" enclosures similar to those described above at all penetrations into "sound" partitions and insulated exterior walls regardless of size. The provisions for the omission of the 5 sided enclosures at certain fire rated partitions do not apply to these sound and exterior partitions.

3.03 GENERAL GYPSUM BOARD INSTALLATION REQUIREMENTS

- A. Pre-Installation Conference: Meet at the project site with the installers of related work and review the coordination and sequencing of work to ensure that everything to be concealed by gypsum drywall has been accomplished, and that chases, access panels, openings, supplementary framing and blocking and similar provisions have been completed.
- B. Install sound attenuation blankets where indicated, prior to gypsum board unless readily installed after board has been installed.
- C. Locate exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 1'-0" in alternate course of board.
- D. Install ceiling boards in the direction and manner which will minimize the number of end-butt joints, and which will avoid end joints in the central area of each ceiling. Stagger end joints at least 1'-0".
- E. Install wall/partition boards vertically to avoid end-butt joints wherever possible. At stairwells and similar high walls, install boards horizontally with end joints staggered

over studs. Do not butt boards to concrete floor. Maintain a minimum 1/4" to a maximum 3/8" space between bottom of board and concrete.

- F. Install exposed gypsum board with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16 inch open space between boards. Do not force into place.
- G. Locate either edge or end joints over supports, except in horizontal applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so that like edges abut, tapered edges against tapered edges and mill-cut or field-cut ends against mill-cut or field cut ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.
- H. Attach gypsum board to framing and blocking as required for additional support at openings and cutouts. Space between recessed boxes and cut edges shall not exceed 1/8 inches.
- I. Form control joints and expansion joints with space between edges of boards, prepared to receive trim accessories described below in article entitled "INSTALLATION OF DRYWALL TRIM ACCESSORIES".
- J. Cover both faces of partition framing with gypsum board in concealed spaces (above ceilings, etc.) except in chase wall which are braced internally.
- K. Space fasteners in gypsum boards in accordance with referenced standards and manufacturer's recommendations, except as otherwise indicated.

3.04 INSTALLATION OF CEILING ACCESS PANELS

- A. General Contractor is required to coordinate locations and number of access panels with affected trades in order to minimize the number of access panels required.
- B. Provide ceiling access panels in gypsum board ceilings as specified. Provide quantity required for access to the following items commonly found above the ceiling plain:
 - 1. Operable portion of fire, smoke and other dampers
 - 2. Valves and other operable portions of sprinkler system
 - 3. Valves to mechanical, domestic and other piping systems
 - 4. Mechanical devices
 - 5. Fire alarm devices
 - 6. Communication system devices and connection points
 - 7. Sanitary and storm sewer clean outs
 - 8. Also included are any other items located above an otherwise inaccessible ceiling that will require adjustment, maintenance, inspection, connection or replacement in whole or in part at any time after the initial installation of the item or the ceiling.

3.05 METHODS OF GYPSUM BOARD APPLICATION

- A. On ceilings:

1. Apply gypsum board prior to wall/partition board application to the greatest extent possible. For single-ply construction, use perpendicular application. For two-ply assemblies use perpendicular application and apply face ply of gypsum board so that joints of face ply do not occur at joints of base ply with joints over framing members.
 2. Where screws are used, they shall be spaced not more than 12 in. o.c. for ceilings where the framing members are 16 in. o.c..
 3. Screws shall be spaced not more than 12 in. o.c. for ceilings where framing members are 24 in. o.c..
 4. For applications on wood or other applications, refer to Gypsum Association GA-216 for fastener type and spacing.
- B. On partitions except shaft wall:
1. Use maximum length sheets practical to minimize end joints.
 2. When gypsum board is installed parallel to framing members, space fasteners 12 inches on center in field of the board, and 8 inches on center along edges.
 3. For applications on wood or other applications, refer to Gypsum Association GA-216 for fastener type and spacing.
 4. When gypsum board is installed perpendicular to framing members, space fasteners 12 inches on center in field and along edges.
 5. Stagger screws on abutting edges or ends.
 6. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints except gypsum board shall be applied vertically over "Z" furring channels.
 7. For two-ply gypsum board assemblies, apply base ply of gypsum board to assure minimum number of joints in face layer. Apply face ply of wallboard to base ply so that joints of face ply do not occur at joints of base ply with joints over framing members.
 8. On Z-furring members apply gypsum board vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

3.06 INSTALLATION OF DRYWALL TRIM ACCESSORIES

- A. General: Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges to comply with manufacturer's recommendations.
- B. Install metal corner beads at external corners of drywall work. Corner beads are to be completely bedded and taped.
- C. Install metal edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed, and except where plastic trim is indicated. Provide type with face flange to receive joint compound except where semi-finishing type is indicated. Install L-type trim where work is tightly abutted to other work, and install special kerf-type where other work is kerfed to receive long leg of L-type trim. Install U-type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints).

- D. Install metal control joints where indicated on drawings. If not indicated on drawings, install in accordance with the following:
1. Interior Partitions: Maximum Single Dimension not to exceed 20 feet. Maximum Single Area not to exceed 400 SF.
 2. Interior Ceiling With Perimeter Relief: Maximum Single Dimension not to exceed 40 feet. Maximum Single Area not to exceed 1,600 SF. Install control joint at any change of direction of ceiling framing or support system.
 3. Interior Ceiling Without Perimeter Relief: Maximum Single Dimension not to exceed 20 feet. Maximum Single Area not to exceed 400 SF. Install control joint at any change of direction of ceiling framing or support system.

3.07 INSTALLATION ON WOOD

- A. Install gypsum board on wood blocking and wood furring by double nailing using annular ringed nails specified in Part 2 of this Section. Space nails not less than 3/8" from ends and edges of wallboard. Hold wallboard in firm contact with nailing member while nails are being driven. Dimple heads slightly below surface of wallboard with final hammer blow, taking care not to break the paper face.

3.08 JOINT TREATMENT

- A. General: Joint treatment for gypsum board surfaces is also described in Section 09 91 00 and may be performed under either the gypsum board or painting subcontract.
- B. All joints in gypsum board construction are to be taped and floated. This includes work above ceilings, at concealed places and anywhere else joints in gypsum board construction occur.**

3.09 FINISHING OF GYPSUM BOARD

- A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 4 finish for all finished areas open to public view.
- B. Before proceeding with installation of finishing materials, assure the following:
1. Gypsum board is fastened and held close to framing or furring.
 2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.
- C. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of gypsum board construction. After the installation of hanger rods, hanger wires, supports, equipment, conduits, piping and similar work, seal remaining openings and maintain the integrity of the construction.

3.10 REPAIRS

- A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including non-decorated surfaces.
- B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.
- C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.
- D. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in non decorated surface to provide smoke tight construction, fire protection equivalent to the fire rated construction and STC equivalent to the sound rated construction, where applicable.

3.09 CLEANING UP

- A. Do not allow accumulation of scraps and debris arising from work of this Section. Maintain premises in neat and orderly condition at all times. Immediately remove spilled or splashed compound material and all trace of residue from adjoining surfaces.

END OF SECTION 09 21 16

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Furnish and install suspension systems, ceiling boards, panels and tiles, and accessories required for complete installation of acoustical ceilings specified.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 APPLICABLE STANDARDS

- A. American Society for Testing and Materials:
1. ASTM A641 - Specification for Steel Sheet, Zinc-Coated (galvanized) Carbon Steel Wire
 2. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (galvanized) or Zinc-Iron Alloy-Coated (galvannealed) by the Hot-Dip Process
 3. ASTM C423 - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 4. ASTM C635 - Standard Specification for Metal Suspension Systems for Acoustic Tile and Lay-in Panel Ceilings
 5. ASTM C636 - Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
 6. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials
 7. ASTM E119 - Fire Test of Building Construction and Materials
 8. ASTM E580 - Practice for Application of Ceiling Suspension Systems for Acoustic Tile and Lay-in Panels in Areas Requiring Seismic Restraint
 9. ASTM E1111 - Test Method for Measuring Interzone Attenuation of Ceiling Systems
 10. ASTM E1264 - Classification for Acoustic Ceiling Products
 11. ASTM E1414 - Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
 12. CISCA (Ceilings & Interior Systems Construction Association) - Ceilings Systems Handbook

1.05 PRODUCT HANDLING

- A. Protection: Protect suspended acoustical ceiling materials before, during, and after installation. Protect installed work and materials of other trades.
- B. Replacements: In event of damage, immediately make repairs and replacements necessary and at Contractor's expense.

1.06 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials, totaling 3% of the total installed, matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.

PART 2 - PRODUCTS

2.01 SUSPENSION SYSTEMS

- A. Provide steel capped 9/16" exposed tee grid by one of the following:
 - 1. Prelude® XL Armstrong World Industries
 - 2. USG Ceiling Solutions Donn® AX™/AXCE™ System
 - 3. CertainTeed EZ Stab Classic System
 - 4. Chicago Metallic® 4000 Temptra™; Standard Color 01 White. **(Basis-of-Design)**
- C. Suspension Members: Heavy Duty type of sufficient strength and rigidity to carry acoustical ceiling units in true and level plane without exceeding 1/32" deflection in any 2 feet of their spans.
- D. Fabrication: Fabricate suspension system components from cold-rolled sheet steel conforming to ASTM A 366. Protect from rust and corrosion with hot dipped galvanized coating.
- E. Finish for Exposed Members: Factory applied, white, low-gloss, baked-enamel finish. Suspend main suspension system runners from overhead construction members with not less than 12 gauge galvanized steel wire conforming to Federal Specification QQ-W-461.
- F. **Comply with installation requirements of ASTM E 580 and International Building Code Section 16 for seismic restraint. Conform to Seismic Design Category D.**

2.02 ACOUSTICAL TILE (NON-RATED)

- A. Provide tile by Armstrong World Industries, USG Interiors, CertainTeed, Rockfon or equal units approved by Architect. Furnish units with Class 25 flame spread index set

forth in Federal Specification SS-S-118b, Class III or Class 1 (0-25) as tested in accordance with ASTM E 84, 12" x 12" x 3/4" thick, beveled edge, non-directional fissured design. Furnish tile with factory applied white paint finish. Approximately 10% of tiles to be access tiles.

2.03 ACOUSTICAL CEILING BOARDS (NON-RATED)

- A. **ACT-1:** 24" x 24" x 5/8", Tropic™ 1020 Square Tegular Narrow (SLN), Smooth White Surface, by Rockfon® or approved equal product. Provide NRC 0.85.
- B. Furnish units rated non-combustible under the Flame Spread Index of Federal Specification SS-S-118b and having factory applied washable white surface finish.

2.04 OTHER MATERIALS

- A. Provide materials, not specifically described but required for complete and proper installation of suspended acoustical ceilings, selected by Contractor subject to approval of Architect.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

- A. Examine surfaces and conditions affecting proper installation of acoustical materials. Do not proceed until unsatisfactory conditions are corrected.
- B. Do not start acoustical ceiling work until glazing is completed and exterior openings are enclosed.
- C. All wet work, including concrete and masonry work must be completed and dried out before work is started.
- D. Do not install acoustical materials unless uniform temperature in spaces where acoustical tile work is performed is at least 60° F. during and after installation.
- E. Install acoustical ceilings, complete, including component parts necessary to suspend systems from structure.
- F. Install suspension systems to permit border units of greatest possible size where not full size.
- G. Following installation, clean soiled and discolored surfaces. Remove and replace units damaged or improperly installed.
- H. For any units that do not have square edges and must be cut for any reason, install edge angle or "T" at same elevation as other supporting members and make a field cut in the same profile as the factory edge or splice in a factory edge. Paint cut edges or splice joints to match giving a visually flawless result.

END OF SECTION 09 51 00

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Furnish and install resilient base and accessories specified. Clean and protect resilient components after installation.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.
- C. Samples: For each type of product indicated, in manufacturer's standard-size samples of each resilient product color, texture, and pattern required.
- D. Product Schedule: For resilient products. Use same designations indicated on Drawings.
- E. Installation and Maintenance Instructions: Submit manufacturer's published guide for Resilient Top-Set Wall Base.
- F. If required, submit the manufacturer's certification that the wall base has been tested by an independent laboratory and complies with the required fire tests.

1.04 QUALITY ASSURANCE

- A. Installation Qualification: Contractors for floor covering installation should be experienced in managing commercial flooring projects and provide professional installers, qualified to install the various flooring materials specified. An installer is "qualified" if trained, or a certified by manufacturer or a certified INSTALL (International Standards & Training Alliance) resilient floor covering installer.
- B. Mockups: Provide resilient products with mockups specified in other Sections.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver resilient base and installation accessories to Project site in original manufacturer's unopened cartons and containers each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).
- C. Protect products from damage when handling and during construction operations.

1.06 PROJECT CONDITIONS

- A. Install resilient products after other finishing operations, including painting, have been completed.
- B. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F (18 deg C) or more than 85 deg F (29 deg C) in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- C. Maintain the ambient relative humidity between 40% and 60% during installation.
- D. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

1.07 EXTRA MATERIALS

- A. Deliver to the Owner / Facility Manager maintenance stock, from the same manufactured lot as materials installed. Furnish 120 LF (one carton) for each color and type of wall base installed, and packaged with protective covering for storage and identified with labels clearly describing contents.

PART 2 - PRODUCTS

2.01 RESILIENT WALL BASE

- A. Manufacturer: Johnsonite, Inc., (800) 899-8916, 16910 Munn Road, Chagrin Falls, Ohio 44023. Web: www.tarkettna.com or approved equal.
 - 1. Mannington BurkeBase
 - 2. Roppe
- B. Furnish homogeneous 4" high, 1/8" thick, set-on type coved base in color(s) selected by Architect. Pre-molded corner units may be used at installer discretion if conditions warrant, but do not place where routine cleaning operations may cause corners to come loose.

1. Traditional Rubber Wall Base
 - a. Manufactured from a proprietary thermoplastic rubber formulation.
 - b. Meets performance requirements for ASTM F 1861 Standard Specification for Resilient Wall Base, Type TP, Group 1.
 - c. ASTM E 648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm² or greater, Class I.
 - d. ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials, Class A, Smoke <450.
 - e. Flexibility: Does not crack, break, or show any signs of fatigue when bent around a 1 1/4" diameter cylinder when tested according to ASTM F 137 Standard Test Method for Flexibility of Resilient Flooring Materials protocols.
 - f. Color Stability: Meets or exceeds ASTM F 1861 requirements for color stability when tested to ASTM F 1515 Standard Test Method for Measuring Light Stability of Resilient Flooring protocols.
 - g. Phthalate-free.
 - h. Contains at least 14% pre-consumer recycled content.
 - i. 100% Recyclable.

2.02 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based formulation manufactured and warranted by a reputable manufacturer.
- B. Adhesives: as recommended by Johnsonite to meet site conditions.
 1. Johnsonite 960™ Cove Base Adhesive or approved equal for cleaned and prepped porous surfaces. **DO NOT USE AT OUTSIDE CORNER INSTALLATIONS.**
 2. Johnsonite 946™ Premium Contact Adhesive or approved equal for cleaned and prepped non-porous surfaces such as stainless steel. **PREFERRED PRODUCT.**
 - a. Use at outside corners to ensure faster set-up, especially at short returns.
 3. ULTRASTIK™ All Purpose Tape which is double-sided, scrim-reinforced acrylic adhesive tape for applying base trim, as manufactured by Surface Shields.

2.03 OTHER MATERIALS

- A. Provide materials, including adhesives, not specifically described but required for complete and proper installation of resilient flooring only as recommended by manufacturer of material to which it is applied and subject to approval of Architect.
- B. Covebase Groover recommendation: Model CB-060 as provided by D-Cut Products, Inc., for fabricating outside corners, (630) 916-9100 www.dcutproducts.com

<http://Www.dcutproducts.com>
<mailto:caryzhang@dcutproducts.com>

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.

- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion and aesthetics of resilient products.
 - 1. **Where existing base material has been removed at existing porous and non-porous wall surfaces, scrape or remove cured adhesives, contact cement or drywall joint compound so that there is a clean and smooth surface before installing new base material.**
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient wall base.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Vacuum clean substrates to be covered by resilient products immediately before installation.

3.03 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's published instructions for installing resilient base. Refer to Installation Video: <https://www.youtube.com/watch?v=QCp2MunOCOY>
For any installation questions call Johnsonite Technical Hotline: 800-899-8916.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths if practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. Preformed corners: Install preformed Outside Corners where utilized before installing straight pieces.
- G. Field-Made or Job Formed Corners (recommendation):
 - 1. Outside and Inside Corners: Install pre-mitered corners first. Seat the bottom of the wall base snugly to the floor on either side of the corner. Anaerobic adhesive (Super Glue) may be used to adhere the two mitered pieces together. This can eliminate any slight gapping. Butt straight pieces of maximum lengths on either

- side of the pre-mitered corners. Make sure heights of the corner returns and the straight base match up.
2. Outside corners: Form by bending without producing discoloration (whitening) at bends. **DO NOT WHITTLE.**
 - a. Fold base in half.
 - b. Make one continuous cut with a sharp cove base gouger or groover.
 - c. Shave both sides, starting halfway down and avoid cutting into original center cut.
 - d. Fold tightly; groove out remaining upper portion. Nip top then affix to wall with Johnsonite 946™ Premium Contact Adhesive.
 3. Inside Corners: Use straight pieces of maximum lengths possible. Form by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

3.04 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
 1. Remove adhesive and other blemishes from exposed surfaces.
 2. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION 09 65 13

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PART 1 - GENERAL

1.01 DESCRIPTION

- A. Furnish and install specified tile carpeting and entry mat carpet tiles, including accessories required for complete and proper installation. Clean and protect installed carpet tiles.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 REFERENCES

- A. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
- B. ASTM F1869-16a - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- C. ASTM F710-19e1 - Practice for Preparing Concrete Floors. Concrete ph determination.
- D. ASTM F2170-19a - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in-situ Probes.

1.05 QUALITY ASSURANCE

- A. Qualifications of Installers: Use only thoroughly trained and experienced carpet installers completely familiar with materials specified, manufacturer's recommended methods of installation, and requirements of this work.
- B. Manufacturer's Recommendations: Manufacturer's recommended methods of installation is basis for methods of installation used in this work.
- C. Applicable Standards: Meet OSHA requirements and flammability requirements of DOC-FF-1-70.
- D. **Pre-installation Meeting:** Conduct the meeting at work site with installers of other work adjoining carpeting including resilient base and representatives of other entities

directly concerned with performance of carpet, including Port and product manufacturers.

1. Review contract documents, submittals, status of coordinating work, proposed installation schedule, and procedures.
2. Review laydown area and logistics.
3. Review ambient conditions and ventilation procedures.
4. All related submittals shall be approved prior to the pre-installation meeting.
5. Discuss carpet protection requirements for the duration of construction.

1.06 JOB CONDITIONS

- A. Environmental Conditions: Maintain temperatures in space in accordance with carpet or adhesive manufacturer's recommendations, but in no case less than 65 degrees F for 24 hours prior to, during and after installation. Sub-floor temperature should be a minimum 65 degrees F for 24 hours prior to and after installation.
- B. Precondition: All of the carpet shall be spread in a room on site 24 hours prior to actual installation with the room preconditioned at a minimum of 65 degrees F with humidity between 10% to 65%.
- C. Moisture: A calcium chloride test should be performed on the concrete to detect the presence of moisture. Acceptable results require that moisture content does not exceed 3 lbs. per 1,000 square feet per 24 hours. One calcium chloride test should be performed for every 300 yards of carpet. Relative Humidity ASTM-F-2170 test method maybe be used in place of calcium chloride test. Acceptable moisture levels are 75% maximum relative humidity. Alkalinity tests must also be performed. PH should register between 5 and 9. All test should be documented and results saved.

1.07 WARRANTY

- A. Warranty for Carpet: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet installation which fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, excess static discharge, lack of color retention, poor wear, and staining, change in texture, and delamination.
 2. There shall be no limitations to:
 - a. Full warranty coverage due to age of carpet or other deductive warranty considerations or pro-rations.
 - b. Duration of adhesive cure time received prior to use of the carpeted area.
 3. Warranty period shall be manufacturer's standard warranty period or 10 years from date of substantial completion, whichever is greater.

PART 2 - PRODUCTS

2.01 TILE CARPETING

- A. Provide from one of the following manufacturers:
 - 1. Mannington
 - 2. J&J Flooring (Basis-of-Design)
 - 3. Mohawk
 - 4. Patcraft
 - 5. ShawContract
 - 6. Tarkett
- B. Refer to Product Schedule on the Drawings for types, sizes, colors and patterns.

2.03 ACCESSORIES

- A. Edge Guard and/or Transition Strip: Roberts Consolidated Industries or approved equal, edge guards and transition strips of types, sizes and profiles required. Submit color choices to Architect for selection of finish color.
- B. Installation Adhesive: Water-resistant type recommended by manufacturer, and complying with flammability requirements for installed carpet, where required.
 - 1. Provide HENRY® 650 R Pressure Sensitive Adhesive with releasable or permanent bonding properties or approved equal, if required. Moisture resistant up to 90% RH, solvent free and nonflammable.
- C. Seaming Cement: Hot melt seaming adhesive or similar product recommended by manufacturer, for taping seams and buttering cut edges at backing to form secure seams and prevent pile loss at seams.

2.03 OTHER MATERIALS

- A. Provide materials not specifically described but required for complete and proper carpet installation of new, first quality of their respective kinds recommended by manufacturer of carpeting, and subject to approval of Architect.

PART 3 - EXECUTION

3.01 MEASUREMENTS

- A. Dimensions for carpet tile areas are approximate. Carefully check dimensions and other conditions affecting this work in the field. Contractor responsible for proper installation in areas designated.

3.02 PRE-INSTALLATION REQUIREMENTS

- A. Installer must examine substrates for moisture content and other conditions under which carpet tile is installed, and notify Contractor in writing of conditions detrimental to proper completion of this work. Do not proceed until unsatisfactory conditions are corrected.
 - 1. Floor preparation shall be free of cracks and holes. Gaps of 1/16" or more are to

- be filled with latex base flashing compound.
- 2. Floor temperature should be at 65° at least 24 hours prior to installation and 48 hours after carpet is installed.
- B. Clear debris and scrape up cementitious deposits from surfaces to receive carpet tile. Vacuum clean immediately before installation. Check concrete surfaces to ensure no "dusting" results through installed carpet. Apply sealer when required to prevent dusting.
- C. Sequence carpet tile installation with other work to minimize possibility of damaging and soiling carpet tile during remainder of construction period.

3.03 INSTALLATION OF CARPET TILE

- A. Comply with manufacturers' instructions and recommendations. At doors, center seams under doors. Do not place seams in traffic direction at doorways.
- B. Cement seams in accordance with manufacturer's instructions to produce best possible even top pile and prevent sprouting of face yarn and backing.
- C. Apply adhesive uniformly to substrate in accordance with manufacturer's instructions. Butt carpet tile edges tightly together to form seams without gaps. Roll lightly to eliminate air pockets and ensure uniform bond. Remove excess adhesive promptly from face of carpet tile.

3.04 ROOM/AREA MOCKUPS

- A. After the building is enclosed to provide weather protection, complete one typical full-size mockup of the following rooms and spaces:
 - 1. One of each room type or area, minimum 100 SF, as determined by the design professional.
- B. Mockup components shall be full size, using the same materials as those to be used in the actual Work, including details and methods of construction.
- C. Interior Room/Area Mockup: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
- D. Fabricate and erect each mockup under manufacturer's / installer's direct supervision and employ same installers as they would be employed during the actual performance of the Work at the job site. Employ same supervisory personnel who will perform site erection.

3.05 PROTECTION AND CLEANING OF CARPET TILE

- A. Adequately cover and protect against damage during shipment and delivery to job site, and until acceptance by Owner.
- B. Protect during installation using drop cloths, or heavy, reinforced, non-staining Kraft paper.

- C. Damaged carpet tile will be rejected and replaced by Contractor.
- D. At completion of work and when directed by Owner, vacuum clean carpet tile and remove soiling.
- E. Install plybar or 6 mil. visqueen protection over areas of carpet tile. Lap 12" at edges. Continuously tape down edges and joints.

3.06 MAINTENANCE

- A. Submit 2 copies of complete manual of manufacturer's maintenance recommendations.

END OF SECTION 09 68 13

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PART 1 - GENERAL**1.01 DESCRIPTION**

- A. Work Included: Provide specified painting and finishing of interior and exterior items.
1. Provide painting of all new exposed steel and iron work, including primed metal surfaces. Paint exposed-to-view pre-finished metal surfaces of items, if required. Refer to drawings for existing metal to be painted.
 2. Provide touch-up of pre-finished items to match original finish.
 3. **Do not paint** waterproof coatings, water repellent coating, acoustical ceilings, toilet partitions, aluminum with factory applied finish, or pre-finished items, except as noted above.
 4. **Do not paint** over any code required metal labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates. Mask off the label before applying finish and remove masking after finish is dry.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 DEFINITIONS

- A. Term "paint", as used herein, includes enamels, paints, sealers, fillers, emulsions, varnishes, stains, and other coatings whether used as prime, intermediate, or finish coats.

1.05 QUALITY ASSURANCE

- A. Qualifications of Painters: Use only qualified journeyman painters for mixing and application of paint. In acceptance or rejection of painting, no allowance made for lack of skill on part of painters.
- B. Mockups - Interior: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

- a. Vertical and Horizontal Surfaces: Provide samples of at least 100 SF.
- b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 PRODUCT HANDLING

- A. Delivery: Deliver paint materials to job site in original unopened containers with labels intact and legible at time of use.
- B. Protection:
 1. Store only approved materials at job site and store only in suitable and designated area restricted to storage of paint materials and related equipment.
 2. Ensure safe storage and use of paint materials and prompt and safe disposal of waste.
 3. Protect paint materials before, during, and after application and protect installed work and materials of other trades.

PART 2 - PRODUCTS

2.01 PAINT MATERIALS

- A. Manufacturers: Provide paints, enamels, stains, varnishes, and admixtures of first line quality by Sherwin Williams or approved equal. Sherwin Williams products specified herein establish minimum quality standards. Approved equal products:
 1. Farrell-Calhoun
 2. PPG Paints
 3. Benjamin Moore
- B. Compatibility:
 1. Paint materials and equipment to be compatible. Finish coats compatible with prime coats, prime coats compatible with surface to be coated, and tools and equipment compatible with coating applied.
 2. Thinners (when used): Use thinners recommended for that purpose by manufacturer of material thinned.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection: Carefully inspect installed work of other trades and verify work is complete to point where painting work may properly commence. Verify paint finishes may be

applied in strict accordance with manufacturer's directions and requirements of these Specifications.

- B. Discrepancies: Do not proceed with installation in areas of discrepancy until discrepancies are fully resolved.

3.02 PREPARATION OF SURFACES

- A. Protection: Completely mask, remove, and adequately protect hardware, accessories, machined surfaces, plates, lighting fixtures, and similar items in contact with painted surfaces not scheduled to receive paint.
- B. Priming: Use primer recommended by manufacturer of coating system. Spot prime exposed nails and metals to be painted with emulsion paints.
- C. Cleaning: Thoroughly clean surfaces receiving paint. Schedule cleaning and painting so dust and contaminants from cleaning process will not fall on wet, newly painted surfaces.
- D. Gypsum Board: Treat and conceal joints, screw heads, and depressions in gypsum board surface in accordance with manufacturer's recommendations and instructions. Painted surfaces must be completely clean and continuously smooth. Treat internal and exterior corners and angles formed by intersection of wallboard surfaces and wallboard edges with joint reinforcements system in accordance with manufacturer's standard installation specifications where intersections and edges do not have metal trim. **All joints in gypsum board construction are to be taped and floated. This includes work above ceilings, at concealed places and anywhere else joints in gypsum board construction occur.** A slight egg-shell texture may be acceptable if approved by Architect prior to application. **Heavy "knockdown" texturing is not acceptable.**
- E. Wood: Clean wood surfaces free of dirt, oil, or foreign substances with scrapers, mineral spirits, and sandpaper. Sandpaper smooth those surfaces exposed to view, and then remove dust. Prime or seal wood requiring job painting immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of this wood. Scrape and clean small, dry seasoned knots, and apply thin coat of white shellac or manufacturer's recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty of plastic wood-filler. Sandpaper smooth when dried.
- F. Primed Ferrous Metals: Clean ferrous metals free of dust, grease and grime. Sand smooth rust spots, mars and abrasions in surfaces. Touch-up shop-applied prime coats which have damage or bare areas. Wire-brush, solvent clean, and touch up with same primer as shop coat.
- G. Non-ferrous Metals: Clean off all oxidation, dust, grease and grime.
- H. Galvanized Metal Surfaces: Clean free of oil and surface contaminates with acceptable non-petroleum based solvent. Touch up bare metal with zinc chromate primer.

3.03 WORKMANSHIP

- A. Do not perform outside painting in extremely cold, frosty, or damp weather. Do not paint in dusty rooms. If required, sprinkle floors, to lay dust. Do not apply coats of paint on either wet or damp surfaces and in no case unless preceding coat is dry and hard.
- B. Clean surfaces before priming. Remove dirt, oil, grease, rust, scale, and foreign matter. Clean with sandpaper, steel scraper, or wire brushes where necessary.
- C. Specified coats are to cover completed painting and finishing work. Where color, stain, or undercoats show through final coat, install additional coats until uniform coverage is obtained.
- D. Vary tints of undercoats slightly for identification of succeeding coats. Ample time of drying required to secure best possible results.
- E. Coats specified are in addition to shop or mill priming required under other Sections of these specifications.
- F. **All cabinet devices that require finish painting are to be painted with doors in the open position and shall be allowed to dry for a minimum of 24 hours in the open position. DO NOT PAINT DOORS CLOSED AND TRIM AFTER DRYING.**
 - 1. **Cabinets that require finish painting include, but are not limited to, wall and ceiling access doors, fire extinguisher/hose/valve cabinets, electrical panel boxes, etc.**

3.04 MOISTURE CONTROL

- A. Give back side of interior wood trim in contact with masonry units one application of water repellent preservative.

3.05 PAINT SCHEDULE

- A. Finish surfaces as follows:

<u>SURFACE</u>	<u>TREATMENT</u>
1. Exterior Steel / Ferrous Metals:	<u>1st Coat</u> - SW Pro-Cryl® Universal Water Based Primer, B66-310 Series (Touch up only on primed surfaces) <u>2nd & 3rd Coats</u> - SW B66W01151 - Pro Industrial DTM Acrylic Semi-Gloss
2. Interior Ferrous Metals:	<u>1st Coat</u> - SW Pro-Cryl Universal Water Based Primer, B66-310 Series (Touch up only on primed surfaces) <u>2nd & 3rd Coats</u> - SW ProMar 200 Alkyd Eg-Shel B33 or S/G B34 as selected by Architect.

3. **Interior Aluminum:** 1st Coat - SW Pro-Cryl Universal Water Based Primer, B66-310 Series (Touch up only on primed surfaces)
2nd & 3rd Coats - SW ProMar 200 Alkyd Eg-Shel B33 or S/G B34 as selected by Architect.
4. **Exterior Aluminum:** 1st & 2nd Coats - SW A-100 Exterior Latex Flat A6 or Satin A82 as selected by Architect.
5. **Galvanized Metals:** 1st Coat: SW B66W00310 - Pro Industrial Pro-Cryl® Universal Acrylic Primer Off White
2nd & 3rd Coats: SW B66W01151 Pro Industrial DTM Acrylic Semi-Gloss Extra White.
6. **Int. Gyp. Board - Painted:** 1st Coat - SW PrepRite High Build Latex Wall Primer/Surfacer, B28W601
2nd & 3rd Coats - SW ProMar 200 Latex Eg-Shel B20-2200 or S/G B31-2200 Enamel as selected by Architect.
7. **Int. Gyp. Board - Glazecoat:** SW Water Based Epoxy Resin, B70-200 Series with Gloss Hardener B60V15

3.06 PAINTING OF MECHANICAL AND ELECTRICAL WORK

- A. Painting of pipe and duct insulation and un-coated ferrous metal in inaccessible pipe and duct chases, in plumbing chases, and in spaces above ceiling is not required.
- B. Metal Work in Mechanical Room (finish as follows):
 1. Clean pre-finished equipment and touch up with enamel to match manufacturer's final coat.
 2. Clean exposed pipe, exposed conduit and electric outlet boxes, hangers and brackets, valve handles, and miscellaneous pipe line devices and give two coats of medium gray enamel.
 3. Clean prime painted or unfinished items of manufactured mechanical and electrical equipment, then prime and finish with two coats of enamel to match other finished items of equipment.
 4. Finish remaining exposed metal items with two coats of light grey enamel.
- C. Paint exposed interior metal work, including ferrous and non-ferrous piping, for heating ventilating, plumbing and electrical equipment, electric cabinets, ventilating grilles, metal access panels. Give exposed metal items one coat of enamel undercoater and one coat of enamel in addition to priming coat.
- D. Give pipe and duct insulation exposed to view one coat glue size and two coats enamel.
- E. **Paint all mechanical, electrical and plumbing items that are visible through registers, grilles and diffusers with Flat Black-Out paint.**

3.07 PROTECTION, CLEAN UP, AND TOUCH-UP

- A. Protect all work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.
- B. Upon completion, clean paint drops and smears from hardware, glass and other surfaces and items.
- C. Before final inspection, touch-up or refinish painted surfaces which have become damaged or discolored.
 - 1. Perform touch-up work in a manner to produce solid even color and finish texture to match surrounding color and finish texture.
 - 2. Areas that receive touch-up work and do not match surrounding color or finish texture will be refinished at Contractors expense.

3.08 REPAINTING AND REFINISHING

- A. Thoroughly clean existing surfaces in present building to be repainted and give one or more new coats of same type of paint originally used. Clean existing natural finish surfaces, sand and give new coat of varnish or finish originally used. Treat patched and repaired surfaces as new surfaces. For bidding purposes figure two coats of paint as average requirement. Scrape surfaces to be repainted, sand by hand or machine, and prepare to receive new coats.
- B. Paint rooms and areas in existing building noted on drawings to paint existing surfaces or required by Finish Schedule.
- C. Paint all rooms and areas in existing building where cutting and patching occurs. Paint after cutting, patching, and remodeling in rooms and areas is completed. Where cutting and patching is required on only one wall or surface, paint the entire room or area. Where cutting or patching occurs along a corridor wall, paint entire corridor wall from corner to corner or between termination lines designated by Architect.

END OF SECTION 09 91 00

**PART 10
SPECIALTIES**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Furnish and install metal accessories called for in Toilet Accessory Schedule.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.
- C. Samples: Submit a sample of each component illustrating color and finish.
- D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.04 REFERENCES

- A. 2021 Arkansas Fire Prevention Code (IBC 2021), Chapter 11 - Accessibility.
- B. BABIES Act, or Bathrooms Accessible In Every Situation Act (2016) requiring changing tables in all publicly accessible federal buildings as determined by the GSA.
- C. 2017 ICC A117.1 - Accessible and Usable Buildings and Facilities.
- D. 2010 ADA Standards for Accessible Design.
- E. ADA Accessibility Guidelines for Buildings and Facilities, July 23, 2004 – Provisions for Children.
- F. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- G. ASTM A167-99 (Re-approved 2004) - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- H. ASTM A269/A269M-2015 - Standard Specification for Seamless and Welded Austenitic

Stainless Steel Tubing for General Service.

- I. ASTM A794/A794M-2018 - Standard Specification for Commercial Steel (CS), Sheet, Carbon (0.16 % Maximum to 0.25 % Maximum), Cold-Rolled.
- J. ASTM B456-2003 - Electro-deposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

1.05 QUALITY ASSURANCE

- A. Use personnel skilled in work required, completely familiar with manufacturers' recommended methods of installation, and thoroughly familiar with requirements of this work.

1.06 PRODUCT HANDLING

- A. Protection: Protect toilet and bath accessories before, during, and after installation. Protect installed work and materials of other trades.
- B. Replacements: In event of damage, immediately make repairs and replacements necessary at Contractor's expense.

PART 2 - PRODUCTS

2.01 METAL TOILET ACCESSORIES

- A. Manufacturers and Accessory Numbers are listed in Toilet Accessory Schedule. Manufacturers who may furnish products for review by Architect are:
 - 1. American Specialties
 - 2. Bobrick
 - 3. Bradley
 - 4. comfortdesigns
 - 5. Delta Faucet
 - 6. McKinney
 - 7. Approved Equal

2.02 MATERIALS

- A. Stainless Steel: AISI Type 302/304, with "Brushed" finish, 0.034-inch (22-gage) minimum thickness.
- B. Brass: Leaded and unleaded, flat products, ASTM B 19; rods, shapes, forgings, and flat products with finished edges, ASTM B 16; Castings, ASTM B 30.
- C. Sheet Steel: Cold-rolled, commercial quality ASTM A 366, 0.04-inch (20-gage) minimum. Surface preparation and metal pretreatment as required for applied finish.
- D. Galvanized Steel Sheet: ASTM A 527, G60.

- E. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456, Type SC 2.

2.03 FASTENERS

- A. Provide screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.

2.04 PLUMBING PIPE WRAP

- A. At all exposed lavatory piping, provide TRUEBRO Lav Guard® 2, Fast Fit Undersink Piping Covers as manufactured by IPS Corporation, 202 Industrial Park Lane, Collierville, TN 38017, 800-340-5969 or approved equal.
 - 1. Use at all sinks or lavatories that do not have removable apron.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Coordinate with other trades to ensure proper and adequate provision in framing and wall finish for installation of selected accessories.
- B. Prior to installation, inspect location of accessories and verify that necessary provisions have been made. Do not proceed with installation in areas of discrepancy until discrepancies have been fully resolved.

3.02 INSTALLATION

- A. Install accessories in accordance with manufacturers' recommendations, anchoring components firmly in place.

END OF SECTION 10 28 13

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PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Firefighting devices consist of hand-portable fire extinguishers and metal cabinets, and accessories.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 REFERENCES

- A. NFPA 10 - Standard for Portable Fire Extinguishers
- B. ADA Accessibility Guidelines
- C. IBC/IFC Tables 906.3(1) and 906.3(2) for determining extinguisher rating, fire classification, hazard classification, and travel distance.
- D. UBC Standard 7-5 (ASTM E-814-83) - Fire-rated cabinet option for combustible and non-combustible walls.

1.05 QUALITY ASSURANCE

- A. Provide fire extinguishers, cabinets, and accessories by a single manufacturer.

1.06 PRODUCT HANDLING

- A. Protection: Protect firefighting devices before, during, and after installation. Protect installed work and materials of other trades.
- B. Replacements: In event of damage, immediately make repairs and replacements necessary at Contractor's expense.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
1. **Basis-of-Design:** Larsen's Manufacturing Co., 7421 Commerce Ln NE, Minneapolis, MN 55432, (763) 571-1181 or (800)527-7367.
 2. Potter Roemer, 17451 Hurley St, City of Industry, CA 91744 Phone: (800) 366-3473 E-mail: info@potterroemer.com
 3. JL Industries, Activar Construction Products Group, 800-554-6077. Email: sales@activarcpg.com
- B. Abbreviations:
SRC-1 Semi-Recessed Cabinet

2.02 FIRE EXTINGUISHERS

- A. **Type 1:** Provide multi-purpose dry chemical type, Model MP5 with UL Rating 2A-10B:C for Class A, B and C fires manufactured by Larsen's® or approved equal.

2.03 FIRE EXTINGUISHER CABINETS

- A. **SRC-1:** Construct cabinets from 18 gauge, or heavier, stainless steel with #4 finish. Provide Larsen's®, 1-1/2" square trim semi-recessed "Architectural Series" No.2409-5R or approved equal, with "Vertical Duo" doors. Lettering, if required, to be black vertical Type 'A' die cut; verify with Owner and local Authority Having Jurisdiction (AHJ) or fire code official. Mount at 56" to top of housing in masonry wall construction, maintaining consistent height at all wall types. Neither the extinguisher handle nor the cabinet handle shall be mounted higher than 48" AFF, per ADA.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Coordination: Coordinate with other trades to ensure proper and adequate provision in framing and wall covering for installation of recessed cabinets.
- B. Inspection:
1. Prior to installation, inspect cabinet recesses, and verify that necessary provisions have been made.
 2. Do not proceed with installation in areas of discrepancy until discrepancies have been fully resolved.

3.02 INSTALLATION

- A. Install the items of this Section in strict accordance with the original design, approved shop drawings, and requirements of agencies having jurisdiction, as approved by the

Architect, anchoring all components firmly into position.

3.03 SERVICE

- A. Determine approximate completion date of Work. Inspect, charge, and tag fire extinguishers at date not more than ten days before or less than one day before actual completion date of the Work.

END OF SECTION 10 44 00

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PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide other miscellaneous specialties specified.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 QUALITY ASSURANCE

- A. Furnish at least one person, present at all times, thoroughly familiar with installation requirements of each item, to personally supervise installation.

1.05 PRODUCT HANDLING

- A. Protection: Protect miscellaneous specialty items before, during, and after installation. Protect installed work and materials of other trades.
- B. Replacements: In event of damage, immediately make repairs and replacements at Contractor's expense.

PART 2 - PRODUCTS

2.01 RAPID ENTRY SYSTEM

- A. Provide Knox-Box® emergency entry key box by Knox Co., 949-252-8181 or approved equal. Provide Model #3270 Recess Mount in Black color and #3290 Hinged Door Recessed Mounting Kit mounted 72" AFF. Contractor to contact local fire department to apply for authorization to order box and verify location. Orders are not accepted without authorized signature of local fire official.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Prior to installation, verify items may be installed in accordance with manufacturers' recommendations.
- B. Notify Architect of conditions that would adversely affect installation.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install miscellaneous specialties in strict accordance with manufacturers' current recommendations and instructions.

3.03 ADJUSTMENT AND CLEANING

- A. Verify that trim is in place and adjust components.
- B. Remove labels from equipment and remove packing materials from job site.

END OF SECTION 10 80 00

PART 12
FURNISHINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide manually-operated roll-up fabric interior window shades, including mounting and operating hardware.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.
- C. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings, field verified window dimensions, quantities, type of shade, controls, fabric, and color, and include opening sizes and key to typical mounting details.
- D. Selection Samples: For each finish product specified, two complete sets of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.
- E. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section. If manufacturer does not meet minimum experience requirement, please submit life cycle test data showing minimum 2000 complete operational cycles for each year of warranty showing no failure and that shade remains fit for use as a operable shade.
- B. NFPA Flame-Test: Passes NFPA 701. Materials tested shall be identical to products proposed for use. Show complete manufacturer data (name, location, contact) and certification from manufacturer that the fabrics sourced for this project comply with the test data provided.
- C. Mock-Up: Provide a mock-up of one of each type roller shade assembly specified for evaluation of mounting, appearance and accessories.

1. Locate mock-up in window(s) designated by Architect.
2. Do not proceed with remaining work until mock-up is accepted by Architect.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver window shades until building is enclosed and construction within spaces where shades will be installed is substantially complete.
- B. Deliver products in manufacturer's original, unopened, undamaged containers with labels intact.
- C. Label containers and shades according to Window Shade Schedule.
- D. Store products in manufacturer's unopened packaging until ready for installation.

1.06 SEQUENCING

- A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.
- B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.07 PROJECT CONDITIONS

- A. Install roller shades after finish work and ambient temperature, humidity and ventilation conditions are maintained at levels recommended for project upon completion.

1.08 WARRANTY

- A. Manufacturer to warrant its hardware components and shade fabric to be free from defects in material and workmanship under the normal and proper use for a period of twenty-five (25) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Draper, Inc.. Toll Free Tel: 800-238-7999.
- B. All work regarding shades to be coordinated with Kavanaugh Blind Shade & Shutter Co., 5208 Kavanaugh Blvd, Little Rock, AR, 501-831-3129; email: Brett Todd <mailto:wtodd8836@sbcglobal.net>; sbretttodd@outlook.com
- C. Approved Dealers:
 1. Shop Mr. Blinds, Searcy, AR 501-232-8382, Mandy Lloyd.
 2. Baker Window Coverings, 501-529-2900, Janet Baker
 3. Other equal dealers will be subject to approval by the architect.

- D. Approved equal manufacturers:
 - 1. Hunter Douglas
 - 2. SWF Contract (Springs Window Fashions)

2.02 MANUALLY OPERATED WINDOW SHADES

- A. Manually Operated Window Shades with Independent Control: Manually operated, vertical roll-up, fabric window shade with components necessary for complete installation.
 - 1. Operation: Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide limit stops to prevent shade from being raised or lowered too far.
 - a. Clutch mechanism: Fabricated from high carbon steel and molded fiberglass reinforced polyester or injected molded nylon. White or Black color as selected by Architect.
 - b. Bead chain loop: Stainless steel bead chain hanging at side of window.
 - c. Idler Assembly: Provide roller idler assembly of molded nylon with adjustable or spring-loaded length idler pin to facilitate easy installation, and removal of shade for service.
 - d. Bead Chain Hold Down: P-Clip (standard).
 - 2. Mounting:
 - a. Mounting brackets.
 - b. End-caps and fascia.
 - 3. Roller Tube: Fabricated from extruded aluminum, galvanized steel, or enameled steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade type and size. Fabric connected to the roller tube with LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal. Adhesive attachment to eliminate horizontal impressions in fabric.
 - 4. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.
 - a. Endcap covers: To match fascia or headbox color.
 - 5. Brackets: Plated stamped steel. Provide size compatible with roller size.
 - a. Mounted to jamb.
 - 6. Shade slat: Slat encased in heat seamed hem.
 - 7. Fascia: L shaped aluminum extrusion to conceal shade roller and hardware.
 - a. Attachment: Snaps onto end-caps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands. No notching is required.
 - b. Shape: Square Fascia Panel.
 - d. Finish: Black powder coat.

2.03 FABRIC

- A. Light-Filtering Fabrics

1. Refer to the Product Schedule located in the drawings for locations, types, patterns and colors. Provide 3% sun-filtering solar shade in Smoke color if not called out on drawings, subject to final approval by the architect.

PART 3- EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.
- B. Coordinate requirements for blocking, construction of shade pockets, and structural supports to ensure adequate means for installation of window shades.
- C. Coordinate installation of recessed shade pockets with construction of suspended acoustical panel ceilings specified in Section 09 51 00.
- D. Coordinate installation of recessed shade pockets with construction of suspended gypsum board ceilings specified in Section 09 21 16.
- E. Coordinate requirements for power supply conduit, and wiring required for window shade motors and controls.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install roller shades level, plumb, square, and true. Allow proper clearances for window operation hardware.
- C. Shade pockets:
 1. Install shade pockets prior to installation of suspended ceiling system. Attach to supporting structure with screws through top of pocket at 24 inches (610 mm) minimum centers.
 2. Install shade pockets in conjunction with installation of suspended ceiling system. Attach to supporting structure with screws through top of pocket at 24 inches (610 mm) minimum centers.
 3. Install corner pieces securely and in alignment with pockets.
 4. Install pocket ends securely and in alignment with pockets.
 5. After interior construction is essentially complete, install shade and operating mechanism in pocket.

- D. Install the following items to conceal roller and operating mechanism. Do not use exposed fasteners.
 - 1. Fascias.
 - 2. Closure panels.
 - 3. Endcaps.
- E. Install headbox, side channels, and sill channel with sealant specified in Section 07 92 00 - Joint Protection.
- F. Position shades level, plumb, and at proper height relative to adjacent construction. Secure with fasteners recommended by manufacturer.

3.04 TESTING AND DEMONSTRATION

- A. Not Used.
- B. Test window shades to verify that operating mechanism, fabric retainer, and other operating components are functional. Correct deficiencies.
- C. During daylight hours, lower shades and turn off interior lights. Verify that there are no light leaks at perimeter or within shade assembly. Correct deficiencies.
- D. Demonstrate operation of shades to Owner's designated representatives.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

3.06 SCHEDULES

- A. Refer to Drawings for shade types and locations.

END OF SECTION 12 24 13

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PART 13
SPECIAL CONSTRUCTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Furnish, deliver, and erect pre-engineered metal building structural components shown on drawings and conforming to these specifications.
- B. Furnish building design of manufacturer regularly engaged in fabrication of pre-engineered structures.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
 - 1. Furnish Shop Drawings, for review by Architect showing necessary fabrication details, fittings, fastenings, foundation reactions for all load cases, anchorage and erection details. In addition to provisions of the General Conditions, prepare Shop Drawings by or under the supervision of a registered professional engineer. Do not use reproductions, in any form, of the Contract Drawings for Shop Drawings. Shop Drawings shall be submitted to Architect for review. Submit related shop drawings together; partial submittals will not be accepted. Furnish mill certificates on foreign steel proposed for use and not produced within the continental USA. Include with mill certificates certified copies of mill test reports giving names and locations of mills and shops, and chemical analysis and physical properties of steel required for this project.
 - 2. All drawings and calculations shall bear the stamp of a structural engineer licensed in the state of Arkansas.
- B. Substitutions will not be considered prior to the award of the General Contract.

1.04 REFERENCE STANDARDS

- A. Conform to latest edition of the following standards where applicable to structural design of building:
 - 1. "Recommended Design Practices Manual", Latest Edition - Metal Building Manufacturer's Association.
 - 2. "Manual of Steel Construction", Latest Edition - American Institute of Steel Construction
 - 3. "Cold Formed Steel Design Manual", Latest Edition - American Iron and Steel Institute.

4. "Aluminum Construction Manual", Latest Edition - The Aluminum Association.
5. "Code for Welding in Building Construction", Latest Edition - American Welding Society.

1.05 DESIGN LOADS

- A. General: Basic design loads include live, wind, and dead loads. Other loads, whether of static, dynamic, or kinetic nature, are considered auxiliary loads.
- B. Refer to Pre-Engineered metal building notes on Structural Drawings for Roof Live Load, Roof Dead Load, Superimposed Roof Dead Load, Roof Deflections, Perimeter Wall Deflections, Drift Under Wind Loading and other loading requirements.
- C. Certification:
 1. Submit letter from metal building manufacturer certifying that the building proposed will be furnished to meet or exceed all the above design load criteria and that all structural design will be in strict conformance with that prescribed in the MBMA "Design Practices Manual".
 2. After awarding of Contract, submit complete structural analysis prepared by metal building manufacturer to Architect upon request for same.

1.06 GUARANTEES

- A. Provide one year labor and material warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Provide pre-engineered structural system by or one of the following manufacturers or approved equal.
 1. Alliance Steel
 2. American Buildings Company
 3. Architectural Integrated Metals
 4. Butler Manufacturing Company
 5. Pinnacle Structures
 6. Varco Pruden
 7. Approved equal

2.02 PRE-ENGINEERED STRUCTURAL SYSTEM

- A. Primary Structurals: Frames will consist of welded up plate section columns and roof beams or trusses complete with necessary splice plates for bolted field assembly. All bolts for field assembly of primary framing will be high strength bolts as indicated on erection drawings.
- B. Beam and post endwall frames will consist of endwall corner posts, endwall roof beams, and endwall posts as required by design criteria.
- C. Exterior columns will be welded-up "H" sections or cold-formed "C" sections; interior

columns will be "H" sections or tube columns.

- D. Connection of all major structural members will be made with A 325 high-tensile bolts through prepunched or predrilled holes for exact alignment.

2.03 ROOF COVERING SUPPORTS AND ACCESSORIES

- A. Roof Panel System able to be fastened to purlins with concealed steel clip or steel backing device having a protective metallic coating. Through penetration of roofing surface by exposed fasteners is not allowed. Refer to Division 7 for specified roof panels.
- B. Purlins Configuration, Thickness, and Spacing: Use building manufacturer's standard, provided design criteria, including deflection, is met or exceeded.

2.04 WALL COVERING SUPPORTS

- A. Girt Configuration and Thickness: Provide building manufacturer's standard design criteria, to include meeting deflection and girt spacing as detailed on the drawings, if required.

2.05 STRUCTURAL STEEL PRIMER

- A. Give all un-coated structural steel 1 shop coat rust-inhibitive (primer) paint which meets or exceeds Federal Specifications TT-P-664, or submit certification that it conforms to a recognized authoritative specification, such as a Federal or Military authority or the Structural Steel Painting Council.

PART 3 - EXECUTION

3.01 GENERAL

- A. Deliver and erect the pre-engineered components specified and complying with manufacturer's erection drawings and specifications.
- B. Perform assembly and erection by the manufacturer's own crew or by an erector trained and authorized by the manufacturer with the erectors work being inspected and certified by the manufacturer.

3.02 ERECTION

- A. Bolt settings and other dimensions shall be held to a tolerance of 1/8-inch±. Use templates or other gaging devices to assure accurate spacing of anchor bolts. Bolt field connections unless otherwise required.
 - 1. Set bases or sill members to obtain uniform bearing. Anchors and anchor bolts for

securing members to concrete curb or structural steel sub-frame shall be of black steel, set accurately to templates and of proper size to adequately resist applicable design loads at the base.

END OF SECTION 13 34 19

PART 22
PLUMBING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The work covered by Division 22 sections consist of furnishing all labor, equipment, appliances and material for the heating, air conditioning, piping and plumbing systems in strict accordance with Codes, Specifications and the applicable drawings and subject to the terms and conditions of the contract. Include all appurtenances necessary to the proper operation of the systems and equipment specified.
- B. General Contractor shall install all concrete pads and bases required for installing mechanical equipment. Mechanical Contractor is responsible for the exact sizes required, location of anchor bolts, etc.
- C. Some equipment may be furnished by other divisions. Mechanical Contractor is responsible to check the drawings and specifications for equipment that will be furnished by others. Furnish the supplies (hot and cold water cut-offs), traps, drains, controls, gas piping, pressure reducing valves, etc., on all equipment furnished by other divisions.
- D. General Contractor shall furnish and install all ceiling access panels required to service mechanical equipment, valves and controls above gyp board or hidden spline ceilings.
- E. General Contractor shall provide all site drive, sidewalk and other surfaced areas saw cutting and repairs back to preexisting conditions for the required mechanical piping. Mechanical Contractor shall provide the trenching, bedding and backfill required for the pipe installation.

1.02 RELATED SECTIONS

- A. The General Conditions and Division 1, General Requirements, as bound in the specification preamble, apply to all work under Division 22. Carefully note its contents in performance of the work.
- B. The Architectural, Mechanical, and Electrical plans and Specifications, including Information to Bidders and other pertinent documents issued by the Engineer are a part of this Specifications and the accompanying mechanical plans. Comply with them in every respect. Examine all the above carefully. Failure to comply does not relieve the Contractor of responsibility nor may it be used as a basis for additional compensation due to omission of architectural, electrical and structural details from the mechanical drawings.

- C. All electrical power wiring is specified under Division 26 of the Specifications. Mechanical Contractor shall furnish all motor starters required for the control and protection of all motors furnished for the Division 22.
- D. All concrete pads and bases required for installing mechanical equipment are specified in another section of the Specifications. Advise the General Contractor as to the exact sizes required, location of anchor bolts, etc.
- E. Paint all mechanical equipment piping, supports and other exposed material. Do not paint equipment supplied with painted finish, such as the main mechanical equipment unless damaged during handling and installation. In such cases, use touch-up paint of the same type and color as original paint. Conform to requirements in other sections of the Specifications and match wall finish to the room in which installed.

1.03 CODES, FEES AND LATERAL COSTS

- A. Comply with all applicable codes, specifications, local ordinances, industry standards, utility company regulations, and the applicable requirements of the following latest nationally accepted codes and standards:
 - 1. Corning, Arkansas City Building Code.
 - 2. Arkansas State Mechanical Code.
 - 3. Arkansas State Plumbing Code.
 - 4. Arkansas Energy Code.
 - 5. IBC - International Building Code.
 - 6. IFC - International Fire Code; latest accepted edition.
 - 7. IGC - International Gas Code; latest accepted edition.
 - 8. IPC - International Plumbing Code; latest accepted edition.
 - 9. IMC - International Mechanical Code; latest accepted edition.
 - 10. IECC - International Energy Conservation Code; latest accepted edition.
 - 11. AMCA - Air Moving & Conditioning Association.
 - 12. ASA - American Standards Association.
 - 13. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.
 - 14. ASME - American Society of Mechanical Engineers.

15. ASTM - American Society of Testing Materials.
 16. AWWA - American Water Works Association.
 17. NBS - National Bureau of Standards.
 18. NEMA - National Electrical Manufacturers Association.
 19. NFPA - National Fire Protection Association.
 20. SMACNA - Sheet Metal & Air Conditioning Contractors' National Association.
 21. UL - Underwriters' Laboratories, Inc.
 22. AGA - American Gas Association.
 23. OSHA - Occupational Safety and Hazard Association.
 24. AABC - Associated Air Balance Councils.
 25. NEBB - National Environmental Balancing Bureau.
- B. Comply with State of Arkansas adopted ADA Accessible Guidelines in regard to accessible or handicapped features.
- C. In case of difference between building codes, Specifications, state Laws, local ordinances, industry standards and utility company regulations and the Contract Documents, the most stringent governs. Promptly notify the Engineer in writing of any such difference.
- D. Remove any work installed that does not comply with the requirements of the applicable building codes, state laws, local ordinances, industry standards, or utility company regulations, correct the deficiencies, and reinstall all work at no cost to the Owner.
- E. The mechanical drawings show the general arrangement of all piping, equipment and appurtenances. Follow as closely as actual building construction and the work of other trades will permit. Final layout will be governed by actual field conditions with all measurements verified at the site. Conform to the requirements shown on all of the drawings. General and structural drawings take precedence over mechanical drawings. Because of the small scale of the mechanical drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. Investigate the existing and finish conditions affecting the work and arrange the work accordingly, providing such fittings, valves and accessories as may be required to meet such conditions. Contractor shall verify that all equipment, ducts, pipes and all other components will fit in the space provided before fabrication or ordering.
- F. Obtain any and all required permits in connection with this work under the Contract and pay any and all fees in connection therewith. Arrange with the serving utility companies

for the connections to all utilities and pay all charges for same including inspection fees and meters if required. Refundable deposits will be paid by the Owner.

- G. Mechanical Contractor shall provide and install, where applicable, seismic restraints for all piping and duct systems per the latest accepted Building Code.

1.04 GUARANTEE

- A. Furnish a written certificate guaranteeing all materials, equipment and labor furnished to be free of all defects for a period of one (1) year from and after the date of final acceptance of the work by the Owner and further guarantee to replace such work without charges if any defects appear within the stipulated guaranty period.

1.05 SOIL CONDITIONS

- A. The Specifications and the drawings in no way imply the conditions of the soil to be encountered. When excavating may be required in execution of the work, this Contractor agrees that he has informed himself regarding conditions affecting the work.

1.06 INSPECTION OF PREMISES

- A. Before submitting a bid, visit the site of the proposed job and determine the conditions relating to this work.

1.07 UTILITIES, LOCATIONS AND ELEVATIONS

- A. Locations and elevations of the various utilities included within the scope of this work have been obtained from substantially reliable sources and are offered as a general guide only, without guarantee as to accuracy. Verify the location and elevation of all utilities and their relation to the work before entering into a contract.
- B. Identify outdoor underground lines with continuous strip of plastic utility marker tape at regular intervals (maximum of 10 feet) "Caution (state utility) pipe below". Install one foot directly above pipe before backfilling to grade.

1.08 EQUIPMENT NOT SPECIFIED UNDER DIVISION 22

- A. Equipment which requires plumbing and other mechanical connections may be specified in another division of this Specification. Under these conditions, provide necessary utilities including waste, water and natural gas.
- B. Rough-in work from approved shop drawings only.

PART 2 PRODUCTS

2.01 EQUIPMENT AND MATERIALS

- A. Provide new materials bearing the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material. Furnish the standard product of a manufacturer regularly engaged in the production of the required type of equipment. Provide the manufacturer's latest approved design.
- B. Deliver equipment and materials to the site and store in original containers, suitably sheltered from the elements, but readily accessible for inspection by the Engineer until installed. Store all items subject to moisture damage (such as controls) in dry, heated spaces.
- C. Provide equipment and materials of the same general type and of the same make throughout the work to provide uniform appearance, operation and maintenance.
- D. Tightly cover equipment and protect against dirt, water and chemical or mechanical injury and theft. At the completion of the work, clean fixtures, equipment and materials and polish thoroughly. Turn over to the Owner in a condition satisfactory to the Engineer. Repair damage or defects developing before acceptance of the work at no expense to the Owner.
- E. Insure that items to be furnished fit the space available. Make necessary field measurements to ascertain space requirements, including those for connections. Furnish and install such sizes and shapes of equipment that the final installation suits the true intent and meaning of the drawings and Specifications.
- F. Follow manufacturer's directions completely in the delivery, storage, protection and installation of all equipment and materials. Promptly notify the Engineer in writing of any conflicts between any requirements of the Contract Documents and the manufacturers' directions. Obtain the Engineer's written instruction before proceeding with the work. Replace any work that does not comply with the manufacturers' directions or such written instructions from the Engineer, at no cost to the Owner.
- G. Support all products by service organizations with adequate spare parts inventory and personnel located reasonably close to the site.
- H. Where multiple units of the same type or class of products are required, provide all units of the same manufacturer.

2.02 EQUIPMENT ACCESSORIES

- A. Furnish and install all equipment, accessories, connections and incidental items necessary to fully complete all work, ready for use, occupancy and operation by the Owner.

- B. Where equipment requiring different arrangement or connections from those shown is provided, install the equipment to operate properly and in harmony with the intent of the drawings and Specifications.
- C. Support, plumb, rigid and true to line, all work and equipment furnished. Study thoroughly all general, structural, electrical and mechanical drawings, shop drawings and catalog data to determine how equipment, fixtures, piping, ductwork, etc., are to be supported, mounted or suspended and provide extra steel bolts, inserts, pipe stands, brackets and accessories for proper supports whether or not shown on the drawings. When directed, submit drawings showing supports.
- D. If accessories are required to complete the work and meet the intent of the specification, it is the responsibility of the Contractor to provide such accessories.

2.03 MATERIAL AND EQUIPMENT SCHEDULE

- A. Submit to the Engineer as soon as practical, six (6) complete sets of the schedule of materials and equipment proposed for the installation, or electronic submittals as detailed below. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data and submit under one cover with an index sheet in front.
 - 1. If Electronic files are submitted, a complete set of the schedule of materials and equipment proposed for the installation shall be included. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data. All information shall be submitted electronically in "pdf" format, and shall be separated into electronic "pdf" files according to the corresponding specification section (i.e. "22 10 06 - Plumbing Specialties.pdf"). Unless incomplete submittals are authorized by the project engineer, all Division 22 submittals shall be electronically sent at one time. Without authorization, incomplete submittals shall be rejected.
- B. Provide written certification that shop drawings are in accordance with the specifications and are dimensionally correct with reference to available space.
- C. All submittals will be reviewed a maximum of two (2) times. The cost of additional submittal reviews beyond those two specified will be charged to the Contractor.
- D. Shop drawings for the Engineer's files are required on the following items:
 - 1. Commercial water heaters.
 - 2. Plumbing fixtures and floor drains.
 - 3. Water balance certification.
 - 4. Piping materials including valves.

5. Piping insulation materials.
6. Complete mechanical equipment electrical data and wiring details.

2.04 EQUIPMENT AND MATERIAL SUBSTITUTIONS

- A. It is the responsibility of the Contractor to investigate any desired substitutions for specified equipment prior to submission of his bid. The Mechanical Contractor shall be responsible for any changes required in mechanical, electrical, structural or vibration isolation systems and shall bear all cost for those changes whether the substitute equipment is named by manufacturer in the specifications or is submitted to the Architect for "or equal" consideration. All changes shall be accomplished in a manner acceptable to the Architect per Section 01 60 00 at no additional cost to the Owner.
- B. In order to obtain prior approval on equipment or material not specified in Division 22 Specifications or Equipment Schedules, Mechanical Contractor MUST submit to the Engineer any proposed equipment or material ten (10) working days prior to the bid date.
- C. If ANY substitute equipment is submitted to Engineer for approval, without said equipment having been pre-approved, the entire submittal will be rejected for resubmittal.
- D. Any equipment manufacturers which are a subsidiary to the listed acceptable manufacturers are not considered equal. Therefore, it is the responsibility of the Contractor and equipment supplier to obtain prior approval as described in paragraph 2.4, this Section.

2.05 ELECTRICAL MOTORS

- A. Provide motors of a recognized manufacturer, wound for the voltage specified, and in conformance to latest standards of the manufacturer and performance of the National Electrical Manufacturers Association and the Institute of Electrical and Electronic Engineers. Provide motors as manufactured by General Electric, Westinghouse, Century or Siemens-Allis, Baldor or approved equal.
- B. Provide motors rated for continuous duty at 100% of rated capacity and temperature raise of 40 degrees Centigrade open type; 50 degrees Centigrade drip and splash proof; 55 degrees Centigrade explosion proof and totally enclosed above an ambient of 40 degrees Centigrade.
- C. Unless otherwise required, provide integral horsepower, polyphase motors, Class B, general purpose, squirrel cage, open type induction motors, T-frame.
- D. Provide single phase fractional horsepower motors of the open capacitor type. Generally, motors under 1/2 horsepower may be split phase type unless otherwise specified. Provide motors rated 1/2 horsepower or less with integral overcurrent protection.

- E. Insure the insulation resistance between stator conductor and frames of motors is not less than 1/2 megohm. Provide shop test of motors including temperature rise, insulation resistance, motor terminal voltage, normal operating line current, RPMs, breaker or switch size with fusing and overload relay sizes.

PART 3 EXECUTION

3.01 COORDINATION OF WORK

- A. Compare the mechanical drawings and Specifications with the drawings and Specifications for other trades and report any discrepancies between them to the Engineer and obtain from him written instruction for changes necessary in the mechanical work. Install the mechanical work in cooperation with other trades installing inter-related work. Before installation, make proper provisions to avoid interferences in a manner approved by the Engineer. Make all changes required in the work caused either by neglect or existing field conditions at no cost to the Owner.
- B. It is the responsibility of the General Contractor, Mechanical Contractor, Electrical Contractor and Sprinkler Contractor to coordinate installation of all equipment. Equipment installed prior to proper coordination, which interferes with the harmony and intent of the specifications and drawings, will be removed and reinstalled at the cost of the responsible Contractor.
- C. Furnish anchor bolts, sleeves, inserts and supports required for the mechanical work. Locate anchor bolts, sleeves, inserts and supports as directed by the trade requiring them and insure that they are properly installed.
- D. Adjust locations of pipes, ducts, equipment fixtures, etc., to accommodate the work and for interferences anticipated and encountered. Determine the exact route and location of each pipe and duct prior to fabrication.
 - 1. New work and remodeled areas are to interface with existing facility services. Contractor to familiarize himself with the extent of the work prior to submitting his bid. Failure to gain familiarity will not be grounds for additional compensation.
 - 2. Provide right-of-way to lines that pitch over those that do not pitch. For example, Plumbing drains normally have right-of-way. Lines whose elevations cannot be changed have the right-of-way over lines whose elevations can be changed.
 - 3. Make offsets, transitions and changes in direction in pipes and ducts as required to maintain proper head room and pitch.
- E. Install all mechanical work to permit removal without damage to other parts, to coils, fan shafts and wheels, filters, belt guards, sheaves and drives and all other parts requiring

periodic replacement or maintenance. Arrange pipes, ducts and equipment to permit ready access to valves, cocks, traps, starters, motors, control components and to clear the openings of swinging and overhead doors and of access panels.

3.02 CHLORINATION OF DOMESTIC WATER LINES

- A. After the hot and cold water systems are complete, all fixtures connected, the system flushed out completely and the shut-off valve to the water main closed, fill the system with a solution containing 50 parts per million of available chlorine. Allow the solution to stand six (6) hours before flushing and returning to service.
- B. Then fill the system with a solution containing 100 parts per million of available chlorine. Allow this solution to stand two (2) hours before flushing and returning to service.
- C. Notify the Owner twenty-four hours prior to test so his representative can witness test. Obtain chemical analysis of the domestic water lines after chlorination from a Certified Chemist and submit the results of these tests to the Engineer and Owner.

3.03 RECORD DRAWINGS

- A. Maintain record drawings showing exact locations and sizes, as actually installed, of piping, drains, cleanouts, ductwork, controls and equipment as specified herein. Deliver to the Owner/Architect upon completion and acceptance of the work, one (1) complete set of contract drawings marked to indicate all deviations from intended installation.

3.04 CUTTING AND PATCHING

- A. The General Contractor shall be responsible for all required Building cutting, patching, etc., incidental to this work and shall make all required repairs thereafter to the satisfaction of the Engineer. Do not cut into any major structural element, beam or column without the written approval of the Engineer.
- B. The General Contractor shall cut, patch, repair and/or replace pavements, sidewalks, roads and curbs as required to permit the installation of the plumbing work and pay all expenses incurred for this work.
- C. Openings in fire or smoke barriers for air handling ductwork or air movement shall be protected in accordance with NFPA 90A and 90B and the Standard Mechanical Code.
- D. Pipes, conduits, cables, wires, air ducts, pneumatic tubes and ducts and similar handling service equipment that pass through fire or smoke barriers shall be protected in accordance with NFPA 101 by the plumbing contractor.
- E. All fire stopping assemblies must be UL approved assemblies.

3.05 EXCAVATION AND TRENCHING FOR PIPING

- A. Excavate to the depths indicated on the Drawings or as required to provide adequate slope and burial depth. Excavated materials not required or suitable for backfill or fill shall be removed from the site. Do such grading as is necessary to prevent surface water from flowing into trenches or other excavations. Water accumulating therein shall be removed by pumping or by other method. Sheet piling and shoring shall be installed as may be necessary for protection of the work and for safety of personnel. Excavation shall be by open cut except that short sections of a trench may be tunneled if the pipe can be safely and properly installed and backfill can be properly tamped in such tunnel sections.
- B. Trench Excavation: Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil. Where rock is encountered excavate to a minimum overdepth of 4" below trench depths indicated on the Drawings or specified. Overdepth in rock excavation and unauthorized overdepths shall be backfilled. Whenever wet or otherwise unstable soil incapable of properly supporting the pipe is encountered such soil shall be removed and the trench backfilled to proper grade as hereinafter specified.
- C. Depth of Cover: Trenches shall be of depth that will provide three feet (3') minimum cover for domestic water, fire lines, sanitary and storm sewers from existing grade or from indicated finish grade, whichever is lower, unless otherwise specifically shown.
- D. Utilities Locating: Locate existing utility lines prior to beginning any excavation
- E. Protection of Existing Utilities: Existing utility lines to be retained that are shown on the Drawings or the locations of which are made known to the Contractor prior to excavation, as well as all utility lines uncovered during excavation operations, shall be protected from damage during excavation and backfilling, and if damaged, shall be repaired by the Contractor, at his expense.
- F. Trenches shall not be backfilled until required pressure and other tests have been performed and until the utilities systems as installed conform to requirements of Drawings and Specifications.
- G. Backfill trenches with excavated materials consisting of earth, sandy clay, sand, gravel, soft shale or other approved materials, free from clods of earth or stones 2-1/2" maximum dimension, deposited in 6" layers and compacted to 95% Standard Proctor Compaction Test of the maximum laboratory density determined in accordance with ASTM D698, Moisture-Density Relation of Soils. If fills fail to meet the specified densities, the Contractor shall remove and re-compact the fill until specified densities are achieved. Compaction test shall be performed for each fifty linear feet of trench.

- H. Provide a 4-inch thick (minimum) layer of 3/4-inch No. 4 gravel aggregate bedding beneath all buried piping. Bedding shall be compacted and leveled to provide sloping required.
- I. Tests for displacement of sewers: After the trench has been backfilled to 2 feet or more above the pipe, if the pipe shows poor alignment, displaced pipe, or any other defects, such defects shall be remedied by the Contractor at his expense.

3.06 EQUIPMENT START-UP AND TESTING

- A. Instruct the Owner's operating personnel during start-up and separate operating tests of each major item of equipment. During the operating tests, prove the operation of each item of equipment to the satisfaction of the Engineer. Give at least seven (7) days notice to the Engineer of equipment start-up and operating tests.

3.07 CATALOG DATA FOR OWNER

- A. Provide, in looseleaf binders, two (2) sets of a compilation of catalog data of each manufactured item of equipment used in the mechanical work and present this compilation to the Owner/Architect for transmittal to the Owner before final payment is made. Include descriptive data and printed installation, operating and maintenance instructions for each item of equipment. Provide a complete double index as follows:
 - 1. Listing of products alphabetically by name.
 - 2. Listing the names of manufacturers whose products have been incorporated in the work alphabetically together with their addresses and the names and addresses of the local sales representatives.
 - 3. Certificates of Final Inspections.
 - 4. Complete spare parts data with current prices and supply sources.
 - 5. Extended warranties.
- B. Deliver to the Owner all special tools, lubricants, extra materials and any other products necessary for the proper operation and maintenance of the mechanical and plumbing systems.
- C. Provide project record documents indicating all changes from contract documents made during construction.
- D. Submit all Certificates of Final Inspections from the Administrative Authorities.
- E. Submit TAB reports on approved forms. Final TAB report submittals shall include all required rebalances if any are required.

- F. Submit to the Engineer as soon as practical, electronic closeout documents as detailed below.
 - 1. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data and submit under one cover with an index sheet in front. All information shall be submitted electronically in "pdf" format, and shall be separated into electronic "pdf" files.

3.08 INSTRUCTION OF OWNER'S REPRESENTATIVE

- A. Instruct the representative of the Owner in the proper operation and maintenance of all elements of the mechanical system.

3.09 PROTECTIVE COATINGS

- A. Paint exterior surfaces of steel piping run in or through concrete floor fill, under tile floors or underground, and aluminum surfaces in contact with masonry, with one coat of acid resisting bituminous base paint.

3.10 TEST AND ACCEPTANCE

- A. Water Piping System: Test with water at 100 psi for one (1) hour or with available city water pressure for twenty-four (24) hours to prove tight and free from leaks.
- B. Plumbing and Drainage System: Test the new system humidity and drain piping with water and prove tight. Test system with 10 feet of water for 24 hour period. Air test is not permitted.

3.11 NOISE CONTROL

- A. It is intended that the mechanical systems as installed under this contract be free from objectionable noise when the system is operating. The system shall operate at noise levels below criteria recommended for the application by ASHRAE. Provide vibration isolation accessories and isolate equipment, pipeline, ductwork, etc., as required so as to insure an acceptable noise level in all of the mechanical systems.

3.12 CLEANING AND ADJUSTING

- A. Do not allow waste material and rubbish to accumulate in or above the premises. After completion of this work, remove rubbish, tools, scaffolding and surplus materials from and about the building and leave all work clean and ready for use. Clean all equipment, pipes, valves and fittings of grease, metal cuttings and sludge. Repair any stoppage, discoloration or other damage to parts of the building, its finish or furnishings due to failure to properly clean the mechanical systems, without additional cost to the Owner. Adjust all automatic control devices for proper operation.

3.13 SYSTEM OPERATING TESTS

- A. After the successful completion of all equipment start-up and test requirements, perform the following tests on the complete mechanical systems:
1. First Operating Test by Contractor: Prove the operation of the mechanical systems and of each individual item in the systems. Give at least 10 days prior notice to the Engineer of such tests. Adjust and set proper quantities to all items and equipment. Should any item of the systems fail to perform in an approved manner, repeat this test until approved by the Engineer. During this test, balance circulation of heating and cooling water to balancing cocks, valves, thermostats and similar Items to insure that the mechanical systems perform as intended.
 2. Checking by Owner and Engineer: Following the successful completion of first operating tests by the Contractor, the Owner and the Engineer have the privilege of making such tests as they may desire during a period of three weeks to ascertain in detail if any corrections are to be made to the system. At the end of the testing by the Owner and the Engineer, the Engineer may direct the Contractor in writing to make such corrections to the systems as are within the scope of the contract.
 3. Contractor's Corrections to Systems: Make all required corrections to the systems and notify the Engineer in writing that the corrections outlined have been completed. Give at least seven (7) days notice of a final three-day operating test.
 4. Three-Day Operating Test: Perform an operating test to the satisfaction of the Engineer for a period of three (3) days. Should any element of the systems not perform properly, make all required corrections and repeat the test until successfully performed.
 - a. Submit the Form of Record proposed by the Contractor for the recording of all measurements to the Engineer for approval at least two weeks before the approved form will be required by the Contractor.
 - b. Measurements: Make the following measurements at two-hour intervals (5 measurements per 8-hour day) during the three-day operating test.
 - 1) Electrical: Running amperes and voltage of each motor 3/4 horsepower or larger.
 - 2) Air temperatures in each heated or air conditioned space and outdoor temperatures.
 - c. Instruments: Provide all instruments, materials and labor to perform the tests and to obtain and record the measurements specified herein, including the furnishing of all required record forms as approved by the Engineer. Submit

for the Engineer's approval, complete shop drawings or catalog data for all instruments to be used for the three day operating test and obtain approval at least two weeks before the instruments will be required for test measurements.

- d. Report: Submit four (4) copies of a written report of the three-day operating test on the approved Form of Record to the Engineer for approval and subsequent transmittal to the Owner.

3.14 MOTOR CONTROL

- A. General: Provide each motor 1/8 horsepower or larger with a suitable controller and devices that will perform the functions as specified for the respective motors, together with manual reset thermal overload, protection in each undergrounded conductor. Provide the controller either integral with circuit protective device or mounted in separate enclosure. Starters shall be Allen-Bradley, G.E., Westinghouse, Square D or approved equal.
- B. Control: Automatic control devices such as thermostats, float or pressure switches may control the starting and stopping of motor directly, provided the device used is designated for that purpose and has an adequate horsepower rating. When automatic control device does not have such a rating, use a magnetic starter with the automatic control device actuating the pilot control circuit. When combination manual and automatic control is specified and the control device operates the motor directly, provide a manual motor starter and selector switch. When combination manual and automatic control is specified and the automatic control device actuates the pilot control circuit, a magnetic control device actuates the pilot control provided. Provide all magnetic starters with push buttons or selector switches in the covers. Provide connections to the selector switch such that only the normal automatic regulating control devices will be bypassed when the switch is in the manual position. Connect all safety control devices, such as low or high pressure cutouts, high temperature cutouts and motor overload protective devices in the motor control circuit in both the manual and automatic positions of the selector switch control circuit. Make connections to any selector switch or to more than one (1) automatic regulatory control device in accordance with wiring diagrams recommended by the manufacturer and approved by the Engineer. Where required for manual control, provide push-button stations consisting of two (2) momentary contact operators, 600 volts, 10 amperes installed and wired for three wire control to provide under-voltage relays, auxiliary contacts or other devices required for a complete system.
- C. Location: Where the controller is located within sight of the motor driven equipment (fifty feet or less), the controller and circuit protective device shall be capable of being locked in the open position. Where the controller is located out of sight of the motor driven equipment (more than fifty feet) provide a non-fused safety disconnect, suitable for the

service, and which opens all ungrounded conductors simultaneously, at or on the motor driven equipment.

- D. Enclosure: Enclosure to be general purpose, NEMA Type 1 unless noted otherwise (NEMA Type 1 gasketed). The circuit breaker shall be operable by hand from outside the enclosure and shall be so interlocked with the door or doors that it must be returned to the "OFF" position before the door can be opened.
- E. Push-buttons: Provide maintained contact, standard duty type in a general purpose, NEMA Type 1 enclosure for surface mounting rated for 10 amperes continuous at 600 volts or less.

3.15 ACCESS PANELS

- A. Provide access panels as required in all walls, ceilings and ductwork to service and have access to all valves, and other operating parts. For all ceiling and wall access doors that are required in gypsum board and plaster, provide minimum 24" x 24", unless due to structural restraints the access door can be reduced to a minimum of 18" x 18", Milcor type appropriate for the construction involved.

3.16 DEMOLITION

- A. There are areas in the existing building in which demolition will have to be performed due to the requirements for remodeling. The demolition work involved is not fully described herein; however, the information given on the electrical and mechanical drawings and the information set out in the specifications will substantially serve to inform the mechanical Contractor as to the full extent of the demolition required.
- B. Contractor should visit job site to verify extent of demolition required to complete project.
- C. It is the intent of this Specification that all required demolition work be fully and completely performed and all work be accomplished in a neat and workmanlike manner.
- D. Remove all existing piping, fittings, heating, cooling, ventilation equipment that is required to accomplish the remodel work. All existing utilities that are disconnected shall be capped recessed in walls and floors. Contractor shall be responsible for visiting building and determining the extent of the demolition work. Contractor shall provide any necessary temporary piping required to keep existing building utilities (water, gas and sewer) in operation until new construction is completed to the extent that the new utilities can be reconnected.
- E. All rubbish, debris and expendable items resulting from demolition work shall be removed from the premises as it accumulates and disposed of at an off-site location by the Contractor.

3.17 SALVAGE

- A. Except as otherwise specified herein, or noted on drawings, the Contractor shall receive title to all building materials indicated to be demolished or removed which are not specifically designated as being retained by the Owner, said title to vest in the Contractor immediately upon receipt of Work Order. All salvage materials removed shall be taken from the premises promptly, as the storage of salvage materials on the site will not be permitted. Bidders shall take into account the salvage value to them of materials removed and such value shall be reflected in the bids.
- B. All items of usable equipment shall remain the property of the Owner. All such items of equipment which are to be removed and which are not to be reused shall be stored on the premises by the Contractor as directed by the Owner.
- C. Usable items shall be determined by the Owner and shall include existing heating and cooling pumps and other equipment so designated as "usable" by the Owner.

3.18 FINALLY

- A. It is the intention that this specification shall provide a complete installation except as herein before specifically excepted. All accessory construction and apparatus necessary or advantageous in the operation and testing of the work shall be included. The omission of specific reference to any part of the work necessary for such complete installation shall not be interpreted as relieving this Contractor from furnishing and installing such parts.

END OF SECTION 22 01 00

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe Markers.
- D. Ceiling tacks.

1.02 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

1.03 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number. Valve locations with tag numbers shall also be indicated on "as-built" drawings.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

- A. Pipe Markers: 3/4 inch (20 mm) diameter and higher.

2.02 IDENTIFICATION APPLICATIONS

- A. Instrumentation: Tags.

- B. Piping: Pipe markers.
- C. Small-sized Equipment: Tags.
- D. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.03 NAMEPLATES

- A. Manufacturers:
 - 1. Kolbi Pipe Marker Co.
 - 2. Seton Identification Products.
 - 3. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch (6 mm).
 - 3. Background Color: Black.
 - 4. Plastic: Conform to ASTM D709.

2.04 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving.
 - 2. Brady Corporation.
 - 3. Kolbi Pipe Marker Co.
 - 4. Seton Identification Products.
 - 5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch (40 mm) diameter.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch (40 mm) diameter with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame. Valve tag chart should indicate valve size, valve model and valve location. Valve locations with tag numbers shall also be indicated on "as-built" drawings.

2.05 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation.
 - 2. Kolbi Pipe Marker Co.
 - 3. MIFAB, Inc.
 - 4. Seton Identification Products.
 - 5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Comply with ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches (150 mm) wide by 4 mil (0.10 mm) thick, manufactured for direct burial service.
- F. Color code as follows:
 - 1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.
 - 2. Fire Quenching Fluids: Red with white letters.
 - 3. Combustible Fluids: Brown with white letters.

2.06 CEILING TACKS

- A. Manufacturers:
 - 1. Craftmark.
 - 2. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Color code as follows:
 - 1. Plumbing Valves: Green.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- D. Install metallic detection tape located approximately 12 inches above pipe, where in ground utility lines are buried outside building footprint. Tape shall be continuous and be marked, indicating utility type (ie. water, sewer, gas, electric, etc).
- E. Use tags on piping 3/4 inch (20 mm) diameter and smaller.
 - 1. Identify service, flow direction, and pressure.
 - 2. Install in clear view and align with axis of piping.
 - 3. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- F. Locate ceiling tacks to locate valves above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION 22 05 53

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flexible elastomeric cellular insulation.
- B. Piping insulation.
- C. Jackets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- C. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).
- D. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2019).
- E. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2019).
- F. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- G. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2017 (Reapproved 2023).
- H. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2023.
- I. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).

- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- K. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- L. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

1.04 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than five years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.
- B. Deliver material to job site in original non-broken factory packaging, labeled with manufacturer's density and thickness.

1.07 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.
- C. Perform work at ambient and equipment temperature as recommended by the adhesive manufacturer.

PART 2 PRODUCTS

2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

- A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, UL 723, or NFPA 255.

2.02 GLASS FIBER

- A. Manufacturers:
 - 1. Knauf Insulation.
 - 2. Johns Manville Corporation.
 - 3. Owens Corning Corp.
 - 4. CertainTeed Corporation.
 - 5. Armstrong World Industries, Inc.
 - 6. Rubatex Corp.
 - 7. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Insulation: ASTM C547 ; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. 'K' ('Ksi') value: ASTM C177, 0.24 at 75 degrees F (0.035 at 24 degrees C).
 - 2. Maximum service temperature: 650 degrees F (343 degrees C).
 - 3. Maximum moisture absorption: 0.2 percent by volume.
- C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches (0.029 ng/Pa s m).
- D. Tie Wire: 0.048 inch (1.22 mm) stainless steel with twisted ends on maximum 12 inch (300 mm) centers.
- E. Vapor Barrier Lap Adhesive:
 - 1. Compatible with insulation.
- F. Insulating Cement/Mastic:
 - 1. ASTM C195; hydraulic setting on mineral wool.
- G. Fibrous Glass Fabric:

1. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight.
 2. Blanket: 1.0 lb/cu ft (16 kg/cu m) density.
 3. Weave: 5x5.
- H. Indoor Vapor Barrier Finish:
1. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight.
 2. Vinyl emulsion type acrylic, compatible with insulation, white color.
- I. Outdoor Vapor Barrier Mastic:
1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- J. Outdoor Breather Mastic:
1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- K. Insulating Cement:
1. ASTM C449/C449M.

2.03 CELLULAR GLASS

- A. Manufacturers:
1. Pittsburgh Corning Corporation.
 2. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Insulation: ASTM C 552.
1. 'K' ('Ksi') value: 0.37 at 100 degrees F (0.053 at 38 degrees C).
 2. Service Temperature: Up to 900 degrees F (482 degrees C).
 3. Water Vapor Permeability: 0.005 perm inch (0.007 ng/Pa s m).
 4. Water Absorption: 0.2 percent by volume, maximum.

2.04 HYDROUS CALCIUM SILICATE

- A. Manufacturers:
1. Johns Manville Corporation.
 2. PABCO.
 3. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

- B. Insulation: ASTM C533 and ASTM C795; rigid molded, asbestos free, gold color.
 - 1. 'K' ('Ksi') value: 2 and C518; 0.40 at 300 degrees F (0.057 at 149 degrees C), when tested in accordance with 2 or 1.
- C. Tie Wire: 0.048 inch (1.22 mm) stainless steel with twisted ends on maximum 12 inch (300 mm) centers.
- D. Insulating Cement:
 - 1. ASTM C449/C449M.

2.05 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:
 - 1. Armacell International.
 - 2. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534 Grade 2; use molded tubular material wherever possible.
 - 1. 'K' ('Ksi') value: ASTM C 177; 0.27 at 75 degrees F (0.04 at 24 degrees C).
 - 2. Maximum Moisture Absorption - Pipe Insulation: 3.5 percent, by weight, when tested in accordance with ASTM D 1056.
 - 3. Maximum Moisture Absorption - Sheets: 6.0 percent, by weight, when tested in accordance with ASTM D 1056.
 - 4. Water Vapor Permeability: 0.20 perm-inches, when tested in accordance with ASTM E 96.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
 - 1. Air dried, contact adhesive, compatible with insulation.

2.06 JACKETS

- A. PVC Plastic.
 - 1. Manufacturers:
 - a. Johns Manville Corporation.
 - b. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
 - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.

- a. Minimum Service Temperature: 0 degrees F (-18 degrees C).
 - b. Maximum Service Temperature: 150 degrees F (66 degrees C).
 - c. Moisture Vapor Permeability: 0.002 perm inch (0.0029 ng/Pa s m), maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 15 mil (0.38 mm).
 - e. Connections: Pressure sensitive color matching vinyl tape.
3. Covering Adhesive Mastic:
- a. Compatible with insulation.
- B. Canvas Jacket: UL listed 6 oz/sq yd (220 g/sq m) plain weave cotton fabric treated with dilute fire retardant lagging adhesive.
1. Lagging Adhesive:
 - a. Compatible with insulation.
- C. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
1. Thickness: 0.016 inch (0.40 mm) sheet.
 2. Finish: Embossed.
 3. Joining: Longitudinal slip joints and 2 inch (50 mm) laps.
 4. Fittings: 0.016 inch (0.4 mm) thick die shaped fitting covers with factory attached protective liner.
 5. Metal Jacket Bands: 3/8 inch (10 mm) wide; 0.015 inch (0.38 mm) thick aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.
- C. Repair all insulation that is damaged during construction using the same materials.

3.02 INSTALLATION

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

- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. For hot piping conveying fluids 140 degrees F (60 degrees C) or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- G. Inserts and Shields:
 - 1. Application: Piping 1 inch (MISSING TEXT) diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert location: Between support shield and piping and under the finish jacket.
 - 4. Insert configuration: Minimum 6 inches (150 mm) long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 - 5. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- I. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces: Finish with PVC jacket and fitting covers.
- J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet (3 meters) above finished floor): Finish with PVC jacket and fitting covers.
- K. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh

reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

- L. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil (0.025 mm) thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.

3.03 SCHEDULES

A. Plumbing Systems:

- 1. Domestic Hot Water Supply:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: 2 inch and under: 1 inch thickness.
 - 2) Pipe Size Range: 2-1/2 inch and larger: 1-1/2 inch thickness.
 - 3) Thickness: 1/2 inch (in interior walls).
- 2. Domestic Cold Water Supply:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: 2 inch and under: 1 inch thickness.
 - 2) Pipe Size Range: 2-1/2 inch and larger: 1 inch thickness.
 - 3) Thickness: 1/2 inch (in interior walls).
- 3. Sanitary Piping Above Ceilings:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: all sizes.
 - 2) Thickness: 1 inch.

B. Cooling Systems:

- 1. Condensate Drains from Cooling Coils: 1/2 inch thickness; cellular insulation.
- 2. Refrigerant Suction: 3/4 inch thickness; cellular insulation.
- 3. Refrigerant Hot Gas: 3/4 inch thickness; cellular insulation.

END OF SECTION 22 07 19

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, valves, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Flanges, unions, and couplings.
 - 4. Valves.
 - 5. Flow controls.
 - 6. Check.
 - 7. Water pressure reducing valves.
 - 8. Relief valves.
 - 9. Strainers.

1.02 RELATED REQUIREMENTS

- A. Section 22 01 00 - General Plumbing Provisions.
- B. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
- C. Section 22 07 19 - Piping Insulation.

1.03 REFERENCE STANDARDS

- A. ANSI Z21.22 - American National Standard for Relief Valves for Hot Water Supply Systems; 2015 (Reaffirmed 2020).
- B. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250; 2021.
- C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- D. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2018.
- E. ASME B31.9 - Building Services Piping; 2020.
- F. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2023.

- G. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- H. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2021.
- I. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023a.
- J. ASTM B32 - Standard Specification for Solder Metal; 2020.
- K. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2020.
- L. ASTM B75/B75M - Standard Specification for Seamless Copper Tube; 2011.
- M. ASTM C4 - Standard Specification for Clay Drain Tile and Perforated Clay Drain Tile; 2004 (Reapproved 2014).
- N. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.
- O. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; latest accepted edition.
- P. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020.
- Q. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2020.
- R. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing; 2020.
- S. ASTM D2846/D2846M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems; 2019a.
- T. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020.
- U. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2023.
- V. ASTM D3517 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe; 2019.
- W. ASTM F437 - Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80; 2021.

- X. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).
- Y. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2021.
- Z. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2017, with Errata (2018).
- AA. AWWA C950 - Fiberglass Pressure Pipe; 2020.
- BB. MSS SP-67 - Butterfly Valves; 2022.
- CC. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends; 2018.
- DD. MSS SP-78 - Gray Iron Plug Valves, Flanged and Threaded Ends; 2011.
- EE. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves; 2019.
- FF. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .

1.04 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Project Record Documents: Record actual locations of valves.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Perform Work in accordance with Arkansas, city of Corning standards.
- C. Valves: Manufacturer's name and pressure rating marked on valve body.
- D. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations.
- E. Welder Qualifications: Certified in accordance with ASME (BPV IX).
- F. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 REGULATORY REQUIREMENTS

- A. Perform Work in accordance with State of Arkansas, and city of Corning plumbing code.

- B. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.07 DELIVERY, STORAGE, AND HANDLING

- 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.

1.08 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 SANITARY SEWER PIPING, BURIED BEYOND 5 FEET (1500 MM) OF BUILDING

- A. Cast Iron Pipe: ASTM A74 service weight.
 - 1. Fittings: Cast iron.
 - 2. Joint Seals: ASTM C 564 neoprene gaskets.
- B. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.
 - 2. Joints: Pipe sizes 4 inches or less: Solvent welded, with ASTM D 2564 solvent cement.
 - 3. Joints: Pipe sizes greater than 4 inch: Push-on, using ASTM F477 elastomeric gaskets.

2.02 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING

- A. Cast Iron Pipe: ASTM A74 service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C 564 neoprene gaskets.
- B. Cast Iron Pipe: CISPI 301, hubless.

1. Fittings: Cast iron.
 2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.
- C. PVC Pipe: ASTM D2665 or ASTM D3034.
1. Fittings: PVC.
 2. Joints: Pipe sizes 4 inch and smaller: Solvent welded, with ASTM D 2564 solvent cement.
 3. Joints: Pipe sizes greater than 4 inch: Push-on, using ASTM F477 elastomeric gaskets.

2.03 SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: ASTM A74, service weight.
1. Fittings: Cast iron.
 2. Joint Seals: ASTM C 564 neoprene gaskets.
- B. Cast Iron Pipe: CISPI 301, hubless, service weight.
1. Fittings: Cast iron.
 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- C. PVC Pipe: ASTM D2665.
1. Fittings: PVC.
 2. Joints: Solvent welded, with ASTM D2564 solvent cement.
- D. In Fire-rated Walls:
1. Cast iron.
 - a. Fittings: Cast iron.
- E. In Plenum-rated Areas:
1. Cast iron.
 - a. Fittings: Cast iron.

2.04 WATER PIPING, BURIED BEYOND 5 FEET (1500 MM) OF BUILDING

- A. Ductile Iron Pipe: AWWA C151/A21.51.

1. Fittings: AWWA C110, ductile or gray iron, standard thickness.
 2. Joints: AWWA C111/A21.11, rubber gasket with 3/4 inch (19 mm) diameter rods.
- B. Copper Pipe: ASTM B42, hard drawn.
1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
 2. Joints: ASTM B 32, alloy Sn95 solder.
- C. PVC SDR 21: pipe shall be manufactured from a Type I, Grade I Polyvinyl Chloride (PVC) compound with a Cell Classification of 12454 per ASTM D1784.
1. Fittings: PVC.
 2. Joints: Solvent welded, with ASTM D 2564 solvent cement.

2.05 WATER PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING

- A. Copper Pipe: ASTM B42, hard drawn Type "K".
1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
 2. Joints: AWS A5.8M/A5.8, BCuP copper/silver braze.

2.06 WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 2. Joints: ASTM B32, alloy Sn95 solder or mechanical press-fit couplings.

2.07 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches (80 mm) and Under:
1. Ferrous pipe: Class 150 malleable iron threaded unions.
 2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Flanges for Pipe Size Over 1 Inch (25 mm):
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.
- E. Victaulic Devices:
1. Couplings shall consist of a one or more piece ductile or malleable iron cast housing, a synthetic rubber gasket of a central cavity pressure-responsive design, with nuts, bolts, locking toggle or lugs to secure unit together.
 - a. Coupling housings shall be cast of ductile iron conforming to ASTM A-536 (Grade 65-45-12) or malleable iron conforming to ASTM A-47 (Grade 32510), hot dip galvanized to ASTM A-153, or zinc electroplated to ASTM B-633, as manufactured by Victaulic Company of America. Refer to Victaulic product specifications for other materials.
 - b. Coatings shall consist of an alkyd enamel paint, or hot-dip galvanizing to ASTM A-153, or zinc electroplating to ASTM B-633, as specified.
 2. Couplings for grooved end steel pipe shall be Victaulic couplings for grooved end steel pipe.
 - a. Line, fittings and valve joints shall be Victaulic flexible (styles 75, 77, 78, or 791) or rigid (styles 005, 07 or HP-70).
 - b. Rigid joints shall be Victaulic style 07 "Zero-Flex", style HP-70 or style 005 "FireLock" couplings.
 - c. Pin assembled joints shall be Victaulic style 791 "Vic-Boltless" couplings.
 - d. Reducing joints shall be Victaulic style 750 Reducing Couplings for pipe to pipe joints or to create reducing fittings using straight fitting configurations.
 - e. Outlets: All joints designated Outlet Couplings, or where feasible to replace reducing outlet tees, shall be Victaulic style 72 Outlet Couplings (specify grooved, female or male threaded outlet).

- f. Flanged Connections shall be Victaulic style 741 (2-24") "Vic-Flange" adapters, engaging directly into grooved pipe and bolting directly to ANSI Class 125 cast iron and Class 150 steel flanged components or style 743 (2-12") for ANSI Class 300 flanged components; installer to supply standard flange bolts.
 - g. Quick disconnects shall be Victaulic style 78 "Snap-Joint" Couplings or style 780/781 for double grooved pipe.
3. Gasket shall be molded of synthetic rubber in a central cavity, pressure-responsive configuration conforming to the pipe outside diameter and coupling housing, of elastomers having properties as designated in ASTM D-2000. Reference shall always be made to the latest published Selection Guide for Victaulic Gaskets for proper gasket selection for the intended service.
- a. Water service: Gasket supplied for water services from -30 degrees F to +230 degrees F, shall be a Grade "E" EPDM compound, with green color code, molded of materials conforming to ASTM D-2000, designation 2CA615A25B24F17Z, recommended for hot water service within the specified temperature range, plus a variety of dilute acids, oil-free air, and many chemical services. Not recommended for petroleum services.
4. Bolts and nuts shall be heat treated carbon steel, track head, conforming to physical properties of ASTM A-183 minimum tensile 110,000 psi, black, or zinc electroplated to ASTM B-633, as supplied or specified.
5. Fittings shall be Victaulic full flow cast fittings, steel fittings or segmentally welded fittings with grooves or shoulders designed to accept Victaulic grooved end couplings.
- a. Standard fittings shall be cast of ductile iron conforming to ASTM A-536 (Grade 65-45-12), or malleable iron conforming to ASTM A-47, Grade 32510, painted with alkyd enamel or hot-dip galvanized to ASTM A-153 or zinc electroplated to ASTM B-633 or cadmium plated to ASTM A-165 as required.
 - b. Standard steel fittings including large size elbows (16-24") shall be forged steel conforming to ASTM A-234 Grade WPB (0.375" wall), painted with alkyd enamel or hot-dip galvanized to ASTM A-153.
6. Branch outlets for hole cut steel pipe shall be Victaulic hole cut products.
7. Branch outlets shall be made with Victaulic style 920, 921 or 929 "Mechanical-T" branch connections with locating collar or foot engaging into hole. (Specify outlet/branch connection type - grooved, female threaded or FIT, as available.)

8. Sprinkler head connections: Branch connections, direct sprinkler head connections, drop nipples and sprigs shall be made with Victaulic style 922 "Hooker" outlet connections with locating collar engaging into hole, assembled with standard plated breakaway head bolt (specify 1/2, 3/4 or 1" female threaded outlet).
9. Gauge, meter outlets for hole cut steel pipe shall be Victaulic strapless mechanical outlet products style 923 "Vic-Let" or 924 "Vic-O-Well" and shall provide a pipe outlet without a need for a strap or lower housing to wrap around the pipe.
10. Flow indicators for hole cut steel pipe shall be Victaulic style 736 Waterflow Indicators for wet sprinkler systems, to sense water flow to 10 GPM or greater.
11. Fittings for plain end steel pipe shall be Victaulic FIT fittings (sizes 1", 1 1/4", 1 1/2" and 2") with internal pipe stop for uniform takeout dimensions, 1/4-turn positive locking lugs of heat treated carbon steel conforming to AISI C-1022, cadmium plated, with externally locked-position indicator for inspection or connection of plain end steel pipe. FIT fittings shall have self-contained, pressure responsive gaskets: for water service (-30 degrees to +230 degrees F) Grade "E"; FIT silicone Grade "L" (-30 degrees to +160 degrees F) are recommended for fire protection dry systems, all systems operating below 0 degrees F, plus dry heat, air without hydrocarbons, certain chemical services and water to +160 degrees F. FIT Nitrile gaskets Grade "T" (0 degrees to +180 degrees F) are recommended for petroleum products, hydrocarbons, air without hydrocarbons, except hot dry air over +140 degrees F, vegetable and mineral oils within the specified temperature range. Not recommended for hot water services.
12. Reducing outlet tees shall be Victaulic FIT style 96 with female threaded outlet (specify 1/2, 3/4 or 1" outlet) for direct sprinkler head, sprig or drop nipple connections.
13. 90 degree elbows shall be Victaulic FIT style 969.
14. FIT Outlet/Mechanical-T shall be Victaulic FIT style 929 with FIT locking lug branch outlet (specify 1 1/4, 1 1/2 or 2" outlet) for direct branch connections.
15. Straight tees shall be Victaulic FIT style 963.
16. Straight couplings shall be Victaulic FIT style 960.
17. Reducing elbows shall be Victaulic FIT style 966 with female threaded outlet (specify 1/2, 3/4, or 1" outlet) for direct sprinkler head, sprig or drop nipple connections.

2.08 MECHANICALLY FORMED TEE FITTINGS

- A. Mechanically extracted outlets shall have a height not less than three times the thickness of the branch tube wall.
- B. Branch tubes shall not restrict the flow in the main tube. Mechanical Contractor shall insure the branch tube penetration into the collar is of the correct depth.
- C. Mechanically formed tee fittings shall be cleaned and brazed with filler material conforming to AWS A5.8.

2.09 PRESS FITTINGS

- A. Fittings shall comply with NSF 61, CSA, UPC and be approved by the local jurisdiction. Wrot copper press fittings shall be made from commercially pure copper mill products per ASTM B 75 Alloy C12200. Cast copper alloy press fittings shall be made from materials with a minimum of 78% copper and a maximum of 15% zinc. The press fittings connections shall be compatible with seamless K, L or M copper tube made to ASTM B 88. Fittings shall have a maximum non-shock working pressure of 200 PSI between the temperatures of -20°F and +250°F. Elastomeric seals shall be made of EPDM material, and the fittings shall be manufactured with an inboard bead design. All fittings shall be installed in accordance with the manufacturer's installation instructions and according to local plumbing and mechanical codes. The press-to-connect joint shall be made with pressing tools and jaw sets recommended and authorized by press fitting manufacturer.

2.10 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
- B. Plumbing Piping - Drain, Waste, and Vent:
 - 1. Conform to ASME B31.9.
 - 2. Hangers for Pipe Sizes 1/2 Inch (15 mm) to 1-1/2 Inches (40 mm): Carbon steel, adjustable swivel, split ring.
 - 3. Hangers for Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
 - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 5. Wall Support for Pipe Sizes to 3 Inches (80 mm): Cast iron hook.
 - 6. Wall Support for Pipe Sizes 4 Inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.

7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Plumbing Piping - Water:

1. Conform to ASME B31.9.
2. Hangers for Pipe Sizes 1/2 Inch (15 mm) to 1-1/2 Inches (40 mm): Carbon steel, adjustable swivel, split ring.
3. Hangers for Cold Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 2 Inches (50 mm) to 4 Inches (100 mm): Carbon steel, adjustable, clevis.
5. Hangers for Hot Pipe Sizes 6 Inches (150 mm) and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.
6. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches (150 mm) and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.
8. Wall Support for Pipe Sizes to 3 Inches (80 mm): Cast iron hook.
9. Wall Support for Pipe Sizes 4 Inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.
10. Vertical Support: Steel riser clamp.
11. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
12. Floor Support for Hot Pipe Sizes to 4 Inches (100 mm): Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
13. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.11 GATE VALVES

A. Manufacturers:

1. Conbraco Industries.
2. Nibco, Inc.
3. Milwaukee Valve Company.
4. Crane Co.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Up To and Including 2 1/2 Inches:

1. MSS SP-80, Class 125, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder or threaded ends.

C. 3 Inches and Larger:

1. MSS SP-70, Class 125, iron body, bronze trim, outside screw and yoke, handwheel, solid wedge disc, flanged ends. Provide chain wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.12 GLOBE VALVES

A. Manufacturers:

1. Conbraco Industries.
2. Nibco, Inc.
3. Milwaukee Valve Company.
4. Crane Co.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Up To and Including 2 1/2 Inches:

1. MSS SP-80, Class 125, bronze body, bronze trim, handwheel, bronze disc, solder or threaded ends.

C. 3 Inches and Larger:

1. MSS SP-85, Class 125, iron body, bronze trim, handwheel, outside screw and yoke, renewable bronze plug-type disc, renewable seat, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.13 BALL VALVES

A. Manufacturers:

1. Conbraco Industries.
 2. Nibco, Inc.
 3. Milwaukee Valve Company.
 4. Crane Co.
- B. Construction, 4 Inches (100 mm) and Smaller: MSS SP-110, Class 150, 400 psi (2760 kPa) CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, threaded ends with union.

2.14 PLUG VALVES

- A. Manufacturers:
1. Conbraco Industries.
 2. Nibco, Inc.
 3. Milwaukee Valve Company.
 4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Construction 2-1/2 Inches (65 mm) and Larger: 1, 250 psi (_____ kPa) CWP, cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.

2.15 BUTTERFLY VALVES

- A. Manufacturers:
1. Hammond Valve.
 2. Crane Co.
 3. Milwaukee Valve Company.
 4. Stockham.
 5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Construction 1-1/2 Inches (40 mm) and Larger: MSS SP-67, 200 psi (1380 kPa) CWP, cast or ductile iron body, elastomer coated ductile iron disc, resilient replaceable EPDM seat, wafer ends, extended neck, 10 position lever handle.
- C. Provide gear operators for valves 6 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

2.16 FLOW CONTROLS

- A. Manufacturers:
 - 1. ITT Bell & Gossett.
 - 2. Griswold Controls.
 - 3. Taco, Inc.
 - 4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet , blowdown/backflush drain.
- C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi (24 kPa).

2.17 SWING CHECK VALVES

- A. Manufacturers:
 - 1. Hammond Valve.
 - 2. Nibco, Inc.
 - 3. Milwaukee Valve Company.
 - 4. Crane Co.
 - 5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Up to 2 Inches (50 mm):
 - 1. 1, Class 125, bronze body and cap, bronze swing disc with rubber seat, solder or threaded ends.
- C. Over 2 Inches (50 mm):
 - 1. 1, Class 125, iron body, bronze swing disc, renewable disc seal and seat, flanged or grooved ends.

2.18 SPRING LOADED CHECK VALVES

- A. Manufacturers:
 - 1. Hammond Valve.
 - 2. Crane Co.

3. Milwaukee Valve Company.
 4. Stockham.
 5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Class 125, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

2.19 WATER PRESSURE REDUCING VALVES

- A. Manufacturers:
1. Amtrol Inc.
 2. Cla-Val Co.
 3. Watts Regulator Company.
 4. Spence Engineering Co.
 5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Up to 2 Inches (50 mm):
1. MSS SP-80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.
- C. Over 2 Inches (50 mm):
1. MSS SP-85, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.

2.20 RELIEF VALVES

2.21 STRAINERS

2.22 RELIEF VALVES

- A. Pressure Relief:
1. Manufacturers:
 - a. Cla-Val Co.
 - b. Henry Technologies.
 - c. Watts Regulator Company.
 - d. Spence Engineering Co.

- e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
 - 2. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled.
- B. Temperature and Pressure Relief:
- 1. Manufacturers:
 - a. Cla-Val Co.
 - b. Henry Technologies.
 - c. Watts Regulator Company.
 - d. Spence Engineering Co.
 - e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
 - 2. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F (98.9 degrees C), capacity ASME (BPV IV) certified and labelled.

2.23 STRAINERS

- A. Manufacturers:
- 1. Armstrong International, Inc.
 - 2. Green Country Filtration.
 - 3. WEAMCO.
 - 4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Size 1-1/2 inch (40 mm) to 4 inch (100 mm):
- 1. Class 125, flanged iron body, Y pattern with 1/16 inch (1.6 mm) stainless steel perforated screen.
- C. Size 5 inch (125 mm) and Larger:
- 1. Class 125, flanged iron body, basket pattern with 1/8 inch (3.2 mm) stainless steel perforated screen.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 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.

3.03 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 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. Refer to Section 22 0719.
- H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.
- I. Establish elevations of buried piping outside the building to ensure not less than 3 ft (____ m) 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 weather proof hood.
- Q. Install water piping to ASME B31.9.
- R. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- S. Sleeve pipes passing through partitions, walls and floors.
- T. 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 (100 mm).
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.
- U. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Support horizontal piping as scheduled.
 - 3. Install hangers to provide minimum 1/2 inch (15 mm) space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches (300 mm) of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch (40 mm) minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

8. Provide copper plated hangers and supports for copper piping.
 9. Provide hangers adjacent to motor driven equipment with vibration isolation.
 10. Support cast iron drainage piping at every joint.
- V. Where water pressure within the building exceeds 75 psi static, install an approved water-pressure reducing valve conforming to ASSE 1003 with strainer to reduce the building pressure to 75 psi static or less.

3.04 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 ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.
- F. Provide flow controls in water recirculating systems where indicated.
- G. All sanitary waste and vent pipe installed above grade in fire-rated walls, fire-rated plenum spaces or return air plenums shall be cast iron.

3.05 TOLERANCES

- A. Drainage Piping: Maintain invert elevations within 1/4 inch vertically of location indicated on drawings. Slope to drain at minimum of 1/4 inch per foot slope for pipes 3 inch and smaller and 1/8 inch per foot slope for pipes larger than 3 inch.
- B. Contractor must maintain inverts as indicated on the drawings. The contractor shall employ the latest precision technology available to insure the accuracy of the installation. If the contractor is unable to maintain, the contractor should notify the engineer IMMEDIATELY to obtain direction.
- C. Water Piping: Slope at minimum of 1/32 inch per foot (1:400) and arrange to drain at low points.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect water distribution system in accordance with Arkansas state and local codes.
- B. Prior to starting work, verify system is complete, flushed and clean.

- C. 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).
- D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- I. 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.

3.07 SERVICE CONNECTIONS

- A. Provide new sanitary sewer services. 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. Connection of dissimilar pipe materials shall be made with the specified adapter couplings.
- C. Sewers shall be encased or cradled in concrete where shown on the plans or as directed by the Engineer. Unless otherwise noted on the plans, concrete encasement shall encircle the pipe and shall be a minimum thickness of four inches.

3.08 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe size: 1/2 inches (15 mm) to 1-1/4 inches (32 mm):
 - 1) Maximum hanger spacing: 8 ft.
 - 2) Hanger rod diameter: 1/4 inch.
 - b. Pipe size: 1-1/2 inches (40 mm) to 2 inches (50 mm):
 - 1) Maximum hanger spacing: 8 ft.
 - 2) Hanger rod diameter: 1/4 inch.
 - c. Pipe size: 2-1/2 inches (65 mm) to 3 inches (75 mm):

- 1) Maximum hanger spacing: 8 ft.
- 2) Hanger rod diameter: 3/8 inch.
- d. Pipe size: 4 inches (100 mm) to 6 inches (150 mm):
 - 1) Maximum hanger spacing: 8 ft.
 - 2) Hanger rod diameter: 3/8 inch.
- e. Pipe size: 8 inches (200 mm) to 12 inches (300 mm):
 - 1) Maximum hanger spacing: 10 ft.
 - 2) Hanger rod diameter: 1/2 inch.
- f. Pipe size: 14 inches and Over (350 mm and Over):
 - 1) Maximum hanger spacing: 10 ft.
 - 2) Hanger rod diameter: 7/8 inch..
2. Plastic Piping:
 - a. All sizes:
 - 1) Maximum hanger spacing: 6 ft (1.8 m).
 - 2) Hanger rod diameter: 3/8 inch (9 mm).

END OF SECTION 22 10 05

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Floor drains
- B. Cleanouts.
- C. Hydrants.
- D. Water hammer arrestors.
- E. Thermostatic mixing valves.

1.02 RELATED REQUIREMENTS

- A. Section 22 10 05 - Plumbing Piping.
- B. Section 22 40 00 - Plumbing Fixtures.
- C. Section 22 30 00 - Plumbing Equipment.

1.03 REFERENCE STANDARDS

- A. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent; 2021.
- B. PDI-WH 201 - Water Hammer Arresters; 2017.

1.04 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- D. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
- E. Project Record Documents: Record actual locations of equipment and cleanouts
_____.
- F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

- G. Product Data: Manufacturer's standard data sheets describing components including materials, dimensions, relationship to adjacent construction, and attachments.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than five years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 DRAINS

- A. Manufacturers:

1. Josam Company.
2. Jay R. Smith Manufacturing Company.
3. Zurn Industries, Inc.
4. Wade Tyler Pipe.
5. MIFAB, Inc.
6. Watts Water Technologies.
7. Striem, Edwardsville, KS USA
8. Schier Products Company, Edwardsville, KS USA
9. Substitutions: See Section 22 10 00 - General Plumbing Provisions.

- B. Floor Drain:

1. ASME A112.6.3; lacquered cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable round nickel bronze strainer with removable perforated sediment bucket.

- C. Floor Sink:

1. Square lacquered cast iron body with integral seepage pan, epoxy coated interior, aluminum dome strainer, clamp collar, sediment bucket; and nickel bronze frame; half grate.

2.02 CLEANOUTS

A. Manufacturers:

1. Jay R. Smith Manufacturing Company.
2. Josam Company.
3. Ward Manufacturing, Inc.
4. Zurn Industries, Inc.
5. Wade Tyler Pipe.
6. Watts Water Technologies.
7. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Cleanouts at Exterior Surfaced Areas:

1. Round cast nickel bronze access frame and non-skid cover.

C. Cleanouts at Exterior Unsurfaced Areas:

1. Line type with lacquered cast iron body and round epoxy coated gasketed tractor-type cover.

D. Cleanouts at Interior Finished Wall Areas:

1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

2.03 HYDRANTS

A. Manufacturers:

1. Jay R. Smith Manufacturing Company.
2. Zurn Industries, Inc.
3. Wade Tyler Pipe.
4. Woodford.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Wall Hydrants:

1. ASSE 1019; freeze resistant, self-draining type with chrome plated lockable recessed box hose thread spout, lockshield and removable key, and integral vacuum breaker.

2.04 BACKFLOW PREVENTERS

A. Manufacturers:

1. Conbraco Industries.
2. Valve Solutions, Inc.
3. Watts Regulator Company.
4. Zurn Industries, Inc.
5. FEBCO.
6. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Reduced Pressure Backflow Preventers:

1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

2.05 WATER HAMMER ARRESTORS

A. Manufacturers:

1. Jay R. Smith Manufacturing Company.
2. Watts Regulator Company.
3. Zurn Industries, Inc.
4. Wade Tyler Pipe.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Water Hammer Arrestors:

1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range -100 to 300 degrees F (-73 to 149 degrees C) and maximum 250 psi (1700 kPa) working pressure.

2.06 MIXING VALVES

A. Thermostatic Mixing Valves:

1. Manufacturers:
 - a. ESBE.
 - b. Leonard Valve Company.
 - c. Honeywell Water Controls.
 - d. Powers Process Controls.
 - e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
2. Valve: Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment.
3. Accessories:
 - a. Check valve on inlets.
 - b. Volume control shut-off valve on outlet.
 - c. Stem thermometer on outlet.
 - d. Strainer stop checks on inlets.
4. Cabinet: 16 gage (1.5 mm) stainless steel, for surface mounting with keyed lock.

B. Pressure Balanced Mixing Valves:

1. Manufacturers:
 - a. Delta Faucet Company.
 - b. H.G. Specialties.
 - c. Powers Process Controls.
 - d. Taconova.
 - e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
2. Valve: Chrome plated cast brass body, stainless steel cylinder, integral temperature adjustment.
3. Accessories:

- a. Volume control shut-off valve on outlet.
- b. Stem thermometer on outlet.
- c. Strainer stop checks on inlets.
- d. Cabinet: 16 gage (1.5 mm) stainless steel, for surface mounting with keyed lock.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished 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. Refer to plans for detail.
- D. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; janitor rooms, flush valves, interior and exterior hose bibbs.
- E. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatories, sinks, and water closets.
- F. Install components in accordance with manufacture's instructions and approved product data submittals.

END OF SECTION 22 10 06

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Lead-free plumbing solder.

1.02 RELATED SECTIONS

- A. Section 22 10 05 - Plumbing Piping.
- B. Section 22 40 00 - Plumbing Fixtures.
- C. Section 22 30 00 - Plumbing Equipment.

1.03 REFERENCES

- A. ASTM B 32 - Standard Specification for Solder Metal; 1996.
- B. NSF 61 - Drinking Water System Components - Health Effects; 2002 (ANSI/NSF 61).

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: The Harris Products Group
- B. Substitutions: See Section 22 01 00 - General Plumbing Provisions for equipment and material substitutions.
- C. Provide all plumbing solder from a single manufacturer.

2.02 MATERIALS

- A. Plumbing Solder: Sterling® solder or equal, ASTM B 32, Alloy Grade TC; 95 percent tin, 4.85 percent copper, 0.15 percent selenium.
 - 1. Certified to comply with NSF 61.
 - 2. Melting Temperature: 410 degrees F. (210 degrees C)
 - 3. Tensile Strength: 7,130 psi (49.2 MPa).
 - 4. Shear Strength: 5,979 psi (41.3 MPa).
 - 5. Elongation Percent: 19.1.
 - 6. Brinell Hardness: 15.1.

7. Burst Strength: 5,800 psi (40.0 MPa).
 8. Pressure/Temperature Test Data on Copper Tube Assemblies comprised of 3 inch (75 mm), 2 inch (50 mm), 1 inch (25 mm), 3/4 inch (19 mm), and 1/2 inch (12.7 mm) Tubing with a Reducing Tee:
 - a. No leaks at 70 degrees F. (21 degrees C), 200 psi (14,060 g/sq. cm), held for 2 minutes.
 - b. No leaks at 180 degrees F. (82 degrees C), 200 psi (14,060 g/sq. cm), held for 2 minutes.
 - c. No leaks at 70 degrees F. (21 degrees C), 2,000 psi (140,600 g/sq. cm), held for 5 minutes.
- B. No lead in plumbing solder.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Apply plumbing solder in accordance with manufacturer's recommendations.

END OF SECTION 22 10 08

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water heaters.

1.02 RELATED REQUIREMENTS

- A. Division 26 - Equipment wiring; electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. Comply with State of Arkansas adopted ADA Accessible Guidelines in regard to accessible or handicapped features.
- B. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2023.
- C. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.04 SUBMITTALS

- A. See Section 22 01 00 - General Plumbing Provisions, for submittals procedures.
- B. Product Data:
 - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - 2. Provide electrical characteristics and connection requirements.
- C. Shop Drawings:
 - 1. Indicate heat exchanger dimensions, size of tappings, and performance data.
 - 2. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.
- D. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.
- B. Standards: Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:
 - 1. National Sanitation Foundation (NSF).
 - 2. American Society of Mechanical Engineers (ASME).
 - 3. National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).
 - 4. National Electrical Manufacturers' Association (NEMA).
 - 5. Underwriters Laboratories (UL).

1.06 CERTIFICATIONS

- A. Water Heaters: NSF approved.
- B. Conform to AGA requirements for water heaters.
- C. Pressure Vessels for Heat Exchangers: ASME labeled, to ASME (BPV VIII, 1).
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.08 WARRANTY

- A. Provide five year manufacturer warranty for domestic water heaters.
- B. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

PART 2 PRODUCTS

2.01 WATER HEATER MANUFACTURERS

- A. Tank Type Water Heater Manufacturers
 - 1. A.O. Smith Water Products Co.
 - 2. State Industries.
 - 3. Rheem Manufacturing Company.

4. Bock Water Heaters, Inc.
5. Lochinvar, LLC.
6. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

2.02 COMMERCIAL ELECTRIC WATER HEATERS

- A. Type: Factory-assembled and wired, electric, vertical storage.
- B. Performance:
 1. As specified in drawing schedule.
- C. Electrical Characteristics:
- D. As specified in drawing schedule.
- E. Tank: Glass lined welded steel; 4 inch (100 mm) diameter inspection port, thermally insulated with minimum 2 inches (50 mm) glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.
- F. Controls: Automatic immersion water thermostat; externally adjustable temperature range from 60 to 180 degrees F (16 to 82 degrees C), flanged or screw-in nichrome elements, high temperature limit thermostat.
- G. Accessories: Provide:
 1. Water connections: Brass.
 2. Dip tube.
 3. Drain Valve.
 4. Anode: Magnesium.
 5. Temperature and Pressure Relief Valve: ASME labelled.
 6. Provide approved manufacturer's drain pan or shop fabricated 24 gage galvanized steel drain pan.

2.03 DIAPHRAGM-TYPE COMPRESSION TANKS

- A. Manufacturers:
 1. Amtrol Inc.
 2. ITT Bell & Gossett.
 3. Taco, Inc.

- 4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Construction: Welded steel, tested and stamped in accordance with ASME (BPV VIII, 1); supplied with National Board Form U-1, rated for working pressure of 125 psig (860 kPa), with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.
- C. Accessories: Pressure gage and air-charging fitting, tank drain; precharge to 12 psig (80 kPa).
- D. Size: Refer to plans or as required to match system volume.

PART 3 EXECUTION

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.
- B. Install water heaters in accordance with manufacturer's instructions and to AGA or UL requirements.
- C. Coordinate with plumbing piping and related fuel piping and electrical work to achieve operating system.

3.02 SCHEDULES

- A. Water Heaters:
 - 1. Refer to plan schedule.

END OF SECTION 22 30 00

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water closets.
- B. Tank type water closets.
- C. Lavatories.
- D. Service sinks.

1.02 RELATED REQUIREMENTS

- A. Section 22 10 05 - Plumbing Piping.
- B. Section 22 10 06 - Plumbing Specialties.
- C. Section 22 30 00 - Plumbing Equipment.
- D. Division 26 - Equipment wiring, electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. Comply with State of Arkansas adopted ADA Accessible Guidelines in regard to accessible or handicapped features.
- B. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008 (Reaffirmed 2013).
- C. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).
- D. ASME A112.18.1 - Plumbing Supply Fittings; 2018, with Errata.
- E. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2018, with Errata.
- F. NSF 372 - Drinking Water System Components - Lead Content; 2022.

1.04 SUBMITTALS

- A. Section 22 01 00 - General Plumbing Provisions: Procedures for submittals.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

- C. Manufacturer's Instructions: Indicate installation methods and procedures.
- D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- 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.

1.08 WARRANTY

- A. Provide five year manufacturer warranty for drinking fountain.
- B. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 TANK TYPE WATER CLOSETS

- A. Tank Type Water Closet Manufacturers:
 - 1. American Standard Inc.
 - 2. Eljer, Inc.
 - 3. Kohler Company.
 - 4. Sloan.
- B. Floor-Mounted Bowl:

1. ASME A112.19.2; vitreous china, powerwash rim, insulated vitreous china closet tank with fittings and lever flushing valve, bolt caps.
 2. Water Consumption: 1.28 gal (4.8 L) per flush, maximum.
- C. Seat Manufacturers:
1. Bemis Manufacturing Company.
 2. Church Seat Company.
 3. Olsonite.

2.03 LAVATORIES

- A. Lavatory Manufacturers:
1. American Standard Inc.
 2. Zurn Industries, Inc.
 3. Kohler Company.
 4. Sloan.
 5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Vitreous China Wall Hung Basin:
1. ASME A112.19.2; vitreous china wall hung lavatory, with 4 inch high back, rectangular basin with front overflow.
 - a. Drilling Centers: 4 inch (100 mm).
- C. Supply Faucet Manufacturers:
1. Sloan Valve Company.
 2. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- D. Metered Faucet: ASME A112.18.1; chrome plated metered mixing faucet with low voltage operated solenoid operator and infrared sensor, aerator and cover plate, open grid strainer.
- E. Accessories:
1. Chrome plated 17 gage (1.3 mm) brass P-trap with clean-out plug and arm with escutcheon.
 2. Offset waste with plug and strainer where required.

3. Wheel handle stops.
 4. Rigid supplies.
 5. Carrier:
 - a. Manufacturers:
 - 1) JOSAM Company.
 - 2) Sloan Valve Company.
 - 3) Zurn Industries, Inc.
 - 4) Watts Water Technologies.
 - 5) Substitutions: See Section 22 01 00 - General Plumbing Provisions.
 - b. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs.
- F. All lavatory faucets shall be listed to ASSE 1070 for temperature and pressure protection with a maximum control flow of 0.5 gpm (2.2 lpm). Faucet shall feature a single cartridge design for ease of repair and maintenance and shall provide an approach temperature of no greater than 5°F (3°C). Faucet shall include integral check valves to prevent cross flow and shall be in compliance with the American with Disabilities Act (ADA). Faucet shall feature ceramic disc mixing and shall be constructed using Lead Free material.

2.04 ELECTRIC WATER COOLERS

- A. Electric Water Cooler Manufacturers:
 1. Tri Palm International/Oasis.
 2. Elkay Manufacturing Company.
 3. Haws Corporation.
 4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.
- B. Water Cooler: ARI 1010; split level handicapped mounted electric water cooler with stainless steel top, vinyl on steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket, refrigerated with integral air cooled condenser and stainless steel grille.
- C. Capacity: 8 gpm (____ L/s) of 50 degree F (10 degree C) water with inlet at 80 degree F (27 degree C) and room temperature of 90 degree F (32 degree C), when tested in accordance with ASHRAE Std 18.

- D. Electrical: Maximum 1/5 hp (____ kW) compressor, 6 foot (2 m) cord and plug for connection to electric wiring system including grounding connector.

2.05 SERVICE SINKS

A. Service Sink Manufacturers:

1. Elkay Manufacturing Company.
2. American Standard. Inc..
3. Williams.
4. Crane-Fiat.
5. Florestone
6. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Bowl:

1. 24 x 24 x 12 inch high white terrazzo, floor mounted, with two inch wide shoulders, vinyl bumper guard, stainless steel strainer.

C. Trim:

1. ASME A112.18.1 exposed wall type supply with cross handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps, hot and cold water supply check valves, and adjustable threaded wall flanges.

D. Accessories:

1. 5 feet (1.5 m) of 1/2 inch (13 mm) diameter plain end reinforced rubber hose.
2. Hose clamp hanger.
3. Mop hanger.
4. 20 ga. stainless steel splash catcher panels for all adjacent walls.

PART 3 EXECUTION

3.01 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.

3.02 PREPARATION

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

3.03 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid supplies to fixtures with hand wheel stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall carriers and bolts.
- E. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 92 00, color to match fixture
- F. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.
- G. Install handicap valve handles to the accessible side.
- H. Provide HandiLav or approved equal molded trap and supply insulation kit for all exposed drain and supply handicap lavatories.
- I. Acrylic one piece showers to be installed inset into concrete to meet ADA requirements. Contractor shall coordinate slab relief to meet these requirements.
- J. Install a check valve in the hot and cold water supply lines at every service sink.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

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

3.05 ADJUSTING

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

3.06 CLEANING

- A. Clean plumbing fixtures and equipment.

3.07 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.
- B. Repair or replace damaged products before Date of Substantial Completion.

3.08 SCHEDULES

- A. Fixture Heights: Install fixtures to heights above finished floor as indicated.

- 1. Water Closet:

- a. Standard: 15 inches (380 mm) to top of bowl rim.
 - b. Accessible: 18 inches (455 mm) to top of seat.
 - c. Youth: Refer to Architectural Plans.

- 2. Water Closet Flush Valves:

- a. Standard: 11 inches (280 mm) min. above bowl rim.

- 3. Urinal:

- a. Standard: 22 inches (560 mm) to top of bowl rim.
 - b. Accessible: 17 inches (430 mm) to top of bowl rim.

- 4. Lavatory:

- a. Standard: 31 inches (785 mm) to top of basin rim.
 - b. Accessible: 34 inches (865 mm) maximum to top of basin rim.
 - c. Youth: Refer to Architectural Plans.

- B. Minimum fixture rough-in sizes or as required for particular fixtures.

- 1. Water Closet (Flush Valve Type):

- a. Cold Water: 1 Inch (25 mm).
 - b. Waste: 4 Inch (100 mm).
 - c. Vent: 2 Inch (50 mm).

- 2. Water Closet (Tank Type):

- a. Waste: 4 Inch (100 mm).
 - b. Vent: 2 Inch (50 mm).

3. Urinal (Flush Valve Type):
 - a. Cold Water: 3/4 Inch (20 mm).
 - b. Waste: 2 Inch (50 mm).
 - c. Vent: 1-1/2 Inch (40 mm).
4. Lavatory:
 - a. Hot Water: 1/2 Inch (15 mm).
 - b. Cold Water: 1/2 Inch (15 mm).
 - c. Waste: 1-1/2 Inch (40 mm).
 - d. Vent: 1-1/4 Inch (32 mm).
5. Service Sink:
 - a. Hot Water: 1/2 Inch (15 mm).
 - b. Cold Water: 1/2 Inch (15 mm).
 - c. Waste: 3 Inch (80 mm).
 - d. Vent: 2 Inch.
6. Shower:
 - a. Hot Water: 1/2 Inch (15 mm).
 - b. Cold Water: 1/2 Inch (15 mm).
 - c. Waste: 2 Inch (40 mm).
 - d. Vent: 2 Inch (32 mm).

END OF SECTION 22 40 00

PART 23
HEATING, VENTILATING AND AIR
CONDITIONING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The work covered by Division 23 sections consist of furnishing all labor, equipment, appliances and material for the heating, air conditioning, piping and plumbing systems in strict accordance with Codes, Specifications and the applicable drawings and subject to the terms and conditions of the contract. Include all appurtenances necessary to the proper operation of the systems and equipment specified.
- B. General Contractor shall install all concrete pads and bases required for installing mechanical equipment. Mechanical Contractor is responsible for the exact sizes required, location of anchor bolts, etc.
- C. Some equipment may be furnished by other divisions. Mechanical Contractor is responsible to check the drawings and specifications for equipment that will be furnished by the Owner. Furnish the duct, insulation, controls, etc., on all equipment furnished by other divisions.
- D. General Contractor shall furnish and install all ceiling access panels required to service mechanical equipment, valves and controls above gyp board or hidden spline ceilings.

1.02 RELATED SECTIONS

- A. The General Conditions and Division 1, General Requirements, as bound in the specification preamble, apply to all work under Division 23. Carefully note its contents in performance of the work.
- B. The Architectural, Plumbing, Electrical, and Structural plans and Specifications, including Information to Bidders and other pertinent documents issued by the Engineer are a part of this Specifications and the accompanying mechanical plans. Comply with them in every respect. Examine all the above carefully. Failure to comply does not relieve the Contractor of responsibility nor may it be used as a basis for additional compensation due to omission of architectural, electrical and structural details from the mechanical drawings.
- C. All electrical power wiring is specified under Division 26 of the Specifications. Mechanical Contractor shall furnish all motor starters required for the control and protection of all motors furnished for the Division 23. Provide and install all automatic temperature and interlock wiring required for controlling mechanical equipment furnished under Division 23, in compliance with Division 26 of the Project Manual.

- D. All concrete pads and bases required for installing mechanical equipment are specified in another section of the Specifications. Advise the General Contractor as to the exact sizes required, location of anchor bolts, etc.

1.03 CODES, FEES AND LATERAL COSTS

- A. Comply with all applicable codes, specifications, local ordinances, industry standards, utility company regulations, and the applicable requirements of the following latest nationally accepted codes and standards:
1. Corning, Arkansas City Building Code.
 2. Arkansas State Mechanical Code; latest accepted edition.
 3. Arkansas State Plumbing Code; latest accepted edition.
 4. Arkansas Energy Code; latest accepted edition.
 5. IBC - International Building Code; latest accepted edition.
 6. IFC - International Fire Code; latest accepted edition.
 7. IGC - International Gas Code; latest accepted edition.
 8. IMC - International Mechanical Code; latest accepted edition.
 9. IPC - International Plumbing Code; latest accepted edition.
 10. IECC - International Energy Conservation Code
 11. AMCA - Air Moving & Conditioning Association.
 12. ASA - American Standards Association.
 13. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.
 14. ASME - American Society of Mechanical Engineers.
 15. ASTM - American Society of Testing Materials.
 16. AWWA - American Water Works Association.
 17. NBS - National Bureau of Standards.
 18. NEMA - National Electrical Manufacturers Association.

19. NFPA - National Fire Protection Association.
 20. SMACNA - Sheet Metal & Air Conditioning Contractors' National Association.
 21. UL - Underwriters' Laboratories, Inc.
 22. AGA - American Gas Association.
 23. OSHA - Occupational Safety and Hazard Association.
 24. AABC - Associated Air Balance Councils
 25. NEBB - National Environmental Balancing Bureau
- B. Comply with State of Arkansas adopted ADA Accessible Guidelines in regard to accessible or handicapped features.
- C. In case of difference between building codes, Specifications, state Laws, local ordinances, industry standards and utility company regulations and the Contract Documents, the most stringent governs. Promptly notify the Engineer in writing of any such difference.
- D. Remove any work installed that does not comply with the requirements of the applicable building codes, state laws, local ordinances, industry standards, or utility company regulations, correct the deficiencies, and reinstall all work at no cost to the Owner.
- E. The mechanical drawings show the general arrangement of all piping, equipment and appurtenances. Follow as closely as actual building construction and the work of other trades will permit. Final layout will be governed by actual field conditions with all measurements verified at the site. Conform to the requirements shown on all of the drawings. General and structural drawings take precedence over mechanical drawings. Because of the small scale of the mechanical drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. Investigate the existing and finish conditions affecting the work and arrange the work accordingly, providing such fittings, valves and accessories as may be required to meet such conditions. Contractor shall verify that all equipment, ducts, pipes and all other components will fit in the space provided before fabrication or ordering.
- F. Obtain any and all required permits in connection with this work under the Contract and pay any and all fees in connection therewith. Arrange with the serving utility companies for the connections to all utilities and pay all charges for same including inspection fees and meters if required. Refundable deposits will be paid by the Owner.

1.04 GUARANTEE

- A. Furnish a written certificate guaranteeing all materials, equipment and labor furnished to be free of all defects for a period of one (1) year from and after the date of final acceptance of the work by the Owner and further guarantee to replace such work without charges if any defects appear within the stipulated guaranty period.

1.05 SOIL CONDITIONS

- A. The Specifications and the drawings in no way imply the conditions of the soil to be encountered. When excavating may be required in execution of the work, this Contractor agrees that he has informed himself regarding conditions affecting the work.

1.06 INSPECTION OF PREMISES

- A. Before submitting a bid, visit the site of the proposed job and determine the conditions relating to this work.

1.07 UTILITIES, LOCATIONS AND ELEVATIONS

- A. Locations and elevations of the various utilities included within the scope of this work have been obtained from substantially reliable sources and are offered as a general guide only, without guarantee as to accuracy. Verify the location and elevation of all utilities and their relation to the work before entering into a contract.
- B. Identify outdoor underground lines with continuous strip of plastic utility marker tape at regular intervals (maximum of 10 feet) "Caution (state utility) pipe below". Install one foot directly above pipe before backfilling to grade.

1.08 EQUIPMENT NOT SPECIFIED UNDER DIVISION 23

- A. Equipment which requires plumbing and other mechanical connections may be specified in another division of this Specification. Under these conditions, provide necessary utilities including waste, water, natural gas, duct, insulation and controls.
- B. Rough-in work from approved shop drawings only.

PART 2 PRODUCTS

2.01 EQUIPMENT AND MATERIALS

- A. Provide new materials bearing the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material. Furnish the

standard product of a manufacturer regularly engaged in the production of the required type of equipment. Provide the manufacturer's latest approved design.

- B. Deliver equipment and materials to the site and store in original containers, suitably sheltered from the elements, but readily accessible for inspection by the Engineer until installed. Store all items subject to moisture damage (such as controls) in dry, heated spaces.
- C. Provide equipment and materials of the same general type and of the same make throughout the work to provide uniform appearance, operation and maintenance.
- D. Tightly cover equipment and protect against dirt, water and chemical or mechanical injury and theft. At the completion of the work, clean fixtures, equipment and materials and polish thoroughly. Turn over to the Owner in a condition satisfactory to the Engineer. Repair damage or defects developing before acceptance of the work at no expense to the Owner.
- E. Insure that items to be furnished fit the space available. Make necessary field measurements to ascertain space requirements, including those for connections. Furnish and install such sizes and shapes of equipment that the final installation suits the true intent and meaning of the drawings and Specifications.
- F. Follow manufacturer's directions completely in the delivery, storage, protection and installation of all equipment and materials. Promptly notify the Engineer in writing of any conflicts between any requirements of the Contract Documents and the manufacturers' directions. Obtain the Engineer's written instruction before proceeding with the work. Replace any work that does not comply with the manufacturers' directions or such written instructions from the Engineer, at no cost to the Owner.
- G. Support all products by service organizations with adequate spare parts inventory and personnel located reasonably close to the site.
- H. Where multiple units of the same type or class of products are required, provide all units of the same manufacturer.

2.02 EQUIPMENT ACCESSORIES

- A. Furnish and install all equipment, accessories, connections and incidental items necessary to fully complete all work, ready for use, occupancy and operation by the Owner.
- B. Where equipment requiring different arrangement or connections from those shown is provided, install the equipment to operate properly and in harmony with the intent of the drawings and Specifications.

- C. Support, plumb, rigid and true to line, all work and equipment furnished. Study thoroughly all general, structural, electrical, fire suppression and mechanical drawings, shop drawings and catalog data to determine how equipment, fixtures, piping, ductwork, etc., are to be supported, mounted or suspended and provide extra steel bolts, inserts, pipe stands, brackets and accessories for proper supports whether or not shown on the drawings. When directed, submit drawings showing supports.
- D. If accessories are required to complete the work and meet the intent of the specification, it is the responsibility of the Contractor to provide such accessories.

2.03 MATERIAL AND EQUIPMENT SCHEDULE

- A. Submit to the Engineer as soon as practical, six (6) complete sets of the schedule of materials and equipment proposed for the installation, or electronic submittals as detailed below. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data and submit under one cover with an index sheet in front.
 - 1. If Electronic files are submitted, a complete set of the schedule of materials and equipment proposed for the installation shall be included. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data. All information shall be submitted electronically in "pdf" format, and shall be separated into electronic "pdf" files according to the corresponding specification section (i.e. "23 40 00 - Air Cleaning Devices.pdf"). Unless incomplete submittals are authorized by the project engineer, all Division 23 submittals shall be electronically sent at one time. Without authorization, incomplete submittals shall be rejected.
- B. Provide written certification that shop drawings are in accordance with the specifications and are dimensionally correct with reference to available space.
- C. All submittals will be reviewed a maximum of two (2) times. The cost of additional submittal reviews beyond those two specified will be charged to the Contractor.
- D. Shop drawings for the Engineer's files are required on the following items:
 - 1. Air Handling Units
 - 2. Air Cooled Condensing Units.
 - 3. Filters.
 - 4. Exhaust Fans.
 - 5. Grilles and Registers.
 - 6. Starters.

7. Air Balance Certification.
8. Ductwork Materials Including Duct Accessories.
9. Duct Insulation Materials.
10. Complete Mechanical Equipment Electrical Data and Wiring Details.

2.04 EQUIPMENT AND MATERIAL SUBSTITUTIONS

- A. It is the responsibility of the Contractor to investigate any desired substitutions for specified equipment prior to submission of his bid. The Mechanical Contractor shall be responsible for any changes required in mechanical, electrical, structural or vibration isolation systems and shall bear all cost for those changes whether the substitute equipment is named by manufacturer in the specifications or is submitted to the Architect for "or equal" consideration. All changes shall be accomplished in a manner acceptable to the Architect per Section 01 60 00 at no additional cost to the Owner.
- B. In order to obtain prior approval on equipment or material not specified in Division 23 Specifications or Equipment Schedules, Mechanical Contractor MUST submit to the Engineer any proposed equipment or material ten (10) working days prior to the bid date.
- C. If ANY substitute equipment is submitted to Engineer for approval, without said equipment having been pre-approved, the entire submittal will be rejected for resubmittal.
- D. Any equipment manufacturers which are a subsidiary to the listed acceptable manufacturers are not considered equal. Therefore, it is the responsibility of the Contractor and equipment supplier to obtain prior approval as described in paragraph 2.4, this Section.

2.05 ELECTRICAL MOTORS

- A. Provide motors of a recognized manufacturer, wound for the voltage specified, and in conformance to latest standards of the manufacturer and performance of the National Electrical Manufacturers Association and the Institute of Electrical and Electronic Engineers. Provide motors as manufactured by General Electric, Westinghouse, Century or Siemens-Allis, Baldor or approved equal.
- B. Provide motors rated for continuous duty at 100% of rated capacity and temperature raise of 40 degrees Centigrade open type; 50 degrees Centigrade drip and splash proof; 55 degrees Centigrade explosion proof and totally enclosed above an ambient of 40 degrees Centigrade.

- C. Unless otherwise required, provide integral horsepower, polyphase motors, Class B, general purpose, squirrel cage, open type induction motors, T-frame.
- D. Provide single phase fractional horsepower motors of the open capacitor type. Generally, motors under 1/2 horsepower may be split phase type unless otherwise specified. Provide motors rated 1/2 horsepower or less with integral overcurrent protection.
- E. Insure the insulation resistance between stator conductor and frames of motors is not less than 1/2 megohm. Provide shop test of motors including temperature rise, insulation resistance, motor terminal voltage, normal operating line current, RPMs, breaker or switch size with fusing and overload relay sizes.

PART 3 EXECUTION

3.01 COORDINATION OF WORK

- A. Compare the mechanical drawings and Specifications with the drawings and Specifications for other trades and report any discrepancies between them to the Engineer and obtain from him written instruction for changes necessary in the mechanical work. Install the mechanical work in cooperation with other trades installing inter-related work. Before installation, make proper provisions to avoid interferences in a manner approved by the Engineer. Make all changes required in the work caused either by neglect or existing field conditions at no cost to the Owner.
- B. It is the responsibility of the General Contractor, Plumbing Contractor, Mechanical Contractor and Electrical Contractor, and Sprinkler Contractor to coordinate installation of all equipment. Equipment installed prior to proper coordination, which interferes with the harmony and intent of the specifications and drawings, will be removed and reinstalled at the cost of the responsible Contractor.
- C. Furnish anchor bolts, sleeves, inserts and supports required for the mechanical work. Locate anchor bolts, sleeves, inserts and supports as directed by the trade requiring them and insure that they are properly installed.
- D. Slots, chases, openings and recesses in existing structure shall be cut, patched and repaired by the Contractor.
- E. Adjust locations of pipes, ducts, equipment fixtures, etc., to accommodate the work and for interferences anticipated and encountered. Determine the exact route and location of each pipe and duct prior to fabrication.

1. Provide right-of-way to lines that pitch over those that do not pitch. For example, Plumbing drains normally have right-of-way. Lines whose elevations cannot be changed have the right-of-way over lines whose elevations can be changed.
 2. Make offsets, transitions and changes in direction in pipes and ducts as required to maintain proper head room and pitch.
- F. Install all mechanical work to permit removal without damage to other parts, to coils, fan shafts and wheels, filters, belt guards, sheaves and drives and all other parts requiring periodic replacement or maintenance. Arrange pipes, ducts and equipment to permit ready access to valves, cocks, traps, starters, motors, control components and to clear the openings of swinging and overhead doors and of access panels.
- G. Change the cross sectional dimensions of ductwork when required to meet job conditions, but maintain at least the same equivalent cross sectional area. Secure the approval of the Engineer prior to fabrication of ductwork requiring such changes. Sizes shown on the plans are clear dimensions; add for internal insulation if specified.

3.02 RECORD DRAWINGS

- A. Maintain record drawings showing exact locations and sizes, as actually installed, of piping, drains, cleanouts, ductwork, controls and equipment as specified herein. Deliver to the Owner/Architect upon completion and acceptance of the work, one (1) complete set of contract drawings marked to indicate all deviations from intended installation.
- B. Record drawings shall be provide in hard copy form, as well as, on a DVD in PDF form.

3.03 CUTTING AND PATCHING

- A. The General Contractor shall be responsible for all required cutting, patching, etc., incidental to this work and shall make all required repairs thereafter to the satisfaction of the Engineer. Do not cut into any major structural element, beam or column without the written approval of the Engineer.

3.04 EQUIPMENT START-UP AND TESTING

- A. Instruct the Owner's operating personnel during start-up and separate operating tests of each major item of equipment. During the operating tests, prove the operation of each item of equipment to the satisfaction of the Engineer. Give at least seven (7) days notice to the Engineer of equipment start-up and operating tests.

3.05 CATALOG DATA FOR OWNER

- A. Provide, in looseleaf binders, two (2) sets of a compilation of catalog data of each manufactured item of equipment used in the mechanical work and present this compilation to the Owner/Architect for transmittal to the Owner before final payment is made. Include descriptive data and printed installation, operating and maintenance instructions for each item of equipment. Provide a complete double index as follows:
 - 1. Listing of products alphabetically by name.
 - 2. Listing the names of manufacturers whose products have been incorporated in the work alphabetically together with their addresses and the names and addresses of the local sales representatives.
 - 3. Certificates of Final Inspections.
 - 4. Complete spare parts data with current prices and supply sources.
 - 5. Extended warranties.
- B. Deliver to the Owner all special tools, lubricants, extra materials and any other products necessary for the proper operation and maintenance of the mechanical and plumbing systems.
- C. Provide project record documents indicating all changes from contract documents made during construction.
- D. Submit all Certificates of Final Inspections from the Administrative Authorities.
- E. Submit TAB reports on approved forms. Final TAB report submittals shall include all required rebalances if any are required.

3.06 INSTRUCTION OF OWNER'S REPRESENTATIVE

- A. Instruct the representative of the Owner in the proper operation and maintenance of all elements of the mechanical system. Spend not less than five (5) days in such formal instruction and additional time as directed by the Engineer to fully prepare the Owner to operate and maintain the mechanical equipment.
- B. Provide classroom and hands-on training of Owner's designated personnel on operation and maintenance of the HVAC system, control system, and all equipment items indicated. Provide the following training as required to fully qualify the Owner's designated personnel. All training must be video taped to a CD and a copy included in each operation and maintenance closeout manual.

1. Air Handling Units: ____ hours.
2. Air Cooled Condensrs: hours
3. Return Fan/Relief Fan: hours

3.07 PROTECTIVE COATINGS

- A. Paint exterior surfaces of steel piping run in or through concrete floor fill, under tile floors or underground, and aluminum surfaces in contact with masonry, with one coat of acid resisting bituminous base paint.
- B. Paint all exposed galvanized ducts behind grilles flat black.

3.08 NOISE CONTROL

- A. It is intended that the mechanical systems as installed under this contract be free from objectionable noise when the system is operating. The system shall operate at noise levels below criteria recommended for the application by ASHRAE. Provide vibration isolation accessories and isolate equipment, pipeline, ductwork, etc., as required so as to insure an acceptable noise level in all of the mechanical systems.

3.09 CLEANING AND ADJUSTING

- A. Do not allow waste material and rubbish to accumulate in or above the premises. After completion of this work, remove rubbish, tools, scaffolding and surplus materials from and about the building and leave all work clean and ready for use. Clean all equipment, pipes, valves and fittings of grease, metal cuttings and sludge. Repair any stoppage, discoloration or other damage to parts of the building, its finish or furnishings due to failure to properly clean the mechanical systems, without additional cost to the Owner. Adjust all automatic control devices for proper operation.

3.10 SYSTEM OPERATING TESTS

- A. After the successful completion of all equipment start-up and test requirements, perform the following tests on the complete mechanical systems:
 1. First Operating Test by Contractor: Prove the operation of the mechanical systems and of each individual item in the systems. Give at least 10 day prior notice to the Engineer of such tests. Adjust and set proper quantities to all items and equipment. Should any item of the systems fail to perform in an approved manner, repeat this test until approved by the Engineer. During this test, balance circulation

of heating and cooling water to balancing cocks, valves, thermostats and similar Items to insure that the mechanical systems perform as intended.

2. Checking by Owner and Engineer: Following the successful completion of first operating tests by the Contractor, the Owner and the Engineer have the privilege of making such tests as they may desire during a period of three weeks to ascertain in detail if any corrections are to be made to the system. At the end of the testing by the Owner and the Engineer, the Engineer may direct the Contractor in writing to make such corrections to the systems as are within the scope of the contract.
3. Contractor's Corrections to Systems: Make all required corrections to the systems and notify the Engineer in writing that the corrections outlined have been completed. Give at least seven (7) days notice of a final three-day operating test.
4. Three-Day Operating Test: Perform an operating test to the satisfaction of the Engineer for a period of three (3) days. Should any element of the systems not perform properly, make all required corrections and repeat the test until successfully performed.
 - a. Submit the Form of Record proposed by the Contractor for the recording of all measurements to the Engineer for approval at least two weeks before the approved form will be required by the Contractor.
 - b. Measurements: Make the following measurements at two-hour intervals (5 measurements per 8-hour day) during the three-day operating test.
 - 1) Electrical: Running amperes and voltage of each motor 3/4 horsepower or larger.
 - 2) Air temperatures in each heated or air conditioned space and outdoor temperatures.
 - c. Instruments: Provide all instruments, materials and labor to perform the tests and to obtain and record the measurements specified herein, including the furnishing of all required record forms as approved by the Engineer. Submit for the Engineer's approval, complete shop drawings or catalog data for all instruments to be used for the three day operating test and obtain approval at least two weeks before the instruments will be required for test measurements.
 - d. Report: Submit four (4) copies of a written report of the three-day operating test on the approved Form of Record to the Engineer for approval and subsequent transmittal to the Owner.

3.11 MOTOR CONTROL

- A. General: Provide each motor 1/8 horsepower or larger with a suitable controller and devices that will perform the functions as specified for the respective motors, together with manual reset thermal overload, protection in each undergrounded conductor. Provide the controller either integral with circuit protective device or mounted in separate enclosure. Starters shall be Allen-Bradley, G.E., Westinghouse, Square D or approved equal.
- B. Control: Automatic control devices such as thermostats, float or pressure switches may control the starting and stopping of motor directly, provided the device used is designated for that purpose and has an adequate horsepower rating. When automatic control device does not have such a rating, use a magnetic starter with the automatic control device actuating the pilot control circuit. When combination manual and automatic control is specified and the control device operates the motor directly, provide a manual motor starter and selector switch. When combination manual and automatic control is specified and the automatic control device actuates the pilot control circuit, a magnetic control device actuates the pilot control provided. Provide all magnetic starters with push buttons or selector switches in the covers. Provide connections to the selector switch such that only the normal automatic regulating control devices will be bypassed when the switch is in the manual position. Connect all safety control devices, such as low or high pressure cutouts, high temperature cutouts and motor overload protective devices in the motor control circuit in both the manual and automatic positions of the selector switch control circuit. Make connections to any selector switch or to more than one (1) automatic regulatory control device in accordance with wiring diagrams recommended by the manufacturer and approved by the Engineer. Where required for manual control, provide push-button stations consisting of two (2) momentary contact operators, 600 volts, 10 amperes installed and wired for three wire control to provide under-voltage relays, auxiliary contacts or other devices required for a complete system.
- C. Location: Where the controller is located within sight of the motor driven equipment (fifty feet or less), the controller and circuit protective device shall be capable of being locked in the open position. Where the controller is located out of sight of the motor driven equipment (more than fifty feet) provide a non-fused safety disconnect, suitable for the service, and which opens all ungrounded conductors simultaneously, at or on the motor driven equipment.
- D. Enclosure: Enclosure to be general purpose, NEMA Type 1 unless noted otherwise (NEMA Type 1 gasketed). The circuit breaker shall be operable by hand from outside the

enclosure and shall be so interlocked with the door or doors that it must be returned to the "OFF" position before the door can be opened.

- E. Push-buttons: Provide maintained contact, standard duty type in a general purpose, NEMA Type 1 enclosure for surface mounting rated for 10 amperes continuous at 600 volts or less.

3.12 ACCESS PANELS

- A. Provide access panels as required in all walls, ceilings and ductwork to service and have access to all valves, operating parts and duct mounted fire dampers. For all ceiling and wall access doors that are required in gypsum board and plaster, provide minimum 24" x 24", unless due to structural restraints the access door can be reduced to a minimum of 18" x 18", Milcor type appropriate for the construction involved.

3.13 TEMPORARY HEATING AND COOLING

- A. Permanent heating and cooling systems may be used to provide temporary heating and cooling to the building during construction, if the following requirements are met:
 - 1. Provide filters in equipment filter racks.
 - 2. Provide filter material at entrance to all return air ducts or over permanent return air grilles. All return air ductwork is to be protected from construction dust and debris. If return air duct work is not protected prior to equipment startup for temporary use, the Contractor will pay to have the entire ductwork system of the affected equipment thoroughly cleaned prior to Owner occupancy.
 - 3. Contractor shall provide and pay for operation, maintenance, regular replacement of filters and worn or consumed parts.
 - 4. Shall replace any equipment that is damaged during temporary usage with new equipment.
 - 5. All warranty periods shall not begin until Certificate of Substantial Completion is issued.
 - 6. Verify with engineer that the installation is ready and approved for operation.
- B. Just prior to turning the building or portions of the building over to the Owner, Contractor will replace all filters on equipment used for temporary ventilation, heat or cooling during construction.

- C. Do not turn water into the system until the systems have been thoroughly cleaned and approved by the Engineer.

3.14 FINALLY

- A. It is the intention that this specification shall provide a complete installation except as herein before specifically excepted. All accessory construction and apparatus necessary or advantageous in the operation and testing of the work shall be included. The omission of specific reference to any part of the work necessary for such complete installation shall not be interpreted as relieving this Contractor from furnishing and installing such parts.

END OF SECTION 23 01 00

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Ceiling tacks.

1.02 REFERENCE STANDARDS

1.03 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number. Valve locations with tag numbers shall also be indicated on "as-built" drawings.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Dampers: Ceiling tacks, where located above lay-in ceiling.
- B. Ductwork: Stencilled painting.
- C. Instrumentation: Tags.
- D. Relays: Tags.
- E. Small-sized Equipment: Tags.
- F. Thermostats: Nameplates.

- G. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Advanced Graphic Engraving.
 - 2. Kolbi Pipe Marker Co.
 - 3. Seton Identification Products.
 - 4. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/2 inch (13 mm).
 - 3. Background Color: Black.
 - 4. Plastic: Conform to ASTM D709.

2.03 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving.
 - 2. Brady Corporation.
 - 3. Kolbi Pipe Marker Co.
 - 4. Seton Identification Products.
 - 5. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch (40 mm) diameter.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch (40 mm) diameter with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame. Valve tag chart should should indicate valve size, valve model and valve location. Valve locations with tag numbers shall also be indicated on "as-built" drawings.

2.04 STENCILS

A. Manufacturers:

1. Brady Corporation.
2. Kolbi Pipe Marker Co.
3. Seton Identification Products.
4. Substitutions: See Section 23 01 00 - General HVAC Provisions.

B. Stencils: With clean cut symbols and letters of following size:

1. 3/4 to 1-1/4 inch (20-30 mm) Outside Diameter of Insulation or Pipe: 8 inch (200 mm) long color field, 1/2 inch (15 mm) high letters.
2. 1-1/2 to 2 inch (40-50 mm) Outside Diameter of Insulation or Pipe: 8 inch (200 mm) long color field, 3/4 inch (20 mm) high letters.
3. 2-1/2 to 6 inch (65-150 mm) Outside Diameter of Insulation or Pipe: 12 inch (300 mm) long color field, 1-1/4 inch (30 mm) high letters.
4. 8 to 10 inch (200-250 mm) Outside Diameter of Insulation or Pipe: 24 inch (600 mm) long color field, 2-1/2 inch (65 mm) high letters.
5. Over 10 inch (250 mm) Outside Diameter of Insulation or Pipe: 32 inch (800 mm) long color field, 3-1/2 inch (90 mm) high letters.
6. Ductwork and Equipment: 2-1/2 inch (65 mm) high letters.

2.05 CEILING TACKS

A. Manufacturers:

1. Craftmark.
2. Substitutions: See Section 23 01 00 - General HVAC Provisions.

B. Description: Steel with 3/4 inch (20 mm) diameter color coded head.

C. Color code as follows:

1. Yellow - HVAC equipment.
2. Red - Fire dampers/smoke dampers.
3. Blue - Heating/cooling valves.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 91 00 for stencil painting.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install ductwork with stencilled painting. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
- D. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION 23 05 53

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Testing, adjustment, and balancing of air systems.
- B. Measurement of final operating condition of HVAC systems.

1.02 REFERENCE STANDARDS

- A. AABC MN-1 - AABC National Standards for Total System Balance; Associated Air Balance Council; 2002.
- B. ASHRAE Std 111 - Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 1988, with 1997 Errata.
- C. NEBB (TAB) - Procedural Standards for Testing Adjusting Balancing of Environmental Systems; National Environmental Balancing Bureau; 2005, Seventh Edition.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting, and Balancing; Sheet Metal and Air Conditioning Contractors' National Association; 2002.

1.03 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Submit to Architect.
 - 2. Submit six weeks prior to starting the testing, adjusting, and balancing work.
 - 3. Include certification that the plan developer has reviewed the contract documents, the equipment and systems, and the control system with the Architect and other installers to sufficiently understand the design intent for each system.
 - 4. Include at least the following in the plan:
 - a. Preface: An explanation of the intended use of the control system.

- b. List of all air flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
- c. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
- d. Identification and types of measurement instruments to be used and their most recent calibration date.
- e. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
- f. Final test report forms to be used.
- g. Detailed step-by-step procedures for TAB work for each system and issue, including:
 - 1) Terminal flow calibration (for each terminal type).
 - 2) Diffuser proportioning.
 - 3) Branch/submain proportioning.
 - 4) Rechecking.
 - 5) Diversity issues.
- h. Expected problems and solutions, etc.
- i. Criteria for using air flow straighteners or relocating flow stations and sensors .
- j. Details of how TOTAL flow will be determined; for example:
 - 1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
- k. Specific procedures that will ensure that air side is operating at the lowest possible pressures and methods to verify this.
- l. Confirmation of understanding of the outside air ventilation criteria under all conditions.
- m. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).

- n. Method of checking building static and exhaust fan and/or relief damper capacity.
 - o. Methods for making coil or other system plant capacity measurements, if specified.
 - p. Time schedule for TAB work to be done in phases (by floor, etc.).
 - q. Description of TAB work for areas to be built out later, if any.
 - r. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
 - s. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
 - t. Procedures for formal progress reports, including scope and frequency.
 - u. Procedures for formal deficiency reports, including scope, frequency and distribution.
- D. Field Logs: Submit at least once a week to Construction Manager and Engineer. Field logs should be submitted with weekly progress reports and include a record of all discrepancies and issues encountered during the period covered.
- E. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.
- F. Progress Reports.
- G. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- 1. Submit to the Construction Manager, HVAC controls contractor, and Engineer within two weeks after completion of testing, adjusting, and balancing.
 - 2. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 3. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
 - 4. Provide reports in soft cover, letter size, 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.

5. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
6. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
7. Units of Measure: Report data in I-P (inch-pound) units only.
8. Include the following on the title page of each report:
 - 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.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 1. AABC MN-1, AABC National Standards for Total System Balance.
 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
 3. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
 4. SMACNA HVAC Systems Testing, Adjusting, and Balancing.

5. Maintain at least one copy of the standard to be used at project site at all times.
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 2. Having minimum of two years documented experience.
 3. Certified by one of the following agencies or methods:
 - a. AABC, Associated Air Balance Council: www.aabchq.com; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org.
 - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org.
 - d. Test and Balance under direct supervision of a Professional Engineer registered in the State of Arkansas.
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.
- F. Acceptable TAB Agencies:
 1. NEBB.
 2. AABC.
 3. SMACNA.
 4. TABB.
 5. Substitutions: Not permitted.

3.02 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. 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 that will or could prevent proper system balance.
- C. Beginning of work means acceptance of existing conditions. Since work will occur in phases, provide listing of system deficiencies for systems to be balanced during the specified phases.

3.03 PREPARATION

- A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
- B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.
- C. Provide additional balancing devices as required.

3.04 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply and outside air 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.

3.05 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
 - 1. Running log of events and issues.
 - 2. Discrepancies, deficient or uncompleted work by others.
 - 3. Contract interpretation requests.
 - 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. Mark on the drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
- H. Check and adjust systems approximately six months after final acceptance and submit report.
- I. After all adjustments and corrections have been performed to balance system as designed, additional readjustment shall be performed to satisfy desired temperature.

3.06 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities . Test and balance all air handlers for the three design positions i.e. minimum (5% adjustable) outside air, design outside air and economizer operation.
- 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. Measure building static pressure and adjust supply, return, barometric relief dampers, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches (12.5 Pa) positive static pressure near the building entries.
- L. Measure and record supply, return, outside and exhaust air cfm, fan rpm, motor amps, coil entering and leaving air, temperatures (both wet and dry bulb temperatures), outside air (wet and dry bulb temperatures) for cooling and heating operations, system static pressures shall be measured at the required conditions at the minimum and maximum fan speeds.
- M. Measure and record the following air handling and distribution systems.
 - 1. Supply, return, outside air and exhaust when system is in the economizer operation. Measure and record supply air and outside air temperatures (both wet and dry bulb).

3.07 SCOPE

- A. Test, adjust, and balance the following:
 - 1. Air Handling Units
 - 2. Air Cooled Condensers
 - 3. Fans.
 - 4. Air Filters.
 - 5. Air Inlets and Outlets.

3.08 MINIMUM DATA TO BE REPORTED

A. Electric Motors:

1. Manufacturer
2. Model/Frame
3. HP/BHP
4. Phase, voltage, amperage; nameplate, actual, no load
5. RPM
6. Service factor
7. Starter size, rating, heater elements
8. Sheave Make/Size/Bore

B. V-Belt Drives:

1. Identification/location
2. Required driven RPM
3. Driven sheave, diameter and RPM
4. Belt, size and quantity
5. Motor sheave diameter and RPM
6. Center to center distance, maximum, minimum, and actual

C. Air Cooled Condensers:

1. Identification/number
2. Location
3. Manufacturer
4. Model number
5. Serial number
6. Entering DB air temperature, design and actual
7. Leaving DB air temperature, design and actual
8. Number of compressors

D. Air Moving Equipment:

1. Location
2. Manufacturer
3. Model number
4. Serial number
5. Arrangement/Class/Discharge
6. Air flow, specified and actual
7. Return air flow, specified and actual
8. Outside air flow, specified and actual
9. Total static pressure (total external), specified and actual
10. Inlet pressure
11. Discharge pressure
12. Sheave Make/Size/Bore
13. Number of Belts/Make/Size
14. Fan RPM

E. Return Air/Outside Air:

1. Identification/location
2. Design air flow
3. Actual air flow
4. Design return air flow
5. Actual return air flow
6. Design outside air flow
7. Actual outside air flow
8. Return air temperature
9. Outside air temperature
10. Required mixed air temperature

11. Actual mixed air temperature
12. Design outside/return air ratio
13. Actual outside/return air ratio

F. Exhaust Fans:

1. Location
2. Manufacturer
3. Model number
4. Serial number
5. Air flow, specified and actual
6. Total static pressure (total external), specified and actual
7. Inlet pressure
8. Discharge pressure
9. Sheave Make/Size/Bore
10. Number of Belts/Make/Size
11. Fan RPM

G. Duct Traverses:

1. System zone/branch
2. Duct size
3. Area
4. Design velocity
5. Design air flow
6. Test velocity
7. Test air flow
8. Duct static pressure
9. Air temperature
10. Air correction factor

- H. Flow Measuring Stations:
1. Identification/number
 2. Location
 3. Size
 4. Manufacturer
 5. Model number
 6. Serial number
 7. Design Flow rate
 8. Design pressure drop
 9. Actual/final pressure drop
 10. Actual/final flow rate
 11. Station calibrated setting

- I. Air Distribution Tests:
1. Air terminal number
 2. Room number/location
 3. Terminal type
 4. Terminal size
 5. Area factor
 6. Design velocity
 7. Design air flow
 8. Test (final) velocity
 9. Test (final) air flow
 10. Percent of design air flow

END OF SECTION 23 05 93

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.
- B. Duct Liner.
- C. Insulation jackets.
- D. Adhesive, tie wires, tape

1.02 RELATED REQUIREMENTS

- A. Section 23 01 00 - General HVAC Provisions.
- B. Section 23 05 53 - Identification for HVAC Piping and Equipment.
- C. Section 23 31 00 - Ducts: Glass fiber ducts.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- C. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
- D. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).
- E. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

- I. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- K. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than five years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with a minimum five years of documented experience and approved by manufacturer.
- C. Perform work at ambient and equivalent temperatures as recommended by the adhesive manufacturer. Work shall be performed only by mechanics who regularly perform this type of work only.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

- A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with UL 723, ASTM E84, or NFPA 255.
- B. Adhesives to be waterproof.
- C. Recovering jackets 6 ounce per square yard canvas attached with a lagging fire retardant adhesive. Install on exposed ductwork insulation. Cover thoroughly with several coats of sizing.

2.02 GLASS FIBER, FLEXIBLE

- A. Manufacturer:
 - 1. Knauf Insulation.
 - 2. Johns Manville Corporation.
 - 3. Owens Corning Corp.
 - 4. CertainTeed Corporation.
 - 5. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
 - 1. 'K' ('Ksi') value: 0.36 at 75 degrees F (0.052 at 24 degrees C), when tested in accordance with ASTM C518.
 - 2. Maximum Service Temperature: 450 degrees F (232 degrees C).
 - 3. Maximum Water Vapor Sorption: 5.0 percent by weight.
 - 4. Maximum Moisture Absorption: 0.20 percent by volume.
- C. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E 96/E 96M.
 - 3. Moisture Vapor Transmission: ASTM E 96; 0.02 perm.
 - 4. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:

1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- E. Outdoor Vapor Barrier Mastic:
1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- F. Tie Wire: Annealed steel, 16 gage (1.5 mm).

2.03 GLASS FIBER, RIGID

- A. Manufacturer:
1. Knauf Insulation.
 2. Johns Manville Corporation.
 3. Owens Corning Corp.
 4. CertainTeed Corporation.
 5. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Insulation: ASTM C612; rigid, noncombustible blanket.
1. 'K' ('Ksi') value: 0.24 at 75 degrees F (0.036 at 24 degrees C), when tested in accordance with ASTM C518.
 2. Maximum service temperature: 450 degrees F (232 degrees C).
 3. Maximum Water Vapor Sorption: 5.0 percent.
 4. Maximum Moisture Absorption: 0.20 percent by volume.
 5. Maximum Density: 8.0 lb/cu ft (128 kg/cu m).
 6. Density: 3.0 lb/cu ft (48 kg/cu m).
- C. Vapor Barrier Jacket:
1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E 96/E 96M.
 3. Moisture vapor transmission: ASTM E 96; 0.04 perm.
 4. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:

1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- E. Indoor Vapor Barrier Finish:
1. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight, glass fabric.
 2. Vinyl emulsion type acrylic, compatible with insulation, white color.

2.04 JACKETS

- A. Canvas Jacket: UL listed 6 oz/sq yd (220 g/sq m) plain weave cotton fabric treated with dilute fire retardant lagging adhesive.
1. Lagging Adhesive:
 - a. Compatible with insulation.
- B. Mineral Fiber (Outdoor) Jacket: Asphalt impregnated and coated sheet, 50 lb/square (2.45 kg/sq m).
- C. Aluminum Jacket: ASTM B209 (ASTM B209M).
1. Thickness: 0.016 inch (0.40 mm) sheet.
 2. Finish: Embossed.
 3. Joining: Longitudinal slip joints and 2 inch (50 mm) laps.
 4. Fittings: 0.016 inch (0.4 mm) thick die shaped fitting covers with factory attached protective liner.
 5. Metal Jacket Bands: 3/8 inch (10 mm) wide; 0.015 inch (0.38 mm) thick aluminum.

2.05 DUCT LINER

- A. Manufacturers:
1. Knauf Insulation.
 2. Johns Manville Corporation.
 3. Owens Corning Corp.
 4. CertainTeed Corporation.

- B. Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; semi-rigid duct liner; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.
 - 1. Fungi Resistance: ASTM G21.
 - 2. Substitutions: See Section 23 01 00 - General HVAC Provisions.
 - 3. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F (0.045 at 24 degrees C).
 - 4. Service Temperature: Up to 250 degrees F (121 degrees C).
 - 5. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm (25.4 m/s), minimum.
 - 6. Minimum Noise Reduction Coefficients:
 - a. 1/2 inch (13 mm) Thickness: 0.30.
 - b. 1 inch (25 mm) Thickness: 0.45.
 - c. 1-1/2 inches (40 mm) Thickness: 0.60.
 - d. 2 inch (50 mm) Thickness: 0.70.
- C. Adhesive: Waterproof, fire-retardant type, ASTM C916.
- D. Liner Fasteners: Galvanized steel, welded with press-on head.

2.06 MATERIALS

- A. External Insulation
 - 1. Concealed Round Ducts: Flexible glass fiber insulation, minimum installed R-value of R-6, with factory applied reinforced aluminum foil vapor barrier for systems conveying air at less than room temperature.
- B. Internal Insulation
 - 1. Rectangular Ducts and Plenums: Internal duct insulation shall be semi-rigid duct liner board manufactured from glass fibers bonded with a thermosetting resin. Insulation shall be coated on one side with a fire resistant black coating and shall have a minimum installed R-value of R-6. Duct liner shall be installed by cutting side pieces of insulation to lap both top and bottom sections for maximum support. Install side pieces first. Side pieces and bottom piece shall be attached with 4" strips of adhesive at one foot intervals. Top section of insulation shall be attached with Stick-Klip fasteners secured by Miracle adhesive spaced one fastener

per two square feet of insulation. Edges of insulation shall be butted with adhesive to insure a tight joint and provide a smooth surface.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that ducts have been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.
- C. Finish with system at ambient conditions.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Insulated ducts conveying air below ambient temperature:
 - 1. Provide insulation with vapor barrier jackets.
 - 2. Finish with tape and vapor barrier jacket.
 - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 - 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- D. Insulated ducts conveying air above ambient temperature:
 - 1. Provide with or without standard vapor barrier jacket.
 - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- E. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces : Finish with canvas jacket sized for finish painting.
- F. External Duct Insulation Application:
 - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 - 2. Secure insulation without vapor barrier with staples, tape, or wires.

3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

G. Duct and Plenum Liner Application:

1. Adhere insulation with adhesive for 100 percent coverage.
2. Secure insulation with welded mechanical liner fasteners. Refer to SMACNA HVAC Duct Construction Standards - Metal and Flexible and NAIMA Fibrous Glass Duct Liner Standards (latest edition) for spacing.
3. Seal and smooth joints. Seal and coat transverse joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.03 SCHEDULES

- A. Exhaust Ducts: Externally wrap.
- B. Outside Air Intake Ducts:
 1. Round: Externally insulate with 2-inch thick insulation, minimum installed R-value of R-6.
 2. Rectangular: Internally insulate with 1-inch thick semi-rigid duct liner with adhesive and welded mechanical fasteners, minimum installed R-value of R-6.
- C. Plenums: Internally insulate with 1-inch thick insulation, minimum installed R-value of R-6.
- D. Concealed Supply Ducts:
 1. Round Duct: Externally insulate with 2-inch thick insulation, minimum installed R-value of R-6.
 2. Rectangular: Internally insulate with 1-inch thick, semi-rigid duct liner, minimum installed R-value of R-6, with adhesive and welded mechanical fasteners.

E. Concealed Return Air Ducts and Plenums:

1. Round: Externally insulate with 2-inch thick insulation, minimum installed R-value of R-6.
2. Rectangular: Internally insulate with 1-inch thick, minimum installed R-value of R-6, semi-rigid duct liner with adhesive and welded mechanical fasteners.
3. Plenums: Internally insulate with 1-inch thick, minimum installed R-value of R-6, semi-rigid duct liner with adhesive and welded mechanical fasteners.

END OF SECTION 23 07 13

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Check valves.
- B. Filter-driers.
- C. Solenoid valves.
- D. Expansion valves.

1.02 RELATED REQUIREMENTS

- A. Section 22 07 19 - Piping Insulation.
- B. Section 23 07 19 - HVAC Piping Insulation.
- C. Section 23 77 00 - Air Handling Units.
- D. Section 23 62 13 - Air Cooled Condensing Units.
- E. Division 26 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AHRI 710 - Performance Rating of Liquid-Line Driers; 2009.
- B. AHRI 750 - Thermostatic Refrigerant Expansion Valves; 2007.
- C. AHRI 760 - Performance Rating of Solenoid Valves for Use With Volatile Refrigerants; 2007.
- D. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2022, with Errata (2023).
- E. ASHRAE Std 34 - Designation and Safety Classification of Refrigerants; 2022, with Errata (2023).
- F. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2023.
- G. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2023.
- H. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2018.

- I. ASME B31.9 - Building Services Piping; 2020.
- J. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- K. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.
- L. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

1.04 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.
- C. Liquid Indicators:
 - 1. Use line size liquid indicators in main liquid line leaving condenser.
 - 2. If receiver is provided, install in liquid line leaving receiver.
 - 3. Use line size on leaving side of liquid solenoid valves.
- D. Valves:
 - 1. Use service valves on suction and discharge of compressors.
 - 2. Use gage taps at compressor inlet and outlet.
 - 3. Use gage taps at hot gas bypass regulators, inlet and outlet.
 - 4. Use check valves on compressor discharge.
 - 5. Use check valves on condenser liquid lines on multiple condenser systems.
- E. Refrigerant Charging (Packed Angle) Valve: Use in liquid line between receiver shut-off valve and expansion valve.
- F. Strainers:
 - 1. Use line size strainer upstream of each automatic valve.
 - 2. Where multiple expansion valves with integral strainers are used, use single main liquid line strainer.

3. On steel piping systems, use strainer in suction line.

4. Use shut-off valve on each side of strainer.

G. Filter-Driers:

1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.

2. Use a filter-drier on suction line just ahead of compressor.

3. Use sealed filter-driers in lines smaller than 1/2 inch (13 mm) outside diameter.

4. Use sealed filter-driers in low temperature systems.

5. Use sealed filter-driers in systems utilizing hermetic compressors.

6. Use replaceable core filter-driers in lines of 3/4 inch (19 mm) outside diameter or greater.

7. Use filter-driers for each solenoid valve.

H. Solenoid Valves:

1. Use in liquid line of systems operating with single pump-out or pump-down compressor control.

2. Use in liquid line of single or multiple evaporator systems.

3. Use in oil bleeder lines from flooded evaporators to stop flow of oil and refrigerant into the suction line when system shuts down.

1.05 SUBMITTALS

A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.

B. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.

C. Shop Drawings: Indicate schematic layout of system, including equipment, critical dimensions, and sizes.

D. Design Data: Submit design data indicating pipe sizing. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.

E. Test Reports: Indicate results of leak test, acid test.

F. Manufacturer's Installation Instructions: Indicate support, connection requirements, and isolation for servicing.

- G. Project Record Documents: Record exact locations of equipment and refrigeration accessories on record drawings.
- H. Maintenance Data: Include instructions for changing cartridges, assembly views, spare parts lists.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of documented experience.
- B. Design piping system under direct supervision of a licensed hvac company experienced in design of this type of work and licensed in the state where the Project is located.

1.07 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 for installation of piping system.
- B. Welding Materials and Procedures: Conform to ASME (BPV IX) .
- C. Welders Certification: In accordance with ASME (BPV IX).
- D. Products Requiring Electrical Connection: Listed and classified by UL, as suitable for the purpose indicated.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store piping and specialties in shipping containers with labeling in place.
- B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.
- C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

PART 2 PRODUCTS

- A. Filter-Driers:
- B. Copper Tube to 7/8 inch (22 mm) OD: ASTM B88 (ASTM B88M), Type K (A), annealed.
- C. Pipe Supports and Anchors:
 - 1. Conform to ASME B31.5.
 - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch (13 to 38 mm): Carbon steel adjustable swivel, split ring.

3. Hangers for Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes to 3 Inches (75 mm): Cast iron hook.
6. Wall Support for Pipe Sizes 4 Inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
10. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
11. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

D. Refrigerant: As defined in ASHRAE Std 34.

1. R-410A.

2.02 MOISTURE AND LIQUID INDICATORS

A. Manufacturers:

1. Henry Technologies.
2. Parker Hannifin/Refrigeration and Air Conditioning.
3. Sporlan Valve Company.
4. Substitutions: See Section 23 01 00 - General HVAC Provisions.

B. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator and plastic cap; for maximum temperature of 200 degrees F (93 degrees C) and maximum working pressure of 460 psi (3170 kPa).

2.03 VALVES

A. Manufacturers:

1. Hansen Technologies Corporation.
2. Henry Technologies.
3. Danfoss Automatic Controls.
4. Substitutions: See Section 23 01 00 - General HVAC Provisions.

B. Diaphragm Packless Valves:

1. UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel diaphragms, rising stem and handwheel, stainless steel spring, nylon seat disc, solder or flared ends, with positive backseating; for maximum working pressure of 500 psi (3450 kPa) and maximum temperature of 275 degrees F (135 degrees C).

C. Packed Angle Valves:

1. Forged brass , forged brass seal caps with copper gasket, rising stem and seat , molded stem packing, solder or flared ends; for maximum working pressure of 500 psi (3450 kPa) and maximum temperature of 275 degrees F (135 degrees C).

D. Ball Valves:

1. Two piece forged brass body with teflon ball seals and copper tube extensions, brass seal cap, chrome plated ball, stem with neoprene ring stem seals; for maximum working pressure of 500 psi (3450 kPa) and maximum temperature of 325 degrees F (163 degrees C).

E. Service Valves:

1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or solder ends, for maximum pressure of 500 psi (3450 kPa).

2.04 STRAINERS

A. Straight Line or Angle Line Type:

1. Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or monel reinforced with brass; for maximum working pressure of 430 psi (2960 kPa).

B. Straight Line, Non-Cleanable Type:

1. Steel shell, copper plated fittings, stainless steel wire screen, for maximum working pressure of 500 psi (____ kPa).

2.05 CHECK VALVES

A. Manufacturers:

1. Hansen Technologies Corporation.
2. Parker Hannifin/Refrigeration and Air Conditioning.
3. Sporlan Valve Company.
4. Substitutions: See Section 01 60 00 - Product Requirements.
5. Substitutions: See Section 23 01 00 - General HVAC Provisions.

B. Globe Type:

1. Cast bronze or forged brass body, forged brass cap with neoprene seal, brass guide and disc holder, phosphor-bronze or stainless steel spring, teflon seat disc; for maximum temperature of 300 degrees F (149 degrees C) and maximum working pressure of 425 psi (2930 kPa).

C. Straight Through Type:

1. Brass body and disc, phosphor-bronze or stainless steel spring, neoprene seat; for maximum working pressure of 500 psi (3450 kPa) and maximum temperature of 250 degrees F (121 degrees C).

2.06 FILTER-DRIERS

A. Manufacturers:

1. Flow Controls Division Emerson Electric Co.
2. Parker Hannifin/Refrigeration and Air Conditioning.
3. Sporlan Valve Company.
4. Substitutions: See Section 23 01 00 - General HVAC Provisions.
5. Flow Capacity - Liquid Line: As indicated in schedule, minimum, rated in accordance with AHRI 710.
6. Flow Capacity - Suction Line: As indicated in schedule, minimum, rated in accordance with AHRI 730 (I-P).
7. Pressure Drop: 2 psi (14 kPa), maximum, when operating at full connected evaporator capacity.
8. Design Working Pressure: 500 psi (3450 kPa), minimum.

- B. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, and filtration to 40 microns; of construction that will not pass into refrigerant lines.
 - 1. Replaceable Core Type: Steel shell with removable cap.
 - 2. Sealed Type: Copper shell.
 - 3. Connections: As specified for applicable pipe type.

2.07 SOLENOID VALVES

- A. Manufacturers:
 - 1. Flow Controls Division of Emerson Electric.
 - 2. Parker Hannifin/Refrigeration and Air Conditioning.
 - 3. Sporlan Valve Company.
 - 4. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Valve: AHRI 760, pilot operated, copper or brass body and internal parts, synthetic seat, stainless steel stem and plunger assembly (permitting manual operation in case of coil failure), integral strainer, with flared, solder, or threaded ends; for maximum working pressure of 500 psi (3450 kPa).
- C. Coil Assembly: UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, integral junction box.

2.08 EXPANSION VALVES

- A. Manufacturers:
 - 1. Flow Controls Division of Emerson Electric.
 - 2. Parker Hannifin/Refrigeration and Air Conditioning.
 - 3. Sporlan Valve Company.
 - 4. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Angle or Straight Through Type: AHRI 750; design suitable for refrigerant, brass body, internal or external equalizer, mechanical pressure limit (maximum operating pressure MOP feature), adjustable superheat setting, replaceable inlet strainer, with replaceable capillary tube and remote sensing bulb.

- C. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve. Select valve for maximum load at design operating pressure and minimum 10 degrees F (6 degrees C) superheat. Select to avoid being undersized at full load and excessively oversized at part load.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. 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 (100 mm).
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- G. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.5.

2. Support horizontal piping as scheduled.
 3. Install hangers to provide minimum 1/2 inch (13 mm) space between finished covering and adjacent work.
 4. Place hangers within 12 inches (300 mm) of each horizontal elbow.
 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.
- H. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.
- I. Provide clearance for installation of insulation and access to valves and fittings.
- J. Provide access to concealed valves and fittings.
- K. Flood piping system with nitrogen when brazing.
- L. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.
- M. Prepare unfinished pipe, fittings, supports, and accessories ready for finish painting.
- N. Insulate piping and equipment; refer to Section and Section 23 07 16.
- O. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.
- P. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.
- Q. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.
- R. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.
- S. Install flexible connectors at right angles to axial movement of compressor, parallel to crankshaft.
- T. Fully charge completed system with refrigerant after testing.
- U. Provide electrical connection to solenoid valves. Refer to Division 26.

3.03 FIELD QUALITY CONTROL

- A. Pressure test system with dry nitrogen to 200 psi (1380 kPa). Perform final tests at 27 inches (92 kPa) vacuum and 200 psi (1380 kPa) using electronic leak detector. Test to no leakage.

3.04 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
1. 1/2 inch (13 mm), 5/8 inch (16 mm), and 7/8 inch (22 mm) OD: Maximum span, 5 feet (1500 mm); minimum rod size, 1/4 inch (6.3 mm).
 2. 1-1/8 inch (29 mm) OD: Maximum span, 6 feet (1800 mm); minimum rod size, 1/4 inch (6.3 mm).
 3. 1-3/8 inch (35 mm) OD: Maximum span, 7 feet (2100 mm); minimum rod size, 3/8 inch (9.5 mm).
 4. 1-5/8 inch (41 mm) OD: Maximum span, 8 feet (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
 5. 2-1/8 inch (54 mm) OD: Maximum span, 8 feet (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
 6. 2-5/8 inch (67 mm) OD: Maximum span, 9 feet (2700 mm); minimum rod size, 3/8 inch (9.5 mm).
 7. 3-1/8 inch (79 mm) OD: Maximum span, 10 feet (3.0 m); minimum rod size, 3/8 inch (9.5 mm).
 8. 3-5/8 inch (92 mm) OD: Maximum span, 11 feet (3.4 m); minimum rod size, 1/2 inch (12.7 mm).
 9. 4-1/8 inch (92 mm) OD: Maximum span, 12 feet (3.6 m); minimum rod size, 1/2 inch (12.7 mm).

END OF SECTION 23 23 00

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Metal ductwork.
- B. Duct cleaning.

1.02 RELATED REQUIREMENTS

- A. Section 23 07 13 - Duct Insulation: External insulation and duct liner.
- B. Section 23 33 00 - Duct Accessories.
- C. Section 23 33 30 - Air Duct Sealants.
- D. Section 23 37 00 - Air Outlets and Inlets.
- E. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

1.03 REFERENCE STANDARDS

- A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- D. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
- E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- F. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- H. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2018, with Editorial Revision (2020).

- I. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry; 2018, with Editorial Revision (2020).
- J. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2017, with Editorial Revision (2020).
- K. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- L. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.
- M. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2024.
- N. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012, 2nd Edition.
- O. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

1.04 DEFINITIONS

- A. Duct Sizes: Duct sizes indicated on drawings are inside clear dimensions.
- B. Low Pressure: Static pressure in duct less than 1" WG and velocities less than 2000 fpm (10 meters/second).

1.05 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide data for duct materials, duct liner, and duct connections.
- C. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for all systems.
- D. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual.
- E. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.
- F. Confirm ductwork has been fabricated and installed in accordance with recommendations and SMACNA standards.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum five years of documented experience.

1.07 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A, NFPA 90B, and NFPA 96, standards.

1.08 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.
- B. Aluminum for Ducts: ASTM B209 (ASTM B209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.
- C. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. VOC Content: Not more than 250 g/L, excluding water.
 - 3. Surface Burning Characteristics: Flame spread of zero, smoke developed of zero, when tested in accordance with ASTM E84.
 - 4. For Use With Flexible Ducts: UL labeled.
 - 5. Products:
 - a. Seal all joints and seams on sheet metal supply, return, makeup air and exhaust ductwork with "Hardcast" type DT sealing tape and type FTA adhesive or "Hardcast" iron grip 601 duct sealant installed in strict accordance with

manufacturer's instructions. Clean all dirt, oil, moisture, etc., before applying adhesive. Duct tape, UL listed or not, is not acceptable.

b. Substitutions: See Section 23 01 00 - General HVAC Provisions.

- D. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
- E. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
 - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
 - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
 - 5. Other Types: As required.

2.02 DUCT ASSEMBLIES

- A. All Ducts: Galvanized steel, unless otherwise indicated.
- B. Low Pressure Supply (Heating Systems): 1 inch w.g. (250 Pa) pressure class, galvanized steel.
- C. Return and Relief: 1 inch w.g. (250 Pa) pressure class, galvanized steel.
- D. General Exhaust: 1 inch w.g. (250 Pa) pressure class, galvanized steel.
- E. Outside Air Intake: 1 inch w.g. (250 Pa) pressure class, galvanized steel.
- F. Combustion Air: 1 inch w.g. (250 Pa) pressure class, galvanized steel.

2.03 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE Handbook - Fundamentals.
- C. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- D. Provide air foil turning vanes when rectangular elbows must be used.

- E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- F. Fabricate continuously welded round duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Joints shall be minimum 4 inch (100 mm) cemented slip joint, brazed or electric welded. Prime coat welded joints.
- G. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.
- H. Lap metal duct in direction of air flow. Hammer down edges and slips to leave smooth duct interior.
- I. Size round ducts installed in place of rectangular ducts from ASHRAE Table of Equivalent Rectangular and Round Ducts. No variation of duct configuration or sizes permitted except by written permission.
- J. Rigidly construct metal ducts with joints mechanically tight, substantially airtight, braced and stiffened so as not to breathe, rattle, vibrate or sag. Caulk duct joints and connections with sealant as ducts are being assembled.

2.04 MANUFACTURED DUCTWORK AND FITTINGS

- A. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.
 - 1. Insulation: Fiberglass insulation with aluminized fiberglass scrim vapor barrier film.
 - 2. Pressure Rating: 6 inches WG (___ kPa) positive and 1.0 inches WG (250 Pa) negative.
 - 3. Maximum Velocity: 5000 fpm (___ m/sec).
 - 4. Temperature Range: -10 degrees F to 160 degrees F (-23 degrees C to 71 degrees C).
 - 5. R-6.0 Formaldehyde free insulation.
 - 6. UL -181 (UL listed).
 - 7. Manufacturers:
 - a. Hart & Cooley.
 - b. Flex Master.
 - c. Substitutions: See Section 23 01 00 - General HVAC Provisions.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Flexible Ducts: Connect to metal ducts with draw bands.
- E. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- F. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- G. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- H. Use crimp joints with or without bead for joining round duct sizes 8 inch (200 mm) and smaller with crimp in direction of air flow.
- I. Use double nuts and lock washers on threaded rod supports.
- J. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet (1.5 m) maximum length of flexible duct held in place with strap or clamp.
- K. Connect flexible ducts to metal ducts per manufacturer's recommendations.
- L. All round and rectangular duct installed in exposed areas shall be paint lock duct.

3.02 CLEANING

- A. Clean duct systems with high power vacuum machines. Protect equipment that could be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.
- B. If determined by the Architect and/or Engineer, that during construction the duct systems were not adequately protected and dirt/debris was allowed to enter the installed ductwork, then it will be required by the HVAC contractor for the duct system to be cleaned. If required, clean duct systems with high power vacuum machines. Protect equipment that

could be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

END OF SECTION 23 31 00

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air turning devices/extractors.
- B. Backdraft dampers - metal.
- C. Duct access doors.
- D. Duct test holes.
- E. Flexible duct connections.
- F. Volume control dampers.

1.02 RELATED REQUIREMENTS

- A. Section 23 31 00 - Ducts.
- B. Division 26 - Electrical: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- C. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Project Record Drawings: Record actual locations of access doors and volume dampers.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Fusible Links: Two of each type and size.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.

- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

- A. Manufacturers:
 - 1. Krueger.
 - 2. PCI Industries, Inc; Pottorff Brand.
 - 3. Ruskin Company.
 - 4. Titus.
 - 5. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.
- C. Multi-blade device with radius blades attached to pivoting frame and bracket, steel or aluminum construction, with worm drive mechanism with removable key operator.

2.02 BACKDRAFT DAMPERS - METAL

- A. Manufacturers:
 - 1. Louvers & Dampers, Inc.
 - 2. Nailor Industries Inc.
 - 3. PCI Industries, Inc; Pottorff Brand.
 - 4. Ruskin Company.
 - 5. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Gravity Backdraft Dampers, Size 18 x 18 inches (450 x 450 mm) or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.
- C. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch (150 mm) 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.

2.03 DUCT ACCESS DOORS

- A. Manufacturers:
 - 1. Nailor Industries Inc.
 - 2. Ruskin Company.
 - 3. Greenheck Fan Corporation.
 - 4. SEMCO Incorporated.
 - 5. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- C. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch (25 mm) thick insulation with sheet metal cover.
 - 1. Less Than 12 inches (300 mm) Square: Secure with sash locks.
 - 2. Up to 18 inches (450 mm) Square: Provide two hinges and two sash locks.
 - 3. Up to 24 x 48 inches (600 x 1200 mm): Three hinges and two compression latches with outside and inside handles.
 - 4. Larger Sizes: Provide an additional hinge.
- D. Access doors with sheet metal screw fasteners are not acceptable.

2.04 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.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.05 FLEXIBLE DUCT CONNECTIONS

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

- C. 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 per sq yd (1.0 kg/sq m).
 - a. Net Fabric Width: Approximately 3 inches (75 mm) wide.
 - 2. Metal: 3 inches (75 mm) wide, 24 gage (0.6 mm) thick galvanized steel.

2.06 VOLUME CONTROL DAMPERS

- A. Manufacturers:
 - 1. Louvers & Dampers, Inc.
 - 2. Nailor Industries Inc.
 - 3. Ruskin Company.
 - 4. Greenheck Fan Company.
 - 5. Jer-Air Manufacturing.
 - 6. United Enertech.
 - 7. Substitutions: See Section 23 01 00 - General HVAC Provisions.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch (150 x 760 mm).
 - 1. Fabricate for duct sizes up to 6 x 30 inch (150 x 760 mm).
 - 2. Blade: 24 gage (0.61 mm), minimum.
- D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch (200 x 1825 mm). Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
 - 1. Blade: 18 gage (1.2 mm), minimum.
- E. End Bearings: Except in round ducts 12 inches (300 mm) and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.
- F. Quadrants:
 - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.

2. On insulated ducts mount quadrant regulators on minimum 2-inch stand-off mounting brackets, bases, or adapters.
3. Where rod lengths exceed 30 inches (750 mm) provide regulator at both ends.

2.07 MISCELLANEOUS PRODUCTS

- A. Duct Opening Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during construction.
 1. Thickness: 2 mils (0.6 mm).
 2. High tack water based adhesive.
 3. UV stable light blue color.
 4. Elongation Before Break: 325 percent, minimum.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 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 and elsewhere as indicated. Provide minimum 8 x 8 inch (200 x 200 mm) size for hand access, size for shoulder access, and as indicated. Provide 4 x 4 inch (100 x 100 mm) for balancing dampers only. Review locations prior to fabrication.
- D. Provide duct test holes where indicated and required for testing and balancing purposes.
- E. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- F. 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.

END OF SECTION 23 33 00

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air duct sealants for permanently sealing fabricated joints and seams of HVAC air ducts and thermal insulation.
- B. Reinforcing membrane for sealants.

1.02 RELATED SECTIONS

- A. Section 23 07 13 - Duct Insulation.
- B. Section 23 31 00 - HVAC Ducts and Casings.
- C. Section 23 33 00 - Duct Accessories.

1.03 REFERENCES

- A. ASTM D 1668 - Standard Specification for Glass Fabrics (Woven and Treated) for Roofing and Waterproofing; 1995.
- B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2005.
- C. ASTM E 96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials; 2005.
- D. UL 181A - Closure Systems for Use with Rigid Air Ducts and Air Connectors; Underwriters Laboratories Inc.; 2005.
- E. UL 181B - Closure Systems for Use with Flexible Air Ducts and Air Connectors; Underwriters Laboratories Inc.; 2005.

1.04 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Manufacturer's product data, including physical properties and application instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.

B. Store materials in accordance with manufacturer's instructions. Protect from freezing.

1. Storage Temperature: 40 to 100 degrees F. (4 to 38 degrees C)

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not apply below 35 degrees F. (2 degrees C) or above 120 degrees F. (49 degrees C)

B. Avoid high humidity.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer:

1. Hardcast, Inc.

2. RCD Corporation.

B. Substitutions: See Section 23 01 00 - General HVAC Provisions.

C. Supply all products specified in this section from a single manufacturer.

2.02 AIR DUCT SEALANTS

A. Low to High Velocity Air Duct Sealant: Non-toxic, water-based, fiber-reinforced adhesive-sealant; for permanently sealing fabricated joints and seams of sheet metal air ducts, UL 181 listed rigid fiberglass air ducts, UL 181 listed flexible air ducts, and thermal insulation; for repairing damaged and leaking air ducts; for sealing conditioned spaces from air infiltration.

1. Type: Elastomeric terpolymer emulsion.

2. Underwriters Laboratories Listed: UL 181A-M and UL 181B-M.

3. Solids by Weight: 67 percent, plus or minus 2 percent.

4. Weight per Gallon: 10.5 pounds, plus or minus 0.20 pounds (4.76 kg, plus or minus 0.09 kg).

5. Wet Film Coverage: 100 linear feet per gallon at 1/16 inch thick by 3 inches wide (8.05 m/L at 1.58 mm thick by 75 mm wide).

6. Consistency: Thixotropic, non-sagging.

7. Adhesive Cure: 72 hours at 50 percent humidity and 70 degrees F. (21 degrees C)

8. Service Temperature Limits: Minus 10 degrees to 180 degrees F. (minus 23 degrees to 82 degrees C)
 9. Water Vapor Transmission Rate: 0.6157 perms in accordance with ASTM E 96.
 10. Flame Spread Index: Not greater than 5, when tested in accordance with ASTM E 84.
 11. Smoke Developed Index: Zero, when tested in accordance with ASTM E 84.
- B. Low to High Velocity Air Duct Sealant: Hardcast Iron Grip 601 non-toxic, water-based, adhesive-sealant; for permanently sealing fabricated joints and seams of sheet metal air ducts, UL 181 listed rigid fiberglass air ducts, UL 181 listed flexible air ducts, and thermal insulation; for repairing damaged and leaking air ducts; for sealing conditioned spaces from air infiltration.
1. Type: Elastomeric terpolymer emulsion.
 2. Underwriters Laboratories Listed: UL 181A-M and UL 181B-M.
 3. Solids by Weight: 70 percent, plus or minus 2 percent.
 4. Wet Film Coverage: 320 linear feet per gallon at 20 mil thick by 3 inches wide.
 5. Consistency: Thixotropic, non-sagging.
 6. Adhesive Cure: 48 hours at 50 percent humidity and 70 degrees F.
 7. Flame Spread Index: Not greater than 5, when tested in accordance with UL-723.
 8. Smoke Developed Index: Zero, when tested in accordance with UL-723.
- C. Reinforcing Membrane: RCD "Glasscoat" inorganic woven fiberglass reinforcing membrane; conforming to irregular surfaces for sealing and coating thermal insulation, air ducts, return air plenums, equipment, vessels, pipes, and fittings.
1. ASTM D 1668, Type III.
 2. Nominal Dry Weight: 1.2 to 2.0 ounces per square yard (40.689 to 67.815 g/sq. m).
 3. Saturated Weight: 1.6 to 2.6 ounces per square yard (54.252 to 88.160 g/sq. m).
 4. Nominal Thread Count: 10 by 20.
 5. Breaking Strength, Saturated: 75 warp, 75 fill minimum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive air duct sealants.
- B. Notify Architect of conditions that would adversely affect application of sealants. Do not proceed with application until unsatisfactory conditions are corrected.

3.02 SURFACE PREPARATION

- A. Prepare surfaces in accordance with manufacturer's instructions.
- B. Remove water, dirt, oil, grease, and corrosion from surfaces to receive air duct sealants.

3.03 APPLICATION

- A. Apply air duct sealants in accordance with manufacturer's instructions.
- B. Apply to sheet metal air ducts, UL 181 listed rigid fiberglass air ducts, UL 181 listed flexible air ducts, thermal insulation, and other surfaces where indicated.
- C. Do not thin or mix.
- D. Apply tack coat at rate of 2 gallons per 100 square feet (0.815 L/sq. m).
- E. Embed reinforcing membrane into tack coat.
- F. Apply finish coat at rate of 2 gallons per 100 square feet (0.815 L/sq. m).
- G. Allow drying time as follows:
 - 1. Minimum 6 hours when used outdoors if wet weather is imminent.
 - 2. Minimum 24 hours before using air duct system.
 - 3. Additional time as required by air temperature and humidity conditions.

END OF SECTION 23 33 30

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Ceiling exhaust fans.

1.02 RELATED REQUIREMENTS

- A. Section 23 31 00 - HVAC Ducts and Casings.
- B. Section 23 33 00 - Duct Accessories: Backdraft dampers.
- C. Division 26 - Electrical: Equipment Wiring.

1.03 REFERENCE STANDARDS

- A. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2016, with Errata (2018).
- B. AMCA 261 - Directory of Products Licensed to Use the AMCA Certified Ratings Seal; Air Movement and Control Association International, Inc.; <http://www.amca.org/licenses/search.aspx>.
- C. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.
- D. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2022.
- E. NEMA MG 1 - Motors and Generators; 2014.

1.04 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- C. Manufacturer's Instructions: Indicate installation instructions.
- D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.
- B. Equivalent fan selections shall not increase or decrease motor horsepower, increase top speed by more than 10%, or increase inlet air velocity by more than 20% from that specified.
- C. Provide fans capable of accommodating static pressure variations of plus or minus 10%.
- D. Provide balanced variable for motors 15 horsepower and under.
- E. Statically and dynamically balance fans to eliminate vibration or noise transmission to occupied areas of the building.
- F. Provide belt guards on belt driven fans.
- G. Provide safety screen where inlet or outlet is exposed.
- H. Prime coat fan wheels and housing factory inside and outside. Prime coating on aluminum parts is not required.

1.06 FIELD CONDITIONS

- A. Permanent ventilators may be used for ventilation during construction only after ductwork is clean, filters are in place, bearings have been lubricated, and fan has been test run under observation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acme.
- B. Captive Aire.
- C. Greenheck.
- D. Loren Cook Company.
- E. Twin Cities Blower.
- F. Substitutions: See Section 23 01 00 - General HVAC Provisions.

2.02 POWER VENTILATORS - GENERAL

- A. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.

- B. Sound Ratings: AMCA 301, tested to AMCA 300, and bearing AMCA Certified Sound Rating Seal.
- C. Fabrication: Conform to AMCA 99.
- D. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
- E. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.03 CEILING EXHAUST FANS

- A. Performance Ratings:
 - 1. Refer to fan schedule on plan sheet for fan performance.
- B. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.
- C. Disconnect Switch: Cord and plug in housing for thermal overload protected motor and factory mounted solid state speed controller.
- D. Grille: Molded white plastic.
- E. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide sheaves required for final air balance.
- C. Provide backdraft dampers on outlet from ceiling exhauster fans and as indicated.

3.02 SCHEDULES

- A. Drawing Code: See plan Schedule.
- B. Air Flow Capacity: See plan Schedule.
- C. Static Pressure: See plan Schedule.
- D. Motor hp:

1. Electrical Characteristics: See plan Schedule.

E. Accessories:

1. See plan Schedule.

END OF SECTION 23 34 23

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Square ceiling diffusers.
- B. Registers/grilles.
 - 1. Ceiling-mounted, exhaust and return register/grilles.
 - 2. Wall-mounted, supply register/grilles.

1.02 REFERENCE STANDARDS

- A. ACGIH (IV) - Industrial Ventilation: A Manual of Recommended Practice for Design, 31st Edition; 2023, with Errata (2024).
- B. AHRI 880 (I-P) - Performance Rating of Air Terminals; 2017 (Reaffirmed 2023).

1.03 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. 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.
- C. Project Record Documents: Record actual locations of air outlets and inlets.

1.04 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Air Devices, Inc.
- B. Carnes Company HVAC.

- C. Krueger.
- D. Nailor.
- E. Price Industries.
- F. Ruskin.
- G. Titus.
- H. Tuttle-Bailey.
- I. Substitutions: See Section 23 01 00 - General HVAC Provisions.

2.02 SQAURE CEILING DIFFUSERS

- A. Type: Provide multi-louvered diffuser to discharge air in adjustable discharge pattern .
- B. Frame: Surface mount, inverted T-Bar type. In plaster ceilings, provide plaster frame and ceiling frame.
- C. Fabrication: Steel or aluminum as indicated on drawings with baked enamel finish.
- D. Color: As shown on drawings.
- E. See Air Distribution Schedule on drawings for details and accessories.

2.03 CEILING RETURN REGISTERS/GRILLES

- A. Type: Streamlined blades, 1/2 inch (_____ mm) minimum depth, 1/2 inch (_____ mm) maximum spacing, with blades set at 45 degrees, horizontal face.
- B. Frame: Surface mount, inverted T-Bar type. In plaster ceilings, provide plaster frame and ceiling frame.
- C. Fabrication: Steel or aluminum as indicated on drawings with baked enamel finish.
- D. Color: As shown on the drawings.
- E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans, where indicated on plans.
- F. See Air Distribution Schedule on drawings for details and accessories.

2.04 WALL SUPPLY REGISTERS/GRILLES

- A. Type: Streamlined and individually adjustable blades, 3/4 inch (19 mm) minimum depth, 1/4 inch (_____ mm) maximum spacing with spring or other device to set blades, vertical face, double deflection.
- B. Frame: 1-1/4 inch (32 mm) margin with countersunk screw mounting and gasket.
- C. Fabrication: Steel with 20 gage (0.90 mm) minimum frames and 22 gage (0.80 mm) minimum blades, steel and aluminum with 20 gage (0.90 mm) minimum frame, or aluminum extrusions, with factory baked enamel finish.
- D. Color: As shown on the drawings.
- E. Damper: Integral, gang-operated opposed blade type with removable key operator, operable from face, where indicated on plans.
- F. See Air Distribution Schedule on drawings for details and accessories.

PART 3 EXECUTION

3.01 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.
- F. Provide minimum 6" deep plenum box on back of all return and exhaust grilles.

3.02 SCHEDULES

- A. Air Outlet and Inlet Schedule
 - 1. Drawing Code: Refer to plan schedule.
 - 2. Manufacturer: As scheduled on drawings.
 - 3. Model: As scheduled on drawings.
 - 4. Description: As scheduled on drawings.

5. Finish: As scheduled on drawings.
6. Service: As scheduled on drawings.
7. Mounting: As scheduled on drawings.
8. Accessories: As scheduled on drawings.

END OF SECTION 23 37 00

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Disposable, extended area panel filters.

1.02 RELATED REQUIREMENTS

- A. Division 26 - Electrical: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AHRI 850 (I-P) - Performance Rating of Commercial and Industrial Air Filter Equipment; 2013 (Reaffirmed 2023).
- B. ASHRAE Std 52.1 - Gravimetric and Dust-Spot Procedures for Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
- C. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2017, with Addendum (2022).

1.04 PERFORMANCE REQUIREMENTS

- A. Conform to Section 7.4.
 - 1. Dust Spot Efficiency: Plus or minus 5 percent.

1.05 SUBMITTALS

- A. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- B. Product Data: Provide data on filter media, filter performance data, filter assembly and filter frames, dimensions and connection requirements.
- C. Shop Drawings: Indicate filter assembly and filter frames, dimensions and connection requirements.
- D. Manufacturer's Installation Instructions: Indicate assembly and change-out procedures.
- E. Operation and Maintenance Data: Include instructions for operation, changing, and periodic cleaning.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Filters: One additional set of each type and size of disposable panel filters to be installed at the time the building is conveyed to the Owner.

1.06 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 FILTER MANUFACTURERS

- A. American Filtration Inc.
- B. AAF International/American Air Filter.
- C. Camfil Farr Company.
- D. Substitutions: See Section 23 01 00 - General HVAC Provisions.

2.02 DISPOSABLE, EXTENDED AREA PANEL FILTERS

- A. Media: UL 900 Class 1, pleated, lofted, non-woven, reinforced cotton and synthetic fabric; supported and bonded to welded wire grid by corrugated aluminum separators.
 1. Frame: Cardboard.
 2. Nominal size: to match equipment filter size requirements (_____).
 3. Nominal thickness: 2 inches (50 mm).
- B. Rating, per ASHRAE Std 52.1:
 1. Dust spot efficiency: MERV 8.
 2. Initial resistance at 500 FPM (2.54 m/sec) face velocity: 0.30 inch WG (75 Pa).
 3. Recommended final resistance: 0.9 inch WG (224 Pa).

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install air cleaning devices in accordance with manufacturer's instructions.
- B. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.
- C. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with clean set.

3.02 SCHEDULES

A. Air Filter Schedule

1. Refer to plan Equipment Schedule.

END OF SECTION 23 40 00

PART 1

1.01 SECTION INCLUDES

- A. Condensing unit package.
- B. Charge of refrigerant and oil.
- C. Controls and control connections.
- D. Refrigerant piping connections.
- E. Motor starters.
- F. Electrical power connections.

1.02 RELATED REQUIREMENTS

- A. Section 23 23 00 - Refrigerant Piping and Specialties.
- B. Section 23 77 00 - Air Handling Unit.
- C. Division 26 - Electrical: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008.
- B. AHRI 365 (I-P) - Performance Rating of Commercial and Industrial Unitary Air-Conditioning Condensing Units; 2009.
- C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2022, with Errata (2023).
- D. ASHRAE Std 23.1 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Pressures of the Refrigerant; 2019.
- E. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; 2013, Including All Amendments and Errata.
- F. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

1.04 PERFORMANCE REQUIREMENTS

- A. Heat Rejection:
 - 1. Refer to plan Schedule.
- B. Heat Pump:
 - 1. Refer to plan Schedule.
- C. Electrical Characteristics:
 - 1. Refer to plan Schedule.

1.05 SUBMITTALS

- A. Section 23 01 00 - General HVAC Provisions: Procedures for submittals.
- B. Product Data: Provide rated capacities, weights specialties and accessories, electrical nameplate data, and wiring diagrams. Make submission with coils and furnaces to ensure capacities are complementary.
- C. Shop Drawings: Indicate components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Include schematic layouts showing condensing units, cooling coils, refrigerant piping, and accessories required for complete system.
- D. Design Data: Indicate pipe and equipment sizing.
- E. Manufacturer's Instructions: Submit manufacturer's complete installation instructions.
- F. Operation and Maintenance Data: Include start-up instructions, maintenance instructions, parts lists, controls, and accessories.
- G. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- B. Unit construction complies with ANSI/ASHRAE 15, latest revision, and with the NEC.
- C. Units are evaluated in accordance with UL standard 60335-2-40.
- D. Units are listed in the CEC directory.

- E. Unit cabinet is capable of withstanding 500-hour salt spray test per Federal Test Standard No. 141 (method 6061).
- F. Air-cooled condenser coils are leak tested at 550 psig.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

1.08 WARRANTY

- A. Provide a five year warranty to include coverage for refrigerant compressors.
- B. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Trane Inc.
- B. Lennox.
- C. Carriers.
- D. YORK.
- E. Rheem/RUUD.
- F. Daikin.
- G. Substitutions: See Section 23 01 00 - General HVAC Provisions.

2.02 MANUFACTURED UNITS

- A. Units: Self-contained, packaged, factory assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressors, condensing coil and fans, integral sub-cooling coil, controls, liquid receiver, wind deflector, and screens.
- B. Construction and Ratings: In accordance with AHRI 210/240. Test in accordance with ASHRAE Std 23.
- C. Construction and Ratings: In accordance with ARI 210/240, ARI 365, and UL 207. Testing shall be in accordance with ASHRAE Std 23.
- D. Performance Ratings: Energy Efficiency Rating (EER) and Coefficient of Performance (COP) not less than prescribed by ASHRAE Std 90.1.

2.03 GENERAL

- A. Factory assembled, single piece, air-cooled outdoor unit. Contained within the unit enclosure is all the factory wiring, piping, controls, and the compressor.

2.04 UNIT CABINET:

- A. Unit cabinet is constructed of galvanized steel, bonderized and coated with a baked-enamel finish on the inside and outside.
- B. Unit access panels is removable with minimal screws and provides full access to the compressor, fan, and control components.
- C. The outdoor compartment is isolated and has an acoustic lining to assure quiet operation

2.05 FANS:

- A. Outdoor fans are the direct drive propeller type, and discharges air horizontally. Fans draw air through the outdoor coil.
- B. Outdoor fan motors are totally enclosed, single phase motors with class E insulation and permanently lubricated ball bearings. The motor shall be protected by internal thermal overload protection.
- C. The shaft has inherent corrosion resistance.
- D. Fan blades are non-metallic and statically and dynamically balanced.
- E. Outdoor fan openings are equipped with a PVC metal/mesh coated protection grille over the fan.

2.06 COMPRESSOR:

- A. Compressor is the fully hermetic rotary type.
- B. Compressor is equipped with an oil system, operating oil charge, and a motor.
- C. Motor is NEMA rated class E, suitable for operation in a refrigerant atmosphere.
- D. Compressor assembly is installed on rubber vibration isolators.

2.07 OUTDOOR COILS:

- A. The coil is constructed of aluminum hydrophilic pre-coated fins mechanically bonded to seamless copper tubes, which are cleaned, dehydrated, and sealed.

2.08 REFRIGERATION COMPONENTS:

- A. Refrigerant circuit components include a brass external liquid line service valve with service gage port connections, a suction line service valve with a service gage connection port, service gage port connections on compressor suction and discharge lines with Schrader type fittings with brass caps, accumulator, reversing valve.

2.09 CONTROLS AND SAFETIES:

- A. Operating controls and safeties are factory selected, assembled, and tested. The minimum control functions include the following:
 - 1. Controls:
 - a. A time delay control sequence is provided standard through the fan coil board
 - b. Automatic outdoor fan motor protection.
 - 2. Safeties:
 - a. Systems diagnostics:
 - b. Compressor motor current and temperature overload protection.
 - c. Outdoor fan failure protection.

2.10 ELECTRICAL REQUIREMENTS:

- A. Unit operates on single-phase, 60 Hz power at 115V for unit size 12 and 208/230V for unit sizes 06, 09, 12, 18, 24, 30, 36 and 36 (AHU Only) as specified.
- B. Unit electrical power has a single point connection.
- C. Unit Control voltage to the indoor fan coil is 0-15 DC.
- D. All power and control wiring must be installed per NEC and local electrical codes.
- E. The unit has high and low voltage terminal block connections.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's installation instructions.
- B. Complete structural, mechanical, and electrical connections in accordance with manufacturer's installation instructions.
- C. Provide for connection to electrical service.

- D. Install units on concrete base as indicated.
- E. Install units on roof curbs as indicated.
- F. Provide connection to refrigeration piping system and evaporators. Refer to Section 232300. Comply with ASHRAE Std 15.

3.02 SYSTEM STARTUP

- A. Supply initial charge of refrigerant and oil for each refrigeration system. Replace losses of oil or refrigerant prior to end of correction period.
- B. Charge system with refrigerant and test entire system for leaks after completion of installation. Repair leaks, put system into operation, and test equipment performance.
- C. Shut-down system if initial start-up and testing takes place in winter and machines are to remain inoperative. Repeat start-up and testing operation at beginning of first cooling season.
- D. Provide cooling season start-up, and winter season shut-down for first year of operation.

3.03 SCHEDULES

- A. Heat Pump Units.
 - 1. As scheduled on drawings.

END OF SECTION 23 62 13

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Air Handling Units
 - 1. Size Range: 1.5 to 5 Ton Nominal Cooling and Heating Capacity.

1.02 RELATED SECTIONS

- A. Section 23 07 13 - Duct Insulation.
- B. Section 23 31 00 - Duct.

1.03 REFERENCES

1.04 SUBMITTALS

- A. Submit shop drawings and product data.
- B. Submit curves showing fan performance with system operating point plotted on curves.
- C. Submit manufacturer's installation instructions.
- D. See Section 23 01 00 - General HVAC Provisions, for submittal procedures.
- E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Provide fans bearing AMCA certified rating seal.
- B. Unit is rated per AHRI Standards 210/240 and listed in the AHRI directory as a matched system.
- C. Provide filter media with UL Class I or Class II rating, as required by local authorities.
- D. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- E. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

1.06 WARRANTY

- A. Correct defective Work within a one year period after Date of Substantial Completion.
- B. Provide five year manufacturer warranty for air handling unit.

1.07 EXTRA MATERIALS

- A. Supply two sets of additional filters for Owner's use in maintenance of project.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Trane.
 - 2. Lennox.
 - 3. Carriers.
 - 4. York/RUUD
 - 5. Rheem.
 - 6. Daikin.
- B. Substitutions: Approved equal.

2.02 SPLIT SYSTEM

- A. General:
 - 1. Indoor, direct-expansion, ceiling-mounted fan coil. The unit is complete with cooling/heating coil, fan, fan motor, piping connectors, electrical controls, microprocessor control system, and integral temperature sensing.
- B. Unit Cabinet:
 - 1. Unit cabinet is constructed of galvanized steel. The cabinet is fully insulated for improved thermal and acoustic performance.
- C. Fans:
 - 1. The fan is the tangential direct-drive blower type with air intake at the rear or bottom of the unit and discharge at the front.
- D. Coils:

1. The coil is a copper tube with aluminum fins and galvanized steel tube sheets. The fins are bonded to the tubes by mechanical expansion and specially hydrophilic pre-coated for enhanced wet-ability. A drip pan under the coil has a drain connection for piping attachment to remove condensate.
- E. Motors:
1. The motors have an open drip-proof, permanently lubricated ball bearing with inherent overload protection. Fan motors are 4- speed.
- F. Controls:
1. The controls consist of a microprocessor-based control system which controls the space temperature, determines optimum fan speed, and runs self diagnostics.
- G. The unit has the following functions (at a minimum):
1. An automatic restart, after a power failure, which sets the unit back to the same operating conditions it operated under at time of failure.
 2. A timer function to provide a minimum 24-hour timer cycle for system Auto Start/Stop.
 3. Automatic airflow technology - fan maintains set CFM range at up to 0.80" W.C. ESP
 4. Temperature-sensing controls sense return air temperature.
 5. Indoor coil freeze protection.
 6. Wired remote controller to enter set points and operating conditions.
 7. **DEHUMIDIFICATION** mode provides increased latent removal capability by modulating system operation and set point temperature. Applicable **only** with third party thermostats that have the dehumidification option.
 8. **FAN-ONLY** operation to provide room air circulation when cooling is not required.
 9. Diagnostics provide continuous checks of unit operation and warns of possible malfunctions. Error messages appear on the unit.
 10. The fan speed control is user-selectable: high, medium, low, or microprocessor controlled automatic operation during all operating modes.
 11. Automatic heating-to-cooling changeover in the **HEAT** pump mode. The control includes deadband to prevent rapid mode cycling between heating and cooling.

12. Indoor coil high temperature protection is provided to detect an excessive indoor discharge temperature when the unit is in the **HEAT** pump mode.
- H. Electrical Requirements:
1. The indoor fan motor operates on 208-230V. Power is supplied from the outdoor unit.
- I. Operating Characteristics:
1. The air handler system has a minimum SEER (Seasonal Energy Efficiency Ratio) and HSPF at AHRI conditions, as listed on the specifications table.
- J. Refrigerant Lines:
1. All units have refrigerant lines that can be oriented to connect from the side of the unit. Both refrigerant lines must be insulated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install items in accordance with manufacturer's instructions.

3.02 STARTING EQUIPMENT

- A. Adjust for proper operation within manufacturer's published tolerances.
- B. Demonstrate proper operation of equipment to Owner's designated representative.

3.03 CLEANING AND PROTECTION

- A. Protect installed equipment from subsequent construction operations.
- B. Do not permit equipment to be used as source of temporary heat.

END OF SECTION 23 77 00

PART 26
ELECTRICAL

PART 1 GENERAL**1.01 WORK INCLUDED**

- A. Furnish and install all electrical wiring, systems, equipment and accessories in accordance with the specifications and drawings. Specifications and drawings are complimentary except that, in case of conflict, the most stringent will govern.
- B. Judgment shall be exercised to install electrical work in a practical manner to function properly, simplify future maintenance, and to fit building construction and finish. Items not shown or specified which are required to produce a complete, operative and finished system shall be provided.
- C. The electrical plans are a guide to the Contractor to show general arrangement of conduit and wiring and equipment required. If any error omissions or obscurities appear therein, which are questionable, do not conform to good practice, or appear contrary to the purpose and intent of the work, the Contractor shall promptly notify the Architect and Engineer and apply for directions before construction. The exact location of conduit runs and lengths shall be determined by the Contractor in the field.
- D. The drawings may be superseded by later revised or detailed drawings or specification addenda prepared by the Architect. The Contractor shall conform to all reasonable change without extra cost to the Owner. All items not specifically mentioned in the specifications or noted on the drawings, but which are obviously necessary to make a complete working installation, shall be included.
- E. Examine the premises in accordance with Division 1 and Division 2 of the specifications.
- F. The Owner may furnish some equipment. Electrical Contractor is responsible to check the drawings and specifications for equipment that will be furnished by the Owner. Furnish the electrical connections, etc., on all Owner furnished equipment.
- G. Should the particular equipment which any bidder proposes to install, require other space conditions than those indicated on the drawings, arrange for such space with the Engineer before submitting a bid. Should changes become necessary because of failure to comply with this clause, install the changes without additional expense.
- H. Where electrical equipment is installed that causes electrical noise interference with other electrical systems installed under this contract, equip the offending equipment with isolating transformers, filters, shielding or any other means as required for the satisfactory suppression of the interference as determined by the Engineer.

- I. Comply with National Electric Code, NFPA, appropriate Building Code, and all local, state, and national ordinances.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. The General Conditions and Supplementary General Conditions of the contract are an integral part of Division 26 of the Specifications. Carefully note its contents in performance of the work.
- B. The General Requirements as included in Division 1 of the Specifications are an integral part of Division 26. Carefully note its contents in performance of the work.
- C. Examine all of the contract drawings and specifications, field verify existing conditions, or otherwise determine the extent of related work in other divisions before submitting a quotation for the work in this division. Coordinate the work in this division with work in other divisions through the Electrical Contractor. No extra payment will be made for additional work required by failure to coordinate the work. Should drastic changes from original drawings be necessary, the Contractor shall notify the Architect and secure written approval and agreement from the Architect on necessary adjustments.
- D. The architectural, mechanical and structural plans and specifications, including Information to Bidders and other pertinent documents issued by the Architect or Engineer are a part of this Specification and the accompanying electrical plans. Comply with them in every respect. Examine all the above carefully.
 1. Failure to comply does not relieve the Contractor of responsibility nor may it be used as a basis for additional compensation due to omission of architectural, mechanical and structural details from the electrical drawings.
- E. Related work in other divisions requiring cooperation and coordination with this division includes, but is not limited to, the following:
 1. Power arranged under Division 1.
 2. Perform all cutting and patching as required under Division 1.
 3. Furnish all sleeves, inserts, anchors and supports required by this work to be installed in concrete or masonry and coordinate with the respective trades under Division 3 and 4 for proper locations and installation.
 4. Flash and seal roof penetrations in accordance with Division 7. Furnish locations and sizes and coordinate the installation with the respective trade.
 5. Perform painting of electrical equipment and materials in finished areas as required under Division 9. Touch up or prime any surfaces required in this division in

accordance with Division 9. Provide factory finishes as specified in other sections of this division.

6. Install branch circuits and make final connections to any equipment requiring electric power that is furnished and installed by the Contractor or by the Owner. Perform the electrical work according to approved shop drawings.
7. Install empty raceways and outlet boxes or branch circuits for equipment to be furnished by others and installed after completion of the contract.
8. Install and connect motor starters furnished under Division 23 where starters are not an integral part of the equipment. Insure that starters generally conform to the requirements of this division.
9. 120 volt control wiring is furnished and installed by the Electrical Contractor in accordance with the requirements of Division 23.
10. Mechanical equipment control conduit system furnished and installed by the Mechanical Contractor.
11. Motors are furnished and installed generally as an integral part of equipment specified under Division 23 and must conform to the requirements of this division.

1.03 FEES, PERMITS AND INSPECTIONS

- A. Obtain any and all required permits in connection with this work under the Contract and pay any and all fees in connection therewith to include fees by the utility companies.
- B. Under this section of work the Contractor shall, upon completion of the work, furnish a certificate of final inspection to the Architect from the inspection department having jurisdiction.

1.04 CODES AND STANDARDS

- A. All work shall be done in a good workmanlike manner. Materials and workmanship shall comply with all applicable local state and federal codes including, but not limited to, the following:
 1. National Electrical Code, Latest Edition (NEC).
 2. Underwriters' Laboratories, Inc. (UL).
 3. Institute of Electrical and Electronic Engineers (IEEE).
 4. Insulated Power Cable Engineers' Association (IPCEA).
 5. National Electrical Manufacturers' Association (NEMA).

6. American Standards Association (ASA).
 7. American Society for Testing Materials (ASTM).
 8. State Fire Prevention Code.
 9. Occupational Safety and Health Act (OSHA).
 10. National Fire Protection Association (NFPA).
 11. International Building Code (IBC).
- B. Comply with all State and Federal ADA Accessible Guidelines in regard to accessible or handicapped features.
- C. The latest specifications and standards available shall be used for the above.
- D. In case of discrepancy between the applicable codes, plans and specifications, the most stringent shall govern.
- E. Should the Contractor perform any work that does not comply with requirements of the applicable authorities, he shall bear all cost arising in correcting the deficiencies.
- F. Equipment and materials which are not covered by UL standard will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory.

PART 2 PRODUCTS

2.01 QUALIFICATION (PRODUCTS AND SERVICES)

- A. Approvals are required of products or services of proposed manufacturers, suppliers and installers and will be based upon submission by Contractor of certification.
- B. Manufacturer's Qualifications, provide submittal information with the following: Manufacturer regularly and presently manufactures as one of the manufacturer's principal products the following items and has manufactured these items for at least five (5) years.
1. Wire and Cable - all types.
 2. Light Fixtures.
 3. Lighting Switches and Receptacles.
 4. Dimmers.
 5. Molded Case Circuit Breakers.

6. Fuses.
 7. Conduit.
 8. Wiring Devices.
 9. Low Voltage Fusible and Non-Fusible Switches.
 10. Conduit Supports and Fittings.
 11. Panelboards.
 12. Fire Sealant.
- C. Manufacturer's product submitted must have been in satisfactory operation on three (3) installations similar to this project for approximately five (5) years.
- D. There must be a permanent service organization maintained or trained by manufacturer which will render satisfactory service to this installation within eight (8) hours of receipt of notification that service is needed.
- E. Installer must have the technical qualifications, experiences, trained personnel and facilities to install specified items including at least three (3) years of successful installation of electrical work similar to that required on this project. Approval will not be given where the experience record is one of unsatisfactory performance.
- F. The lighting wholesale supplier shall have an office and a stocking warehouse within 100 miles of the project site. The distributor/manufacturer's representative shall have an office within 100 miles of the project site, and shall have on staff a full time lighting designer as well as personnel who are available to service the project after completion.

2.02 MANUFACTURED PRODUCTS

- A. Insure that materials and equipment furnished is of current production by manufacturers regularly engaged in the manufacture of such items for which replacement parts should be available.
1. Items not meeting this requirement but which otherwise meet technical specifications and merits of which can be established through reliable test reports or physical examination of representative samples will be considered.
- B. Provide products of a single manufacturer when more than one (1) unit of the same product is needed.
- C. Equipment Assemblies and Components:

1. All components of an assembled unit need not be products of the same manufacturer.
 2. Manufacturers of equipment assemblies which include components made by others must assume complete responsibility for the final assembled unit.
 3. Components must be compatible with each other and with the total assembly for the intended service.
 4. Constituent parts which are similar must be the product of a single manufacturer.
 5. Moving parts of any element of equipment of the units normally requiring lubrication must have means provided for such lubrication and must be adequately lubricated at factory prior to delivery.
- D. Identify all factory wiring on the equipment being furnished and on all wiring diagrams.
- E. Equipment and materials shall be new and shall bear the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material.
- F. Equipment and materials of the same general type shall be of the same make throughout the work to provide uniform appearance, operation and maintenance.
- G. Dimensions: It shall be the responsibility of the Contractor to insure that items furnished fit the space available. He shall make necessary field measurements to ascertain space requirements, including those for connections, and shall furnish and install such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the drawings and specifications. Dimensions are to be taken from the architectural drawings.
- H. Manufacturer's directions shall be followed completely in the delivery, storage, protection and installation of equipment and materials. Notify the Architect of any conflict between any requirement of the contract documents and the manufacturer's directions and obtain the Architect's written instruction before proceeding with the work. Should the Contractor perform any work that does not comply with the manufacturer's directions or such written instructions from the Architect, he shall bear all costs arising in correcting the deficiencies.
- I. The Contractor shall provide and install all accessories, and incidental items to complete the work, ready to use and fully operational.

2.03 EQUIPMENT RATINGS AND APPROVAL OF "EQUAL" EQUIPMENT

- A. Equipment voltage ratings must be in accordance with the requirements indicated on the drawings or as specified.

- B. Obtain written approval for any equipment which differs from the requirements of the drawings and specifications.
 - 1. Furnish drawings showing all installation details, shop drawings, technical data and other pertinent information as required.
 - 2. Approval by the Engineer of the equal equipment does not relieve the Contractor of the responsibility of furnishing and installing the equipment at no additional cost.
 - 3. Furnish and install any other items required for the satisfactory installation of the equal equipment at no additional cost. This includes, but is not limited to, changes in branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels, and correlation with other work, subject to the jurisdiction and approval of the Engineer.
- C. Equipment and materials specified herein are named to establish a standard of quality. Other material of equal quality may be substituted per Section 01 60 00 and with approval by the Architect.
- D. It is the responsibility of the Contractor to investigate any desired substitutions for specified equipment prior to submission of his bid. The contractor shall be responsible for any changes required in mechanical, electrical or structural systems resulting from equipment substitutions and shall bear all costs for those changes whether the substitute equipment is named by Architect for "equal" consideration or not. All changes shall be accomplished in a manner acceptable to the Architect at no additional cost to the Owner.
- E. In order to obtain prior approval on equipment or material not specified in Division 26, 27 and 28 Specifications or Equipment Schedules, Contractor MUST submit to the Engineer any proposed equipment or material ten (10) working days prior to the bid date.

2.04 EQUIPMENT PROTECTION

- A. Store all materials and equipment to be installed in the work so as to insure the preservation of their quality, workability, and fitness for the work intended. Provide storage provisions for protection from the elements, rust and physical damage. Place stored materials on clean, hard surfaces above ground and keep covered at all times to insure protection from paint, plaster, dust, water and other construction debris or operations. Install heaters under the protective cover where the equipment may be damaged due to moisture and weather conditions. Keep conduit ends plugged or capped and all covers closed on boxes, panels, switches, fixtures, etc., until installation of each item. Store all plastic conduit or duct out of direct sunlight in shaded areas. Located stored materials and equipment to facilitate prompt inspection. All boxes and packaging must remain intact.

- B. Protect during installation, all equipment, controls, controllers, circuit protective devices, etc., against entry of foreign matter on the inside and be vacuum clean both inside and outside before testing, operating and painting.
- C. Replace damaged equipment, as determined by the Engineer, in first class operating condition or return to source of supply for repair or replacement.
- D. Protect painted surfaces with removable heavy Kraft paper, sheet vinyl or equal, installed at the factory and removed prior to final inspection.
- E. Repair damaged paint on equipment and materials. Finish with same quality of paint and workmanship as used by manufacturer so repaired areas are not obvious.
- F. All lighting fixtures are to be stored on the project in their original factory cartons.

2.05 EQUIPMENT ACCESSORIES

- A. Furnish and install all equipment, accessories, connections and incidental items necessary to fully complete all work, ready for use, occupancy and operation by the Owner.
- B. Where equipment requiring different arrangement or connections from those shown is provided, install the equipment to operate properly and in harmony with the intent of the drawings and specifications.
- C. Support, plumb, rigid and true to line all work and equipment included. Study thoroughly all general, structural, electrical and mechanical drawings, shop drawings and catalog data to determine how equipment is to be supported, mounted or suspended and provide extra steel bolts, inserts, pipe stands, brackets and accessories for proper supports whether or not shown on the drawings. When directed, submit drawings showing supports.

PART 3 EXECUTION

3.01 WORK PERFORMANCE

- A. Furnish and install a temporary electrical distribution system of adequate feeder sizes to prevent excessive voltage drop. Install all temporary work in a neat and safe manner. Provide temporary lighting as necessary to furnish 2.5 footcandles on all work surfaces.
- B. Field coordinate with other trades in ample time to build all chases and openings, set all sleeves, inserts and concealed materials, and provide clearances that may be required to accommodate materials and equipment. Lay out electrical work so that in case of interference with other items the layout may be altered to suit conditions encountered.
- C. Cutting and Patching:

1. The Electrical Contractor shall be responsible for all required cutting, patching, etc., incidental to this work and shall make all required repairs thereafter to the satisfaction of the Engineer. Do not cut into any structural element, beam or column without the written approval of the Engineer.
 2. Pipes, conduits, cables, wires, wire ducts and similar equipment that pass through fire or smoke barriers shall be protected in accordance with NFPA 101.
- D. Wall Penetrations: When conduit, wireways, bus duct and other electrical raceways pass through fire partitions, fire walls, or walls and floors, install a firestop that provides an effective barrier against the spread of fire, smoke and gases. Firestop material must be packed tight and completely fill clearances between raceways and openings. Use firestop material conforming to the following:
1. All wall penetrations shall be caulked and sealed. Provide fire barrier pillows to protect the interior of conduits/sleeves passing through fire rated walls.
 2. The Contractor shall furnish and install all necessary sleeves and chases for all work passing through and attaching to walls, ceilings or the roof.
 3. Provide UL listed, fire rated poke through devices for floor penetrations as required by the Standard Building Code, National Fire Code and Life Safety Code.
 4. Provide UL approved fire rated chases and fire sealing as required to maintain fire rating for all penetrations in fire rated walls.
 5. Firestopping material must be of the latest type as supplied by leading manufacturers such as "3M".
 6. Floor, exterior wall and roof seals must be watertight. Sleeve walls and floors which are cored for installation of conduit with steel tubing, grouted and the space between the conduit and sleeve filled as specified herein. Where conduits pierce the roof, refer to architectural specifications and drawings for details. Provide pourable sealant as specified by the Roofing Contractor.
- E. Do not use electrical hangers and other supports for other than electrical equipment and materials. Provide not less than a safety factor of five (5) and conform with any specific requirements as shown on the drawings or in the specifications.
- F. Do not deviate from the plans and specifications without the full knowledge and consent of the Engineer. Should, at any time during the progress of the work, a new or existing condition be found which makes desirable a modification of the requirements of any particular item, report such item promptly to the Engineer for his decision and instruction.

- G. Notify all other contractors of any deviations or special conditions. Resolve interferences between the work of the various contractors prior to installation. Remove, if necessary, work installed which is not in compliance with the plans and specifications as specified above, and properly reinstall without additional cost to the Owner.
- H. This Contractor shall furnish all necessary scaffolding, cranes, tackle, tools and appurtenances of all kinds, and all labor required for the safe and expeditious execution of his contract.

3.02 EQUIPMENT INSTALLATION AND EQUIPMENT

- A. Installation:
 - 1. "Provide" and "Install" as used on the drawings and in the specifications means furnish, install, connect, adjust and test except where otherwise specified.
 - 2. Install coordinated electrical systems, equipment and materials complete with auxiliaries and accessories installed.
- B. Equipment Location: As close as practical to locations shown on drawings.
- C. Working Spaces: Not less than specified in the National Electrical Code for all voltages specified.
- D. Inaccessible Equipment:
 - 1. Where the Engineer determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, remove and reinstall equipment as directed at no additional cost.
 - 2. "Conveniently Accessible" is defined as being capable of being reached without the use of ladders or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping and ductwork.
- E. Equipment and Materials:
 - 1. Install new equipment and materials unless otherwise specified.
 - 2. Insure that equipment and materials are designed to provide satisfactory operation and operating life for environmental conditions where being installed. NEC and other code requirements applied to the installation and other code requirements apply to the installation in areas requiring special protection such as explosion proof, vapor-proof, water tight and weather-proof construction.

3.03 EQUIPMENT IDENTIFICATION

- A. In addition to the requirements of the National Electrical Code, install identification signage which will clearly indicate information required for use and maintenance of items such as panelboards, cabinets, motor controllers (starters), safety switches, time clocks, contactors, separately enclosed circuit breakers, individual breakers, and controllers in switchgear and motor control assemblies, control devices and other significant equipment.

3.04 DRAWINGS AND SPECIFICATIONS

- A. The drawings and specifications indicate the requirements for the systems, equipment, materials, operation and quality. They are not to be construed to mean limitation of competition to the products of specific manufacturers.

3.05 SYSTEM VOLTAGES

- A. System voltage is 120/240 volts, single-phase.

3.06 SUBMITTALS

- A. Obtain the Engineer's approval for all equipment and materials before purchasing or delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval is not permitted at the job site. Only equipment and material which have been approved by submittals may be used on this project. Refer to Section 26 00 10, Paragraph 2.3.E for substitutions.
- B. Include in all submittals adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Engineer to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval must be legible and clearly identify equipment being submitted.
- C. Submit to the Engineer within (30) days after the awarding of the Contract, a complete set of brochures of shop drawings and descriptive data of all material and equipment proposed for the installation. All information shall be submitted electronically in "pdf" format, and shall be separated into electronic "pdf" files in three groups, lighting, switchgear and all others.
- D. The submittals must include the following:
 - 1. Information which confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 - 2. Elementary and interconnection wiring diagrams for communication and signal systems, control system and equipment assemblies. All terminal points and wiring must be identified on wiring diagrams.

3. Parts list which must include those replacement parts recommended by the equipment manufacturer.
 4. Approvals will be based on complete submission only.
- E. Furnish shop drawings for the work involved in sufficient time so that no delay or changes will be caused. Thermofax copies are not acceptable - only permanent type prints are allowed.
- F. Verify that shop drawings comply in all respects with the item originally specified. It is the Contractor's responsibility to procure the proper sizes, quantities, rearrangements, structural modifications or other modifications in order for the substituted item to comply with the established requirements.
- G. Any shop drawings prepared to illustrate how equipment, conduit, fixtures, etc., can be fitted into available spaces will be examined under the assumption that the Contractor has verified all the conditions. Obtaining approval thereon does not relieve the Contractor of responsibility in the event the material cannot be installed as shown on the drawings.
- H. Shop drawings need not cover detailed installation drawings prepared for the Contractor's own use, but be limited, as in the case of raceways, to necessary departures from the plans as prepared by the Engineer.
- I. Submit working scale drawings of apparatus and equipment which in any way varies from these specifications and plans, to be reviewed by the Engineer before the work is started. Correct interferences with the structural conditions before the work proceeds.
- J. Submit all shop drawings at the same time in a loose-leaf binder with double index as follows:
1. List the products by designated letter or number as indicated on plan sheets.
 2. List the name and manufacturers whose products have been incorporated in the work alphabetically together with their addresses and the name and addresses of the local sales representative.
 3. Provide indexes with sheet numbers and quantities of the products listed.

3.07 TESTS AND DEMONSTRATION

- A. As equipment and materials are being installed and connected, test the installation for the following:
1. Short circuits and ground faults.
 2. Insulation resistance at 500 volts DC.

3. Grounding continuity.

- B. After tests are completed and necessary corrections are made, put each system into operation and demonstrate its performance to the satisfaction of the Owner's authorized representative.
- C. Provide written documentation of tests and performance as requested by the Owner's authorized representative. The results are to be made part of the Closeout Documents.
- D. Furnish all instruments, test equipment and personnel that are required for the particular test. Certify that equipment and gauges are in good working order. Remove equipment subject to damage during test from line before test is applied.
- E. After installation is complete the Contractor shall conduct operating test of all electrical systems for approval by the Architect. Test shall include verification of direction of rotation for all motors. The equipment shall be demonstrated to operate in accordance with the requirements of the plans and specifications. The test shall be performed in the presence of the Architect or Engineer.
- F. Provide certified test of the grounding electrode system. It shall test to 5 ohms or less.

3.08 COMPLETION AND ACCEPTANCE

- A. Upon completion of the work and before final acceptance, perform the duties and provide the documents as follows in accordance with the General Conditions, Supplementary Conditions and Division 1 of Contract.
- B. Remove all rubbish, tools and surplus materials accumulated during the execution of the work in this Division.
- C. Touch up any equipment or finishes damaged during delivery or installation from the work in this Division.
- D. Provide a written one-year guarantee of materials and work except for items that are specified to have a longer warranty. Items that have a published or normal life expectancy of less than one year, such as incandescent lamps are to be covered by the manufacturer's guarantee.
- E. Provide systems and equipment installation, operating and maintenance instructions and catalog data for transmittal to the Owner. Place the data in a loose-leaf binder which contains an index of the products listed alphabetically by name and a separate index listing the manufacturers alphabetically by name and including the manufacturer's address and the name and address of their local representative.

- F. Instruct the Owner's representative in the proper operation and maintenance of the systems and their elements as required or directed to familiarize the Owner in the operation and maintenance of the systems.

3.09 RECORD DRAWINGS

- A. The Contractor shall keep a neat and accurate record of field changes made during construction. Changes shall be penciled in on a separate set of drawings used only for recording changes. At completion of the project the Contractor shall deliver this set to the Architect for preparation of record drawings.
- B. Record drawings shall include corrected panel schedules and riser diagram as well as all plan sheets.

3.10 FINALLY

- A. It is the intention that this specifications shall provide a complete installation. All accessories and apparatus necessary for complete operational systems shall be included. The omission of specific reference to any part of the work necessary for such complete installation shall not be interpreted as relieving this Contractor from furnishing and installing such parts.

END OF SECTION 26 00 10

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Wires and cables.

1.02 RELATED WORK

- A. Section 26 05 53: Identification.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Wire and cable shall be new, shall have size, grade of insulation, voltage and manufacturer name, permanently marked on outer covering at regular intervals.
- B. Building Wiring: 95% conductivity, soft drawn conforming to requirements of the NEC and relevant ASTM specifications, copper, 600 volt insulation, dual rated THHN-THWN.
- C. Branch Circuit Wiring: Conductors smaller than No. 12 AWG not permitted; No. 8 AWG and larger, stranded construction; smaller than No. 8, either solid or stranded.
- D. Fire Alarm System Wiring: UL Listed plenum-rated cable for conductors installed in plenum rated spaces. Coordinate with Authority Having Jurisdiction.
- E. Exterior Wiring: Bare stranded for ground, THWN-THHN for all other.
- F. Use pre-insulated pressure connectors such as Scotchlock on stranded conductors No. 10 and smaller. Use approved high-pressure crimp sleeve connectors on No. 8 and larger conductors.
- G. Where allowed by local inspecting authorities, type "MC" cable shall be allowed for fixture whips. It shall be installed using proper fittings and installation tools per NEC.
- H. Low voltage cable is to be installed in conduit in areas with no ceiling.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Make conductor length for parallel feeders identical.
- B. Lace or clip groups of conductors at panelboards, pull boxes and wireways.
- C. Provide copper grounding conductors and straps.

- D. Install wire and cable in code conforming raceway.
- E. Use wire pulling lubricant for pulling No. 4 AWG and larger wire.
- F. Install wire in conduit runs after concrete and masonry work is complete and after moisture is swabbed from conduits.
- G. Splice only in accessible junction or outlet boxes. Install splices and taps which have mechanical strength and insulation rating equivalent-or-better than conductor and are compatible with conductor material.
- H. Color code conductors to designate neutral conductor and phase as follows: 120/208V (phases) black, red, blue, (neutral) white, (ground) green; 277/480V (phases) orange, brown, yellow, (neutral) white with color stripe, (ground) green.
- I. All 20 amp circuits are 2-#12, 1-#12 ground unless noted. Use #10 AWG conductors on 20 amp branch circuits which exceed 75 feet to the first outlet.
- J. Install home runs as indicated on the panel schedules. Circuits may be grouped into 3-Phase home runs but in no case are more than 3 phase conductors allowed.
- K. Sharing of neutrals is not allowed, to include lighting and power circuits.
- L. Where conduit and wire are installed on the roof, refer to NEC Section 310.15.(B.)(2)(C) for derating/correcting factors for the distance installed from the roof.
- M. No low-voltage wiring is to be visible in open ceiling areas; install in conduit.

3.02 MARKING

- A. Identify circuits using wire markers at the following locations:
 - 1. All power and lighting branch circuits and feeders at pull boxes, fixtures, outlets, motors, etc., indicating panel and circuit number at which each circuit or feeder originates.
 - 2. All branch circuits in the panelboard gutters indicating corresponding branch circuit numbers.
 - 3. All signal and control wires at all termination points such as cabinets, terminal boxes, equipment racks, control panels, consoles, etc. Install in accordance with approved schedules prepared by the equipment manufacturer or by the Contractor.
 - 4. Mark both ends of all pull wires with tag reading "PULL WIRE" and numbered to refer to the same pull wire.

END OF SECTION 26 05 19

PART 1 GENERAL**1.01 WORK INCLUDED**

- A. Power system grounding.
- B. Communication system grounding.
- C. Building ground system.

1.02 RELATED WORK

- A. Section 26 05 19: Wires and Cables.
- B. Section 26 05 34: Conduit.

1.03 REGULATORY REQUIREMENTS

- A. Install complete grounding system for the building(s) and all electrical equipment in accordance with National Electrical Code, Section 250.

PART 2 PRODUCTS**2.01 GROUNDING**

- A. Provide copper grounding conductors for grounding connections sized according to NEC.

PART 3 EXECUTION**3.01 POWER SYSTEM GROUNDING**

- A. Install NEC sized ground conductor, #12 AWG minimum, in all branch circuit and equipment conduits.
- B. Bonding Jumpers: Provide green insulated wire, size correlated with over-current device protecting the wire. Connect to neutral only at service neutral bar.
- C. Bonding Wires: Install bonding wire in flexible conduit connected at each end to a grounding bushing.
- D. No strap type grounding clamps shall be used. All connections shall be made only after surfaces have been cleaned or ground to exposed metal.
- E. The building structural steel shall be grounded as follows:

1. All locations noted on the plans or if not shown, at approximately 75 foot intervals where structural columns are located.
 2. All grounding locations are to be made with 1/0 bare copper wire with exothermic welds or Burndy "HyGround" to the column, to in-footing rebar, and to a 3/4" x 8' copper ground rod. Include "Eupher" grounds at all locations shown with grounding symbol.
- F. Provide one 1-1/0 bare copper ground wire from the electrical service, and from nearest branch panel, grounding electrode, in 1 1/4" conduit, to the location of each telephone terminal board and Data Room. Provide "Intersystem Bonding Termination" bars at these locations and at the electrical meter where applicable. Termination bars in data or telephone rooms are to be equal to Chatsworth Products, Inc; Model 40153-020. Ground all equipment and metal parts using #6 bare copper ground from this terminal bar.
- G. Bond the neutral (grounded conductor) to ground at one location only once per building at the building's main service disconnect. Bond per NEC Article 250.
- H. Ground cable trays per N.E.C.

END OF SECTION 26 05 26

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Conduit supports.

PART 2 PRODUCTS

2.01 CONDUIT SUPPORTS

- A. Single Runs: Galvanized conduit straps or ring bolt type hangers with specialty spring clips. All "Caddy" and "B-Line" hangers are approved.
- B. Multiple conduits running horizontally at the same grade and elevation may be supported by trapezes of channels suspended on rods. All support components shall be adequate size for loaded weights being supported. Provide conduit racks with 25% spare capacity.
- C. Perforated strap iron or wire shall not be used for supporting conduits or equipment.
- D. Where large conduits are supported beneath bar joist, hanger rods shall be secured to angle irons of adequate size. Each angle shall span two or more joist to distribute the weight properly.
- E. Supports shall be installed within three (3) feet of each coupling or connector.
- F. Vertical Runs: Channel support with conduit fittings, clamp type supports where conduits penetrate floors.

2.02 ANCHOR METHODS

- A. Hollow Masonry: Toggle bolts or spider type expansion anchors.
- B. Solid Masonry: Lead expansion anchors or preset inserts.
- C. Metal Surfaces: Machine screws, bolts or welded studs.
- D. Wood Surfaces: Wood screws.
- E. Concrete Surfaces: Self drilling anchors or power driven studs.

2.03 METAL FRAMING SYSTEMS

- A. Provide metal framing systems for electrical equipment and conduits as required for proper support spacing and approved for the purpose. Powerstrut, Unistrut, Kindorf or equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Layout to maintain headroom, neat mechanical appearance, and to support equipment loads required.
- B. Install horizontal supports at eight feet (8') on centers, at fittings and corners, and as required for proper support.
- C. Provide a complete installation with all channels, accessories, screws, nuts, washers, inserts, springs, clamps, hangers, clips, fittings, brackets framing fittings, post bases and brackets to provide a structural rigid support or mounting system.
- D. On the roof, provide B-Line DB series roof top support bases. Provide two supports per 10' length of conduit. Conduit to be 24" off the roof, minimum. Provide 1/2" rubber pads under the B-Line support blocks. Coordinate to be higher than other trades' piping on the roof. Install conduit in the ceiling space below where possible.

END OF SECTION 26 05 29

PART 1 GENERAL**1.01 WORK INCLUDED**

- A. Conduit and couplings.
- B. Flexible conduit.

1.02 RELATED WORK

- A. Section 26 05 53: Identification.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Conduit/Elbows: Rigid steel threaded ANSI C80.1; electrical metallic tubing ANSI C80.3, Schedule 40 PVC.
- B. Couplings/Connectors: Threaded; liquid-tight; compression gland. Set screw type products are not allowed.
- C. Flexible Conduit: Aluminum or steel armor, plastic jacketed type with liquid-tight connectors used only at motor/equipment terminations. Connectors are to be metal.
- D. Metal Clad Cable: Type "MC" cable may be used where allowed by local codes for fixture whips only.
- E. PVC or High Density Polyethylene Conduit: HDPE or PVC conduit is acceptable for underground and innerduct applications.

2.02 TYPE

- A. Utilize rigid steel conduit (3/4" minimum) in the following locations:
 - 1. In concrete.
 - 2. In exterior locations.
 - 3. Areas subject mechanical abuse.
- B. Utilize electrical metallic tubing in other locations, 3/4" minimum. Only E.M.T. is allowed in walls. E.M.T. may be Steel or Aluminum.
- C. Make connections to motors and equipment with PVC jacketed flexible conduit and liquid-tight connectors. Minimum size 1/2" for motor connections. Use 3/8" Greenfield flexible

conduit only for fixture wiring. Provide sufficient length of flexible conduit to avoid transmission of vibration. Install straps per NEC.

- D. PVC conduit may be used for underground service entrance conduits and all low voltage under-slab applications. It is not to be installed exposed. Elbows for service conduits and panel feeders are to be galvanized rigid.
- E. Flexible conduit is not allowed within walls.

2.03 MARKING

- A. All empty conduit shall be left with a pull string for future use, and shall be permanently marked on each end with like numbers.
- B. Mark the conduits and boxes mentioned in this Section paragraph 2.2F as to circuits included and on the record drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All wiring systems shall be installed in raceways consisting of galvanized steel tubing, PVC conduit, HDPE conduit, rigid galvanized steel, flexible steel conduit or neoprene covered flexible steel conduit.
- B. Water tight junction boxes, fittings, expansion joints, compression fittings (for use with all electrical tubing), conduit hubs, etc., shall be provided, for all electrical systems wherever construction dictates, including, but not limited to, outdoor locations.
- C. Flexible conduit used in outdoor locations or indoor locations where exposed to continuous or intermittent moisture shall be liquid tight, neoprene covered and UL listed. All fittings for such applications shall be liquid tight, nylon insulated throat type as manufactured by Thomas and Betts, Series 5331, or approved equal.
- D. Sufficient slack shall be provided in all flexible conduit connections to reduce the effects of vibration.
- E. Insulated bushings shall be used where rigid conduit is installed in any enclosure or junction box. In addition, insulated bushings shall be used on all conduits 1 1/4-inch and larger.
- F. All conduit bends shall have a radius greater than or equal to that stipulated by the NEC.
- G. Install conduit concealed in all areas excluding mechanical and electrical rooms and conduit to fixtures in rooms without ceilings.
- H. For exposed runs, attach surface mounted conduit with clamps.

- I. Coordinate installation of conduit in masonry work.
- J. Install conduit free from dents and bruises. Plug ends to prevent entry of dirt or moisture.
- K. All conduit systems shall be installed complete and shall be cleaned out before installation of conductors.
- L. Alter conduit routing to avoid structural obstructions, minimizing crossovers.
- M. Seal conduit with glass fiber where conduits leave heated area and enter unheated area.
- N. Provide flashing and pitch pockets making watertight joints where conduits pass through roof or waterproofing membranes. Provide pourable sealant as approved by the Roofing Contractor.
- O. Install UL approved expansion fittings complete with grounding jumpers where conduits cross building expansion joints (review architectural and structural drawings and coordinate with General Contractor to determine expansion joint locations). Provide bends or offsets in conduit adjacent to building expansion joints where conduit is installed above suspended ceilings.
- P. Avoid routing conduit through public spaces with exposed structure where possible.
- Q. Route all exposed conduits parallel or perpendicular to building lines. Coordinate all exposed conduit locations with the Architect prior to rough-in.
- R. In exposed ceiling areas stub conduits feeding devices in walls out of the wall as high as possible at bottom of structure or bond beam, whichever is higher.
- S. Allow minimum of 6-inch clearance at flues, steam pipes and heat sources. Allow 12-inch clearance at telephone conduits. Where possible, install horizontal raceway runs above water and steam piping.
- T. Install conduit system from cabinets to boxes, boxes to outlet and outlet to outlet in such a manner as to be electrically continuous throughout.
- U. Make bends or offsets with approved bender or hickey.
- V. Where conduits are stubbed up for low voltage cabling or future use, do so neatly; furnish with nylon pull string, conduit caps and labeling on each end.
- W. Securely support conduits from the structure using approved type clamps, hangers and assemblies. Space supports according to manufacturer's recommendations and accepted practice. Do not support conduits from ceiling suspension system. In no case exceed support spacing per NEC maximum.

- X. Avoid installing conduit on the roof. Where necessary, support conduits via B-Line type DB supports and the appropriate strut straps. Support twice per 10' length of conduit. Use supports which hold conduit 24 inches above roof. Conduit on the roof is rigid aluminum. Provide 1/2" rubber pads under the conduit supports.
- Y. Leave a nylon pull string in all empty conduits. Terminate empty conduit stubouts with bushing manufactured for that purpose.
- Z. Install properly sized grounding conductor in all conduit.
- AA. Elbows for service and panel feeders are to be galvanized rigid conduit.
- BB. No conduit may be installed in slab. Conduit for stub-ups and panel feeders are to be installed with the top of the conduit at a minimum of four inches under the slab. Bed with one-half inch washed rock. Conduit for floor boxes is to be installed coming out of the bottom of the floor box and installed under slab.
- CC. Provide conduit for all low voltage cable installed in areas which have no ceiling or hard ceilings.
- DD. All data/telephone conduits are to be "home-run" to an area above an accessible ceiling. No "Daisy Chaining" allowed.
- EE. No "Daisy Chaining" of fixtures is allowed.
- FF. Seal conduits where they transition from underground distribution system to the interior of a building or structure, refer to N.E.C. 225.27.

END OF SECTION 26 05 34

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Outlet boxes.
- B. Pull and junction boxes.

1.02 RELATED WORK

- A. Section 26 05 53: Identification.
- B. Section 26 27 26: Wall Switches, Receptacles and Plate Covers.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Boxes: Hot dip galvanized, 1.25 oz/sq.ft. or cadmium plated, conforming to UL requirements.
- B. Interior Boxes: Pressed sheet steel blanked for conduit.
- C. Exterior Boxes: Corrosion-resistant cast, deep type, with face plate gasket and corrosion-resistant fasteners.
- D. For Ceiling: 4" square boxes for receiving three or less 3/4" conduits.
- E. For Flush Mounting in Walls: 4" square boxes with matching plaster cover for single or two gang outlets. For larger boxes, use solid type or special units, with flush plates.
- F. Surface Mounted: 4" square.
- G. Pull Boxes and Junction Boxes: Metal construction, conforming to National Electrical Code, with screw-on or hinged cover.
- H. Flush Mounted Pull Boxes: Provide overlapping covers with flush head cover retaining screws, prime coated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Mount outlet boxes flush in areas other than mechanical rooms, electrical rooms, above removable ceilings, and on exposed structure in rooms without ceilings.

- B. Do not install boxes back-to-back in same wall, allow 6" minimum horizontal spacing between boxes.
- C. Do not use sectional or handy boxes unless specifically requested.
- D. For boxes mounted in exterior walls, make sure that there is insulation behind outlet boxes to prevent condensation in boxes.
- E. For outlets mounted above counters, benches and splashbacks, coordinate location and mounting heights with built-in units. Adjust outlet mounting height to agree with required location for equipment served.
- F. Securely mount each outlet box to metal studs with outlet box mounting supports. Secure to at least two studs or install box stabilizers as manufactured by "B-Line" and "Caddy".
- G. Do not install more than three 3/4" conduits into one 4" outlet box. Do not use more than one extension ring on a box.
- H. For heights of outlets above the finished floor in permanent partitions, use the following unless otherwise noted: To Center of Device:
 - 1. Convenience Receptacles: 18" or as directed.
 - 2. Brackets: As directed.
 - 3. Switches: 46" or as directed.
 - 4. Telephone Outlets: 18" or as directed.
 - 5. Other Outlets: As directed or indicated.
 - 6. Over Counters: 6" above countertop, horizontal at windows or where indicated.
 - 7. Fire Alarm Pull stations: Minimum 42" and Max 48" measured vertically, from the floor level to activating handle or lever.
 - 8. Fire Alarm Audio Visual Device: 80" to top of box
- I. Locate pull boxes and junction boxes above removable ceiling or in electrical rooms, utility rooms or storage areas.
- J. Install pull boxes of the proper size and depth to accommodate the required conduits and wires.
- K. When installing outlet boxes in fire rated walls, provide fire blocking material on the back side of the boxes.
- L. Coordinate box mounting height with brick courses, where applicable.

- M. Study all devices and light fixtures, providing and installing applicable outlet and back boxes as necessary.

END OF SECTION 26 05 37

PART 1 GENERAL**1.01 WORK INCLUDED**

- A. Provide and install identification markers.

1.02 RELATED WORK

- A. Section 26 05 19: Wires and Cables.
- B. Section 26 05 34: Conduit.
- C. Section 26 05 37: Outlet and Pull Boxes.
- D. Section 26 24 16: Panelboards.
- E. Section 26 28 18: Motor and Circuit Disconnects.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Provide nameplates of laminated phenolic plastic with engraved letters 3/16" high at push-button stations, thermal overload switches, receptacles, wall switches and similar devices where the nameplate is attached to the device plate. At all other locations, make lettering 1/4" high, unless otherwise detailed on the drawings. Securely fasten nameplates to the equipment. Motor nameplates may be non-ferrous metal not less than 0.03" thick, die stamped.
- B. Pre-marked, self adhesive, wrap around type markers, manufacturers: Brady, T&B, E-Z Code.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. General: Equip the following items with nameplates:
 - 1. All motors, motor starters, motor control center, push-button stations, control panels, time switches.
 - 2. Disconnect switches, fused or unfused, switchboards and panelboards, circuit breakers, contactors or relays in separate enclosure.

3. Power receptacles where the nominal voltage between any pair of contacts is greater than 150 volts.
 4. Wall switches controlling outlets for lighting fixtures or equipment where the outlets are not located within sight of the controlling switch.
 5. Special electrical systems at junction and pull boxes terminal cabinets and equipment racks.
- B. Adequately describe the function of or use of the particular equipment involved. Where nameplates are detailed on the drawings, use inscription and size of letters as shown. Include on nameplates for panelboards and switchboards the panel designation, voltage and phase of the supply. The name of the machine or the motor nameplates for a particular machine must be the same as the one used on all motor starter, disconnect and push button station nameplates for that machine.
- C. The Contractor shall provide typed panel schedules for all electrical panels. Schedules shall reflect actual wiring incorporating all field changes. Copies of Panel Schedules from the construction drawings are not acceptable.
1. Panel Schedules shall reflect room numbers as depicted by the Owner as well as construction numbers.
- D. Label all junction boxes with a black permanent marker indicating circuit number and distribution panel or motor control center feeding the circuits contained therein.
- E. At each panel, provide a phenolic plastic plate with 1/4-inch high engraved letters, stating the voltages in the panel, the color code of the wires in the panel, power supply origination, the arc flash hazard, and the date of the installation. Attach to the panel cover with stainless steel bolts, locknuts and nuts or locking nuts. At the main disconnect, provide a label noting the available fault current and date of installation.
- F. All breakers within each panel are to be labeled.
- G. All underground conduits are to be labeled as to each end.

END OF SECTION 26 05 53

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Fuses.
- B. Molded-case circuit breakers.

1.02 RELATED WORK

- A. Section 26 24 16: Panelboards.
- B. Section 26 28 18: Motor and Circuit Disconnects.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Fuses:
 - 1. Bussman.
 - 2. Littlefuse.
- B. Breakers and Relays:
 - 1. Eaton.
 - 2. General Electric.
 - 3. Siemens.
 - 4. Square D.

2.02 CIRCUIT BREAKERS

- A. General: Except as otherwise indicated, provide circuit breakers and ancillary components, of types, sizes, ratings and electrical characteristics indicated, which comply with manufacturer's standard design, materials, components and construction in accordance with published product information and as required for a complete installation.
- B. Molded-Case Circuit Breakers: Provide factory assembled molded-case circuit breakers of frame assembled molded-case circuit breakers of frame size voltage and interrupting ratings as indicated on the drawings. Provide breakers with permanent thermal and instantaneous magnetic trips in each pole and ampere ratings and indicated. Construct with overcenter, trip-free, toggle type operating mechanisms with quick-make, quick break

action and positive handle indication. Construct breakers for mounting and operating in any physical position and operating in an ambient temperature of 40 Deg. C. Provide breakers with mechanical screw type removable connector lugs, AL/CU rated.

- C. Any overcurrent protection device rated 1200A or higher shall be furnished with an energy-reducing maintenance switching feature with local status indication. This feature shall be furnished with the overcurrent device by the manufacturer.
- D. Tandem circuit breakers are not acceptable.

2.03 FUSES

- A. General: Except as otherwise indicated, provide fuses of types, sizes, ratings and average time-current and peak let through current characteristics indicated, which comply with manufacturers' standard design, materials and construction in accordance with published product information and with industry standards and configurations.
- B. Class RK1 and Class J Current Limiting Fuses: Provide UL Class RK1 and Class J current limiting fuses rated 200,000 RMS symmetrical interrupting current for protecting motors and equipment, equal to Buss LPN-RK or LPS-RK.

PART 3 EXECUTION

3.01 INSTALLATION OF OVERCURRENT PROTECTIVE DEVICES

- A. Install overcurrent protective devices as indicated in accordance with the manufacturer's written instructions and with recognized industry practices to insure that protective devices comply with requirements. Comply with NEC and NEMA standards for installation of overcurrent protective devices.
- B. Coordinate with other work, including electrical wiring work as necessary to interface installation of overcurrent protective devices.
- C. Fasten circuit breakers without mechanical stresses, twisting or misalignment being exerted by clamps, supports or cabling.

3.02 FIELD QUALITY CONTROL

- A. Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and for short circuits. Correct malfunctioning units and then demonstrate compliance with requirements.

END OF SECTION 26 05 73

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work in contract: As indicated on plans.
- B. Work not in contract:
 - 1. Service transformer(s): Provided by serving utility.
 - 2. Primary conductors: Provided by serving utility.

1.02 SUBMITTALS

- A. Shop drawings:
 - 1. Pull Boxes.
- B. Product data:
 - 1. Specification comparison.
 - 2. Duct bank conduit separation.
- C. Project information:
 - 1. Test reports.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Store conduit to avoid warping or deterioration.
- B. Store plastic conduit on flat surface protected from direct rays of sun.

1.04 JOB CONDITIONS

- A. Protect existing utilities and structures as indicated in Section 26 00 10.
- B. Avoid overloading. Keep surcharge sufficient distance back from edge of excavation to prevent slides or caving. Maintain and trim excavated materials in such a manner to be as little inconvenience as possible to public and adjoining property owners.
- C. Provide full access to public and private premises, to fire hydrants, at street crossings, sidewalks and other points as designated by Engineer to prevent serious interruption of travel.

PART 2 PRODUCTS

2.01 DUCT SYSTEM

- A. Primary duct system: Multiple (or single) 4-inch single, round-bore PVC conduits, coordinate with the local utility company.
 - 1. Rigid PVC conduit: As specified in Section 26 05 34.
 - 2. Separators: Concrete, plastic or other non-metallic, non-decaying material.
- B. Pull wire: 1/4-inch heavy nylon cord or 1/4-inch pull tape, free of kinks and splices.

2.02 PULL BOXES

- A. Conduit pull boxes equal to Quazite # PC1324 BB12/00, cover # PC1324CA-17. Modify size to match quantity of conduits used. Space per NEC.
- B. Provide gravel bed with drainage and install per manufacturer's instructions.

2.03 BACKFILL MATERIAL

- A. Backfill material:
 - 1. 1/2 inch washed rock.

PART 3 EXECUTION

3.01 EXCAVATING AND TRENCHING - GENERAL

- A. Remove and dispose of materials determined by Civil Engineer to be unsuitable.
- B. Trench, backfill and compact for all underground utilities.

3.02 TRENCH EXCAVATION

- A. Excavate trenches by open cut method to depth necessary to accommodate the work.
 - 1. Permission may be granted for tunnel work for crossing under crosswalks, driveways or existing utility lines.
- B. Open no more than 300 LF of trench at one time, or less, as required by Engineer. Failure to comply may necessitate shutdown of entire project until backfilling is performed.
- C. Carry rock excavations minimum of 12 inches below indicated grades.
- D. Avoid over-excavating below indicated grades unless required to remove unsuitable material.
- E. Back-fill over-excavations with 1/2 inch rock.

- F. Trench size: Excavate only sufficient width to accommodate free working space.
 - 1. Cut trench walls vertically from bottom of trench to top of conduit.
- G. Keep trenches free of water.

3.03 EXISTING UTILITIES

- A. Protect all existing utilities.
- B. Pay fees for all new services.

3.04 INSTALLATION OF PRIMARY AND SECONDARY DUCT SYSTEM

- A. Install duct lines so that top of conduit is not less than 30 inches for secondary ducts and 48 inches for primary ducts below finished grade or finished paving at any point.
- B. Accomplish changes in direction of runs exceeding total of 10 degrees, either vertical or horizontal, by long sweep elbows.
 - 1. Manufactured bends: Minimum radius of 48 inches for primary ducts of 4 inches in diameter and larger, 24 inches for secondary ducts.
- C. Thoroughly clean conduit before using or laying.
- D. Lay no conduit in water or in unsuitable weather or trench conditions.
- E. During construction and after duct line is completed, plug ends of conduits to prevent water washing into conduit or manholes.
 - 1. Take particular care to keep conduits clear of concrete, dirt, and any other substance during course of construction.
- F. After duct line has been completed, pull standard flexible mandrel not less than 12 inches long, with diameter approximately 1/4 inch less than inside diameter of conduit, through each conduit. Then pull brush with stiff bristles through each conduit to make certain that no particles of earth, sand, or gravel have been left in line.
- G. Pneumatic rodding may be used.
- H. Install nylon pull string in all unused new ducts.
 - 1. Extend minimum of 3 feet into each manhole or above pads beyond ends of ducts.
- I. Encase each secondary conduit completely in concrete not less than 3 inches beyond any surface of conduit.
 - 1. Do not place concrete until conduits have been inspected by Architect/Engineer.

- J. Provide uniform spacing between conduits: Not less than 3.5 inches.
 - 1. Place separators on maximum 4 foot centers.
 - 2. Securely anchor ducts to prevent movement during placement of concrete.
- K. Make conduit joints in accordance with manufacturer's recommendations for conduit and coupling selected.
 - 1. Make plastic conduit joints by brushing plastic solvent cement on inside of plastic coupling fitting and outside of conduit ends.
 - 2. Slip conduit and fitting together with quick one-quarter-turn twist to set joint tightly.
- L. Coordinate service conduits entering the building with the Structural Engineer.

3.05 BACKFILLING

- A. Do not backfill until all tests are performed on system, and system complies with specified requirements.
- B. Hand or pneumatic tamp backfill around and over pipe in lifts not exceeding 8 inches loose thickness.
- C. Compact to density specified, so pipe will not be injured.
- D. Exercise care in backfilling operations to avoid displacing pipe joints either horizontally or vertically and to avoid breaking pipe.
- E. Do not water flush for consolidation.

3.06 COMPACTION

- A. Compact all trench backfill in areas under paved roads, parking areas, sidewalks and other structures as directed by Civil Engineer to at least 95 percent of maximum dry density.
- B. In locations where trench will not be under paved areas, compact backfill to minimum 90 percent of maximum dry density.
- C. Remove materials which cannot be compacted as specified.
- D. Backfill with 1/2 inch washed rock.

END OF SECTION 26 21 02

PART 1 GENERAL**1.01 WORK INCLUDED**

- A. Branch circuit panelboards.

1.02 REGULATORY REQUIREMENTS

- A. Construct panelboards to UL standards and provide UL labels.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Eaton.
- B. General Electric.
- C. Siemens.
- D. Square D.

2.02 ENCLOSURES

- A. Panels: Surface (or flush) mounted complete with hinged trim with outer door lock and metal directory frame.
- B. Panel Can: Galvanized, painted to match trim.
- C. Keys: Provide two keys for each panel. Make keys interchangeable for panels on this project.

2.03 120/208 AND 277/480 VOLT PANELBOARDS

- A. Panelboards: Single phase, 3-wire, solid neutral design with sequence style bussing, full capacity neutral and bare uninsulated grounding bar bolted to enclosure, composed of an assembly of bolt-in-place molded case automatic air circuit breakers with thermal and magnetic trip and trip free position separate from either "ON" or "OFF".
- B. Furnish and install power and distribution panelboards, equipped with thermal magnetic molded case circuit breakers of frame, trip ratings and interrupting capacities, as shown on the panelboard schedule, manufactured in accordance with the latest NEMA standards, listed by Underwriters' Laboratories, Inc. and bearing the UL label.

- C. Panelboard Main Bus, Main Lugs and/or Main Breaker: Copper only with current ratings as shown on the panelboard schedule. Current density in accordance with Underwriters' Laboratories requirements. Bus mounting for circuit breakers of the bolted connection type and accommodating any combination of circuit breaker units without further modification, wiring lugs suitable for copper conductors.
- D. Circuit Breakers: Quick make and quick break trip free on overload or short circuit; multi-pole breakers with common trip, wiring terminals suitable for the type conductor specified, bolt-on connections to the bus.
- E. Steel Box: As specified by Underwriters' Laboratories standards, end walls removable, size of wiring gutters in accordance with Underwriters' Laboratories standards, trim of code-gauge steel with primer and durable enamel finish, trim doors equipped with spring latch and cylinder lock keyed alike. Each individual circuit to be clearly numbered on the face of the panelboard and a directory for circuit identification provided.
- F. Where noted on the plans, provide "SPD" units.
 - 1. On main service equipment provide units equal or better than 125 kA per mode, minimum.
 - 2. On sub panels provide units equal to 80 kA per mode, where called for.
 - 3. All units to be built in to the panels called for. Provide with phase indicating lights and disconnecting means.
- G. Switchboards are to be supplied with copper bus and standard electronic metering. Where switchboards have main breakers, provide with lightning arrestors and loss of phase protection.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide mounting brackets, busbar drillings and filler pieces for unused spaces.
- B. Prepare and affix typewritten directory to inside cover of panelboard indicating loads controlled by each circuit. Label with construction and permanent room numbers.
- C. Provide 4-inch housekeeping concrete pads for all floor mounted units which are located inside the building or outdoors.
- D. At each panel, provide a phenolic plastic plate with 1/4-inch high engraved letters, stating the voltages in the panel and the color code of the wires in the panel and the available fault current and date of installation. Attach to the panel cover with stainless steel bolts, locknuts and nuts or locking nuts.

END OF SECTION 26 24 16

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Wall switches.
- B. Receptacles.
- C. Plate covers.

1.02 RELATED WORK

- A. Section 26 05 26: Grounding.
- B. Section 26 05 37: Outlet and Pull Boxes.
- C. Section 26 05 53: Identification.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Arrow Hart.
- B. Bryant.
- C. Eagle.
- D. General Electric.
- E. Hubbell.
- F. Leviton.
- G. P&S.
- H. Substitutions: See Section 26 00 10 - General Electrical Provisions.

2.02 WALL SWITCHES

- A. Acceptable Devices
 - 1. Single Pole Switch: Type 1221, or equal.
 - 2. Double Pole Switch: Type 1222, or equal.
 - 3. Three-way Switch: Type 1223, or equal.

4. Four-way Switch: Type 1224, or equal.
5. Dimmers: Lutron "NOVA" Series or equal; size as required per the circuit wattage, 600 watt minimum. Provide type for the fixtures being dimmed.
6. Two-pole switches used to control two loads, like lights and exhaust fans in restrooms, must be "rated" for that duty.
7. Keyed Switches: Provide four keys per switch.

B. Materials

1. 120/277 Volt Switches: Quite slow make, slow break design, toggle handle with totally enclosed case, rated 20 ampere, specification grade. Provide matching two pole, three-way and four-way switches.
2. Color: Coordinate with the Architect.
3. Dimmers: Electronic switching type with toroid filter coil to eliminate RF interference.
4. Two-pole switches used to control two loads, like lights and exhaust fans in restrooms, must be "rated" for that duty.
5. Provide metal barrier between gangs in boxes, where adjacent switches have a potential in excess of 300V between conductors.

2.03 RECEPTACLES

A. Device: Receptacles In General Use Areas of Project: All receptacles shall be commercial grade and shall be "Tamper Resistant."

1. Duplex Receptacle: Type BR20TR, or equal.
2. Duplex Receptacle, GFCI: Type GFTR20, or equal.
3. Single Receptacle: Type 5361, or equal.
4. Special Outlets: See Plans.
5. Isolated Ground Receptacle: Type 5362IG, or equal.

B. Devices

1. Standard Duplex Receptacle: Nema 5-20R. Full gang size, polarized, duplex, parallel blade, U grounding slot, rated at 20 amperes, 125 volts, designed for split feed service.

2. Nameplates: Provide engraved or embossed plastic for receptacles other than standard duplex and standard single receptacles indicating voltage, phase and amperes.
3. Isolated ground outlets to be orange, emergency circuit devices to be red, all other device colors to be coordinated with the Architect.
4. Exterior receptacles are to be "GFI" and rated as "weather resistant".

2.04 PLATE COVERS

A. Materials

1. Stainless Steel: Type 302 or 304, No. 4 finish, 0.040 inches thick, accurately die cut, protected with release paper.
2. Cast Metal: Die cast profile, ribbed or strength, flash removed, primed with grey enamel, furnished complete with four mounting screws.
3. Gaskets: Resilient rubber or closed cell foam urethane.
4. Nylon: High-performance, molded nylon.
5. Stamped Metal: For use on 4" square boxes.

B. Device

1. Flush Mounting Plates: Beveled type with smooth rolled outer edge.
2. Surface Box Plates: Beveled, steel, pressure formed for smooth edge to fit box.
3. Weatherproof Plates: CAST METAL, gasketed; for receptacles, provide the weatherproof "while in use" type.
4. Where two-gang boxes are required for single gang devices, provide special plates with device opening in one gang and second gang blank.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Coordinate switch mounting location with architectural detail and heights as noted on plans.
- B. Run separate neutral for each lighting circuit.
- C. Install switches at 46" to center above finished floor, coordinate with brick layers where applicable.

- D. Mount receptacles at mounting heights specified on the plans, 18" to center of the box unless noted otherwise.
- E. Connect all devices using pigtails. Do not through-wire on device terminals.
- F. Mount outlets for electric water coolers and other similar permanently installed plug connected equipment behind equipment according to approved installation drawing, coordinate with the equipment installer.
- G. Install coverplates on wiring devices level and with all four edges in contact with finished surface.
- H. Use nylon plates, color to match devices as specified by the Architect, in all interior areas unless noted. Use steel plates in mechanical and utility type areas.

END OF SECTION 26 27 26

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide and install motor and circuit disconnects.

1.02 REGULATORY REQUIREMENTS

- A. Conform to National Electrical Code and to applicable inspection authority.

1.03 REFERENCES

- A. Underwriters' Labs, Inc. Annual Product Directories.
- B. Classification of Standard Types of Non-ventilated Enclosures for Electric Controllers, National Electrical Manufacturers Association.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Eaton.
- B. General Electric.
- C. Hubbell.
- D. Leviton.
- E. Square D.

2.02 EQUIPMENT

- A. Provide motor and circuit disconnects with UL label.
- B. Single Phase 120 Volt Disconnect Switches: Double pole toggle switch, Leviton MS302.
- C. Provide with lockable covers.
- D. Three-Phase Motor Disconnect Switches and Single Phase 240 Volt Disconnect Switches: 2 or 3 pole heavy duty fusible or non-fusible as shown, 250 or 480 volt as required in NEMA Type 1 or 3 enclosures. Provide with lugs for suitable wire range, with ground lug, copper current carrying parts, silver-tungsten contacts, reinforced fuse clips for type R rejection fuses.
- E. Provide NEMA "4/4X" type disconnects within the kitchen area.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install motor and circuit disconnect as recommended by manufacturer and as required by Code.
- B. Where required by local authorities, install disconnects for all roof mounted equipment separate from that equipment. Furnish (galvanized) "Unistrut" or angle iron mounting stands with B-Line DB series roof top support base. Coordinate with the equipment supplier and Roofing Contractor.

END OF SECTION 26 28 18

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Installation of luminaires, supports and accessories.
- B. Emergency lighting units.
- C. Exit signs.
- D. Lamps.
- E. Ballasts, drivers, and accessories.

1.02 RELATED WORK

- A. Section 26 05 19: Wires and Cables.
- B. Section 26 05 29: Supporting Devices.

1.03 REFERENCES

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with General Conditions including pertinent physical characteristics and complete photometric data reports from independent testing laboratory.
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Provide dimensions, ratings, and performance data.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Quality Assurance. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation and Maintenance Data: Instructions for each product. Installation manuals are required.

1.05 COORDINATION

- A. Confirm compatibility and interface of other materials with luminaire and ceiling system. Report discrepancies to the Engineer/Architect and defer ordering until clarified.
- B. Supply plaster frames, trim rings and backboxes to other trades.
- C. Coordinate with Division 23 to avoid conflicts between luminaires, supports, fittings and mechanical equipment.
- D. Conform to requirements of NFPA 70.
- E. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- F. Products: Listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.
- G. The lighting wholesale supplier shall have an office and a stocking warehouse within 100 miles of the project site. The distributor/manufacturer's representative shall have an office within 100 miles of the project site, and shall have on staff a full time lighting designer as well as personnel who are available to service the project after completion.
- H. Any substitutions to the light fixture schedule shall be proven, by the manufacturer at the discretion of the Engineer, to be of equal or superior quality, material, and performance than the specified light fixtures. All requests for substitutions shall be submitted along with fixture specification sheets, photometric calculations and electronic ies files 10 days prior to bid opening date for review. Substitutions shall be requested in writing only, accompanied by the above listed electronic ies files. Substitutions will not be considered if they are indicated or implied in shop drawing submission without previous formal request. Substitutions will not be considered if they require substantial revision of the contract documents. The Contractor shall be responsible for any and all additional costs required by modifications to architectural, structural, mechanical or electrical facilities, devices, systems, etc. resulting from the approved substitution.
- I. Light fixtures and ballasts are to comply with the fixture schedule and the Specifications.

PART 2 PRODUCTS

2.01 LUMINAIRES

- A. Acceptable Manufacturers
 - 1. Provide products of manufacturers as listed in the lighting fixture schedule or equal, subject to compliance with requirements.

2. Fixtures are to be supplied in manufacturer's standard cartons.
3. Substitutions: See Section 26 00 10 - General Electrical Provisions.

B. Recessed Luminaires

1. Supply recessed luminaire complete with trim type required for ceiling system installed. Before ordering, confirm ceiling construction details and architectural finish for each area. Supply with "IC" type housing or gyp board hat over the fixture, where insulation will cover.
2. Fixtures shall be delivered to the job site in factory provided individual cartons.
3. All damaged fixtures are to be replaced

2.02 LAMPS

A. Acceptable Manufacturers

1. General Electric.
2. Osram/Sylvania.
3. Philips.

B. LED Lamps

1. LED Lamps: Manufacturers must have Energy Star/DLC rating or shall offer LM-80 and TM-21 test reports to the public online.
2. LED estimated useful life: Minimum of 50,000 hours at 70% lumen maintenance, calculated based on LM-80 test data.
3. LED fixtures shall be modular and allow for separate replacement of LED lamps and drivers. User serviceable LED lamps and drivers shall be accessible and replaceable from the room side.
4. Light fixture provider shall provide all low voltage control wiring for dimmable fixture.
5. Note lamp color specifications on the fixture schedule, minimum CRI shall be 80.
6. All light fixtures shall be provided with a 5 year warranty on the LED and driver system.

2.03 BALLASTS AND DRIVERS

- A. Provide ballasts that meet standards of an electrical testing laboratory and the Certified Ballasts Manufacturers' Association.
- B. Acceptable Manufacturers:
 - 1. Universal.
 - 2. Philips/Advance.
 - 3. Osram/Sylvania.
- C. LED Drivers
 - 1. LED drivers shall be electic-type, labeled as compliant with radio frequency interference (RFI) requirements of FCC Title 47 Part 15, and comply with NEMA SSL 1 " Electronic Drivers for LED Devices, Arrays, or System". LED drivers shall have a sound rating of "A", have a minimum efficiency of 85%, and be rated for a THD of less than 20 percent at all input voltages.
 - 2. Dimmable LED drivers shall be 0-10V type unless otherwise noted on the schedule. Dimmable LED drivers shall be capable of dimming without LED strobling or flicker across their full drimming range.
 - 3. Emergency LED drivers shall be manufactured by a company with a minimum of five (5) years service. They shall be factory installed and tested, to include red pilot lights. They shall be manufactured by Bodine Mfg. and be rated at 1100 lumens, minimum.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install lamps in accordance with manufacturer's instructions.
- B. Provide spare lamps in the amount of 5% of the total count, or 5 each type, whichever is the greater number.
- C. All incandescent lamps shall be replaced at the Date of Substantial Completion.
- D. Provide ballasts of compatible design to lamps specified.
- E. No "Daisy Chaining" of fixtures is allowed.
- F. Install fixtures securely, in a neat and workmanlike manner.

- G. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
- H. Support all luminaires independent of ceiling framing, directly from building structure by rod hangers and inserts or suspension wire, two per fixture.
- I. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- J. Install recessed luminaires to permit removal from below.
- K. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- L. Install clips to secure recessed grid-supported luminaires in place.
- M. Install wall mounted luminaires, emergency lighting units, and exit signs at height as scheduled.
- N. Manufactured wiring systems are approved. Provide submittals per Specifications.

3.02 RECESSED LUMINAIRES

- A. Perform field inspection, testing, and adjusting in accordance with Section 26 00 10.
- B. Install recessed luminaires to permit removal from below to gain access to outlet or pre-wired fixture box.
- C. Install an accessible junction box not less than two feet away from the fixture and connect to it by not less than four feet nor more than six feet of flexible conduit, using type of fixture wire approved for this purpose.
- D. Mount in suspended ceiling with exposed tee bar grid system, support directly from the building structure by a minimum of two support wires.
- E. Hold insulation back from all fixtures by three (3) inches and clear on top.
- F. A disconnecting means is required for all ballasted luminaires with double ended lamps. Install per NEC 410.130(G).

3.03 ALIGNMENT

- A. Aim and adjust luminaires.
- B. Align luminaires, clean diffusers and replace burned out lamps prior to final acceptance.

3.04 FIRE RATED CEILINGS

- A. Where recessed fixtures will penetrate either fire-rated ceilings or fire rated gypsum board located above suspended ceilings, the fire-rated ceiling or gypsum board shall be continuous over and around the fixture housing and outlet box. Coordinate the ceiling and fixture installations to insure a continuous fire rated ceiling.

3.05 FINALLY

- A. Remove dirt and debris from enclosures.
- B. Clean photometric control surfaces as recommended by manufacturer.
- C. Clean finishes and touch up damage.
- D. Relamp luminaires that have failed lamps at Substantial Completion and all lamps that have been energized during construction for more than 500 hours.

END OF SECTION 26 51 00

PART 31
EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY

- A. Perform earthwork.
- B. Meet requirements for excavation safety, or to facilitate construction due to wet conditions.
- C. Perform excavation regardless of type, nature, or condition of materials encountered.
- D. Contractor shall make his own estimate of the type and extent of the various materials to be excavated in order to accomplish the work.
- E. There will be no extra compensation for dewatering.

1.02 RELATED SECTIONS

- A. Section 31.23 33 - Trenching and Backfilling.

1.03 REFERENCES

- A. Arkansas Department of Transportation, Standard Specifications for Highway Construction, latest edition.
 - 1. ARDOT Section 303 - Aggregate Base Course.
- B. American Society for Testing and Materials, 1916 Race St. Philadelphia, PA 19103.
 - 1. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49-kg) Rammer and 12-in. (304.8-mm) Drop.
 - 2. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 3. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10 lb (4.54-kg) Rammer and 18-in. (457-mm) Drop.
 - 4. ASTM D2216 - Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures.
 - 5. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 6. ASTM D3017 - Test Method for Moisture Content of Soil and Soil-Aggregate in Place of Nuclear Methods (Shallow Depth).
- C. Occupational Safety and Health Administration (OSHA) Standard for Excavation and Trenches Safety System, 29 CFR 1926, Subpart P: Excavations.

1.04 DEFINITIONS

- A. Relative Compaction:
 - 1. The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by the Standard Proctor Test, ASTM D698, or as determined by the Modified Proctor Test, ASTM D1557, as applicable.
 - 2. Corrections for oversize material may be applied to either the as-compacted field dry density or the maximum dry density, as determined by the Engineer.
- B. Optimum Moisture Content:
 - 1. Moisture content of the material for which the maximum dry density is obtained as determined by ASTM D698 or D1557.
 - 2. Field moisture contents shall be determined on the basis of the fraction passing the 3/4-inch sieve.
- C. Completed Course: A course or layer that is ready for the next layer or the next phase of construction.

1.05 SUBMITTALS

- A. Submit in accordance with the Frontend Documents.
- B. Provide the following:
 - 1. Samples of imported material.
 - 2. Samples of onsite material to be used as fill.
 - 3. Certification that imported materials conform to the Specification requirements along with copies of test results from a qualified commercial testing laboratory.
 - 4. Proctor curves on fill material as prepared by approved laboratory.

1.06 PROJECT CONDITIONS

- A. Beginning work of this Section means acceptance of existing conditions.

PART 2 - PRODUCTS

2.01 FILL

- A. Free from roots, organic matter, trash, and debris with maximum particle size of 1-1/2 inches.
- B. It is intended that structural backfill material be obtained from on site to the maximum extent possible.

2.02 IMPORTED GRANULAR FILL

- A. Provide granular fill beneath structures as noted on Drawings.
- B. Imported granular fill to consist of a natural or artificial mixture of gravel and soil mortar, uniformly well graded from coarse to fine.
- C. Conform to the ARDOT Section 303 classifications for Class 7 as designated on the Drawings.

2.03 TOPSOIL

- A. Selected topsoil at the site, properly stored and protected, free from roots, sticks, hard clay, and stones which will not pass through a 2-inch square opening.
- B. Provide imported topsoil of equal quality if required to accomplish the work.

2.04 COMPACTION EQUIPMENT

- A. Provide compaction equipment of suitable type and adequate to obtain the densities specified.
- B. Operate compaction equipment in strict accordance with the manufacturer's instructions and recommendations.
- C. Hand-operated equipment shall be capable of achieving the specified densities.

2.05 MOISTURE CONTROL EQUIPMENT:

- A. Provide equipment for applying water of a type and quality adequate for the work; it shall not leak; and be equipped with a distributor bar or other approved device to assure uniform application.
- B. Provide equipment for mixing and drying out material consisting of blades, discs, or other approved equipment.

2.06 WATER REMOVAL EQUIPMENT

- A. Provide and operate equipment adequate to keep excavation and trenches free of water.

2.07 IMPORTED MATERIAL ACCEPTANCE

- A. Import only if insufficient material is available on-site.
- B. Locate and arrange use of a site near the construction area for obtaining borrow material.
- C. Additional tests required at the borrow area:
 - 1. Standard Proctor.
 - 2. Remolded permeability.
 - 3. Atterberg limits.
- D. Upon completion of removal of borrow material, grade the site to drain, place topsoil on disturbed areas, and establish grass.
- E. Cost for testing and imported material shall be the responsibility of the Contractor.

2.08 SELECTED MATERIAL ACCEPTANCE

- A. Provide samples for testing representative of the actual material to be installed in the work. Take samples from each 2,000 cubic yards of material stockpiled. Depending on the uniformity of the material, Engineer may request more frequent samples.
- B. Forward test results to the Engineer at least 10 days before the material is required for use. If tests indicate that the material does not meet Specification requirements, the material shall not be installed in the work.
- C. Material which is placed in the work but does not conform to the Specification requirements shall be removed and replaced at the Contractor's sole expense.
- D. Contractor is responsible for performing all testing for acceptance on the material used in the project. All results must be sent to the Engineer for review and approval prior to payment.

PART 3 - EXECUTION

3.01 STRIPPING TOPSOIL

- A. Remove existing grass and overburden before excavating topsoil.
- B. Prior to beginning excavation or fill, strip the topsoil to a depth of at least 6 inches or to a depth sufficient to remove organic material and stockpile for future use.
- C. In general, remove topsoil where structures are to be built, trenches dug, and roads, parking lots, walks, and similar improvements constructed within the areas presently covered with topsoil.
- D. Store topsoil clear of the construction area.
- E. Take reasonable care to prevent the topsoil from becoming mixed with subsoil or eroding.

3.02 STRUCTURAL EXCAVATION

- A. Contractor shall be solely responsible for trench and excavation safety systems in accordance with ACT 291 of 1993 and OSHA requirements.
- B. Identify required lines, levels, and grades.
- C. Identify known underground utilities. Contractor will be responsible for locating utilities.
- D. The method of excavation is optional, however, no equipment shall be operated in a manner that will endanger existing structures and their integrity.
- E. Use excavation support system such as sheet piling where ever necessary.
- F. Allow for forms, working space, granular base, and finish topsoil where shown on Drawings or required.

- G. Do not carry excavation for footings and slabs deeper than the elevation shown on Drawings after allowing for base material. Excavation of material to depths below the grades indicated, unless so directed by the Engineer or Owner's representative, will be deemed unauthorized excavation.
- H. After required excavation, proof-roll site with minimum 20,000 lb. pneumatic-tired roller, loaded tri-axle dump truck, or similar equipment. Remove soft and organic-containing soil, miscellaneous debris, and roots. Fill and compact areas.
 - 1. Provide for observation of each paving area by geotechnical engineer to assess adequacy of bearing stratum. If observation indicated excessively soft and/or organic-containing soils, undercut, fill and compact areas and/or extend footing as directed by geotechnical engineer.

3.03 DEWATERING EXCAVATION

- A. Remove water during periods when concrete is being deposited, pipe is being laid, and placing of backfill unless water settling is required, and at other times as required for efficient and safe execution of the work.
- B. Accomplish removal of groundwater in a manner that will preserve the strength of the foundation soils, will not cause instability of the excavation slopes, and will not result in damage to existing structures.
- C. Where necessary to these purposes, lower the water level in advance of excavation, utilizing wells, well points, or similar methods.
- D. Maintain the water level in the gravel stratum as measured in piezometers, a minimum of 3 feet below the prevailing excavation level or as needed to prevent bottom heave of the excavation.
- E. Open pumping, sumps, and ditches: If these result in boils, loss of fines, softening of the ground or instability of slopes, areas shall not be accepted.
- F. Install wells and well points with suitable screens and filters so that continuous pumping of fines does not occur.
- G. Operate well points continuously to prevent boils and loss of consolidation.
- H. Arrange discharge to facilitate collection of samples by Engineer.
- I. Avoid settlement or damage to adjacent property.
- J. Dispose of water in a manner that will not damage adjacent property, as approved.

3.04 GRANULAR FILL MATERIAL UNDER FACILITIES

- A. Place fill granular material as specified in this Section within the influence area beneath slabs, walks, structures, roads, and parking areas, and as shown on the Drawings.
- B. Do not exceed loose lifts of 6 inches.
- C. Compact each lift to not less than 95 Percent Modified Proctor Density.

- D. Place and compact a 6-inch layer of granular fill to at least 95 Percent Modified Proctor density immediately beneath spread footings, slabs on grade, or other concrete structures.
- E. Moisten material as required to aid compaction (± 2 percent optimum moisture).
- F. Place material in horizontal lifts and in a manner to avoid segregation.
- G. Correct and repair subsequent damage to slabs, piping, concrete structures, facilities, or other structures caused by settlement of fill material.

3.05 BACKFILL AND STRUCTURES

- A. Remove form materials and trash from excavation before placing backfill.
- B. Do not operate earth-moving equipment within 5 feet of walls of concrete structures for the purpose of depositing or compacting backfill material.
- C. Compact backfill adjacent to concrete walls with hand-operated tampers or similar equipment that will not damage the structure.
- D. Backfill water-holding basins only after satisfactory leakage tests have been conducted.
- E. Place earth fill in areas not designated to be structural fill or granular fill.
- F. Deposit material in maximum 6-inch loose lifts, and compact each lift to not less than 95 Percent Modified Proctor.

3.06 FILL NOT BENEATH STRUCTURES OR FACILITIES

- A. Place earth fill to the lines and grades shown.
- B. Place fill material in maximum 6-inch loose lifts and compact each lift to not less than 95 Percent Modified Proctor.
- C. Make proper allowance for topsoil where required.

3.07 MOISTURE CONTROL

- A. During compacting operations, maintain optimum practicable moisture content required for compaction purposes in each lift of fill.
- B. Maintain moisture content uniform throughout the lift.
- C. Add water to the material at the site of excavation. Supplement, if required, by sprinkling the fill.
- D. At the time of compaction, maintain the water content of the material at optimum moisture content, plus or minus 2 percentage points, except as otherwise specified for embankments.
- E. Do not attempt to compact fill material that contains excessive moisture.

- F. Aerate material by blading, discing, harrowing, or other methods, to hasten the drying process.

3.08 FIELD DENSITY TESTS

- A. Test Methods: ASTM D2922, D1556, D2216, and D3017.
- B. Cooperate with testing work by leveling small test areas designated by the Engineer.
- C. Backfill test areas.
- D. Field density test shall be performed for every 100 square yards of road subgrade constructed. Two field density tests shall be performed for each concrete sidewalk subgrade constructed.
- E. Engineer may order testing of lift of fill at any time, location, or elevation. Contractor responsible for completing all testing as required for material acceptance.

3.09 SITE GRADING

- A. Perform earthwork to lines and grades as shown on Drawings with proper allowance for topsoil where specified or shown on Drawings.
- B. Shape, trim, and finish slopes to conform with lines, grades, and cross sections shown.
- C. Slopes shall be free of loose exposed roots and stones exceeding 3-inch diameter.
- D. Round tops of banks to circular curbs, in general, not less than a 6-foot radius.
- E. Neatly and smoothly trim rounded surfaces; over-excavating and backfilling to the proper grade are not acceptable.
- F. Finished site grading shall be reviewed by the Engineer.

3.10 DISPOSAL OF EXCESS EXCAVATION

- A. Dispose of excess excavated materials, not required or suitable for use as backfill or fill, outside of the area of work.
- B. Compact excess material as specified for fill, dress the completed disposal area to slopes no greater than 4:1 (horizontal: vertical), and slope to drain.

3.11 SETTLEMENT

- A. Settlement in backfill, fill, or in structures built over the backfill or fill, that may occur within the 1-year guarantee period in the General Conditions shall be considered to be caused by improper compaction methods.
- B. Restore structures damaged by settlement to original condition.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Earthwork for this project includes but is not necessarily limited to:
 - 1. Layout of building and site improvements.
 - 2. Excavating for foundations, utilities and other below grade work.
 - 3. Filling and backfilling of all excavations.
 - 4. Rough and finish grading of the site.
 - 5. Granular drainage fill.
- B. Perform excavation regardless of type, nature or condition of materials encountered.
- C. All excavation under this Section is unclassified and no allowances will be made for nature of material encountered. Contractor shall make soil investigations as he considers necessary for his own determination of types of materials existing at the site.
- D. There will be no extra compensation for dewatering.

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
 - 1. Samples of all imported material. Provide 25 pound bags of material to Geotechnical engineer's office at least 10 days before the material is to be imported to the site.
 - 2. Samples of all on-site material to be used as fill.
 - 3. Certification that imported materials conform to the specification requirements along with copies of the test results from a qualified commercial testing laboratory.
 - 4. Proctor curves on fill material as prepared by approved laboratory.
- B. All fill material requires approval prior to placement.
- C. Substitutions will not be considered prior to the award of the General Contract.

1.04 JOB CONDITIONS

- A. Beginning work of this Section means acceptance of existing conditions.
- B. Dust Control: Control dust on and near the Work if dust is caused by Contractor's operations during performance of the Work or if resulting from condition in which Contractor leaves the site.

1.05 REFERENCES

- A. Arkansas State Highway and Transportation Department, Standard Specifications for Highway Construction, latest edition.
 - 1. AHTD Section 207 - Stone Backfill.
 - 2. AHTD Section 303 - Aggregate Base Course.
- B. ASTM International, 100 Barr Harbor drive, PO Box C700, West Conshohocken, PA 19428-2959, USA Phone: (610) 832-9585.
 - 1. ASTM D698 - Test for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb. Rammer and 12 in. Drop.
 - 2. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 3. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10 lb. Rammer and 18 in. Drop.
 - 4. ASTM D2216 - Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock and Soil-Aggregate Mixtures.
 - 5. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 6. ASTM D3017 - Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- C. Occupational Safety and Health Administration (OSHA) Standard for Excavation and Trenches Safety System, 29 CFR 1926, Subpart P = Excavations.
- D. Arkansas Statute 291 of 1993.
- E. AASHTO - American Association of State Highway and Transportation Officials.

1.06 DEFINITIONS

- A. Relative Compaction: The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by the Standard Proctor Test, ASTM D698, or as determined by the Modified Proctor Test, ASTM D1557, as applicable. Corrections for oversize material may be applied to either the as-compacted field dry density or the maximum dry density, as determined by the Architect.
- B. Optimum Moisture Content: Moisture content of the material for which the maximum dry density is obtained as determined by ASTM D698 or D1557. Field moisture contents shall be determined on the basis of the fraction passing the 3/4" sieve.

- C. Completed Course: A course or layer that is ready for the next layer or the next phase of construction.
- D. Under-Cut: Additional excavation into native soils beyond sub-grade or stripping depth that is required to provide an adequate depth of suitable backfill bearing material.
- E. Sub-grade: The following shall define the sub-grade elevations:
 - 1. Footings: The elevation of the bottom of the footing.
 - 2. Building slabs: The elevation at the bottom of the capillary break.
 - 3. Walkways and Paving: The elevation at the bottom of the paving section.
 - 4. Utility Trenches: The elevation of the bottom of the pipe bedding.
 - 5. Landscaped Areas: The elevation below the stripping depth or the soil planting section, whichever is lower.
- F. Unsuitable material shall be that material below the sub-grade elevation that does not meet bearing capacity requirements as defined by the field Geotechnical engineer. Material not previously approved by Geotechnical engineer as unsuitable will not be considered for compensation.

1.07 UNSUITABLE MATERIAL

- A. The Contractor will be compensated beyond his base bid for excavation and off-site disposal of un-anticipated unsuitable soils only as verified and documented by the Geotechnical engineer in the field. No compensation will be made to the Contractor for unverified and undocumented quantities.
- B. Measure in-place bank yards of material that is to be removed by field measurement that shall be observed, verified, and documented by the Geotechnical Engineer prior to backfilling with imported Granular fill. Measurement by truck tickets will not be accepted. Measurement of excavation prior to backfilling will also be used to determine the quantity of excess import required to replace the excavated material.
- C. Soil integrity will be influenced by the weather conditions and the Contractor's handling and protection of the material as it is removed and placed. It is the sole responsibility of the Contractor to protect soils from the elements. The Contractor will be responsible for removing material, including previously inspected fill or exposed sub-grade, that is deemed unsuitable due to lack of protection and replacing with acceptable material at no additional cost to the Owner.
- D. Compensation will not be made for material that was not defined and verified in the field as unsuitable material by the Geotechnical engineer.

PART 2 - PRODUCTS

2.01 EARTH FILL

- A. Place earth fill in areas not designated to be structural fill or backfill.

- B. Free from roots, organic matter, trash and debris with maximum particle size of 1-1/2 inches.
- C. Imported fill is to consist of clayey sand (SC), sandy clay (CL) or clayey gravel (GC).
- D. Engineered fill is to consist of approved low volume-change material designated as CL or GC soils having a Liquid Limit less than 40 and a Plasticity Index less than 20 or Class 7 Aggregate Base Course.
- E. It is intended that fill be obtained from the site excavation to the maximum extent possible. DO NOT CONSTRUCT BORROW PITS ON SITE WITHOUT WRITTEN AUTHORIZATION FROM THE ARCHITECT.

2.02 STRUCTURAL (FLOWABLE) FILL

- A. Imported structural fill, Controlled Low Strength Material (CLSM), is to consist of a natural or artificial mixture of sand, coarse aggregate, cement and water, uniformly well graded from coarse to fine. The mix shall have good workability and flowability with self-compacting and self-leveling characteristics. Conform to ASTM D4832.
- B. Conform to the AHTD Section 303 classifications for Class 3, Class 4 or Class 7 as required by existing soil conditions.

2.03 UNDERSLAB DRAINAGE FILL

- A. Crushed stone or washed gravel, uniformly graded from 3/4" minimum size to 1-1/2" maximum size.

2.04 CRUSHED SYENITE FILL

- A. Fill and Backfill Inside Building Walls: Crushed syenite, similar to Donna-Fill. Deliver to job in moist condition. Settle in place by completely immersing under water for optimum compaction. Keep water level above syenite at all times during placing.

2.05 COMPACTION EQUIPMENT

- A. Provide compaction equipment of suitable type and adequate to obtain the densities specified.
- B. Operate compaction equipment in strict accordance with the manufacturer's instructions and recommendations.
- C. Maintain equipment in such condition that it will deliver the manufacturer's rated compactive effort.
- D. Hand operated equipment shall be capable of achieving the specified densities.

2.06 MOISTURE CONTROL EQUIPMENT

- A. Provide equipment for applying water of a type and quality adequate for the work; it shall

not leak and shall be equipped with a distributor bar or other approved device to assure uniform application.

- B. Provide equipment for mixing and drying out material consisting of blades, discs or other approved equipment.

2.07 WATER REMOVAL EQUIPMENT

- A. Provide and operate equipment adequate to keep excavation and trenches free of water, including but not limited to pumps and hoses.

2.08 SELECTED MATERIAL ACCEPTANCE

- A. Provide samples for testing representative of the actual material to be installed in the work. Take samples from material stockpiled. Depending on the uniformity of the material, Architect may request additional samples.
- B. Tests required at the borrow area:
 - 1. Standard Proctor.
 - 2. Atterberg limits.
- C. Forward test results to Architect at least 10 days before the material is required for use. If tests indicate that the material does not meet specification requirements, the material shall not be installed in the work.
- D. Material which is placed in the work but does not conform to the specification requirements shall be removed and replaced at the Contractor's expense.

2.09 OTHER MATERIALS

- A. Provide materials, not specifically described but required for proper completion of work of this Section, selected by Contractor subject to Architect approval.

PART 3 - EXECUTION

3.01 CLEARING AND GRUBBING

- A. Complete clearing and grubbing work as specified in Section 02 41 13 prior to beginning work in this section.

3.02 LAYOUT AND STAKING

- A. The Contractor will employ and pay a competent, independent, Registered Professional Land Surveyor with demonstrated ability to perform the layout work required.
- B. Definitions
 - 1. "Control Stakes" are the original reference points set by Engineer for the construction work.
 - 2. "Construction Staking" is an additional staking required as the project progresses which is the responsibility of Contractor.

- C. Engineer shall provide the following staking:
 - 1. Set temporary bench marks.
 - 2. Reset stakes found to be in error.

- D. Contractor shall provide the following staking:
 - 1. All construction staking except as provided by Engineer above.
 - 2. Reset stakes, marks or pins lost due to Contractor's operations.

- E. Electronic copies of surveying staking points will not be made available for this project.

- F. Control Staking
 - 1. Notify Engineer, in writing, at least five days in advance of the date when control staking services are desired.
 - 2. Engineer shall provide control staking.
 - 3. Examine stakes before commencing operations.
 - 4. Notify Engineer if validity of any control stake is questionable.
 - 5. Engineer will check stake or stakes in question.
 - 6. Any control stakes found to be in error will be reset by Engineer.
 - 7. If stakes are valid, Contractor shall pay for cost of checking stakes.
 - 8. Contractor shall inform his employees, subcontractors and vendors of importance of control stakes and the necessity of their preservation.
 - 9. Contractor shall pay for resetting any control stakes, marks, or pins lost due to Contractor's operations.

- G. Construction Staking
 - 1. Provide all construction staking as needed to complete the Work.

- H. If site conditions vary from those indicated, the Contractor shall notify the Architect immediately.

3.03 STRUCTURAL EXCAVATION

- A. Excavate subsoil required for building foundations both interior and exterior, construction operations and other work. Excavate for structures to the lines and grades shown or as required to accomplish the construction.
 - 1. After excavating footings and prior to placing any fill material, Contractor is to arrange for qualified testing agency to perform hand held penetrometer tests at 10 foot intervals along entire length of perimeter footing and along all interior grade beams to determine that minimum soil bearing capacity has been achieved.

- B. The method of excavation used is optional; however, no equipment shall be operated within 5 feet of existing structures or newly completed construction.

- C. Excavation that cannot be accomplished without endangering present or new structures shall be done with hand tools.

- D. Machine slope banks to angle of repose or less until shored.

- E. Excavate to the depths and widths required.
- F. Do not interfere with normal 45 degree bearing splay of foundations.
- G. Allow for forms, working space, granular base and finish topsoil.
- H. Do not carry excavation for footings and slabs deeper than the elevation shown.
 1. Fill over excavations under footings with concrete of equal strength to that of the footing when excavations are deeper than the elevation shown.
 2. Replace excavation carried below the grade lines shown or established by the Architect with the same fill Material as specified for the overlying fill or backfill, compact as required for such overlying fill or backfill.
 3. Where the overlying area is not to receive fill or backfill, replace the over excavated material and compact to a density not less than that of the underlying ground.
 4. Correct over excavated areas and unauthorized excavation at the Contractor's expense.
- I. Correct cuts below grade by similarly cutting adjoining areas and creating a smooth transition.
- J. Hand trim excavation and leave free of loose matter.
- K. Remove lumped subsoil, boulders and rock.
- L. Stockpile excavated material in area designated on site and remove excess subsoil not being reused from site.

3.04 EXCAVATION SAFETY

- A. The Contractor shall be solely responsible for making the excavation in a safe manner.
- B. Provide appropriate measures to retain excavation side slopes to ensure that men working in or near the excavation are protected.

3.05 DEWATERING EXCAVATION

- A. Remove water during periods when concrete is being deposited, pipe is being laid and placing of backfill unless water settling is required and at such other times as required for efficient and safe execution of the work.
- B. Accomplish removal of groundwater in a manner that will preserve the strength of the foundation soils, will not cause instability of the excavation slopes and will not result in damage to existing structures.
- C. Where necessary to these purposes, lower water level in advance of excavation, utilizing wells, wellpoints or similar methods.
- D. Maintain the water level in the gravel stratum as measured in piezometers, a minimum of

3 feet below the prevailing excavation.

- E. Open pumping, sumps and ditches: If these methods result in boils, loss of fines, softening of the ground or instability of slopes, they will not be permitted.
- F. Install wells and wellpoints with suitable screens and filters so that continuous pumping of fines does not occur.
- G. Operate well points continuously so as to prevent boils and loss of consolidation.
- H. Arrange discharge to facilitate collection of samples by Architect.
- I. Avoid settlement or damage to adjacent property.
- J. Dispose of water in a manner that will not damage adjacent property, as approved by Architect.

3.06 UNDERCUTTING

- A. Undercut areas on the site that do not meet the permeability requirements to such depth as to allow placement of sufficient impervious material as determined by permeability testing at borrow area as stated in Part 2 of this section.
- B. Prior to placement of fill in the undercut area, scarify the upper 6" of subgrade and re-compact to 95 percent of ASTM D1557.

3.07 FOUNDATION SUBGRADE PREPARATION

- A. After completion of excavation and prior to foundation or fill construction, proofroll the excavation surface with a loaded tandem-axle dump truck or similar heavy wheeled vehicle to detect soft or loose zones.
- B. Conduct proof-rolling in the presence of Architect.
- C. If soft or loose zones are found, excavate the material to a depth accepted by Architect, then fill and compact as specified for the overlying fills.
- D. Prior to placement of overlying fill or concrete, scarify the upper 6" of subgrade and re-compact the foundation subgrade to at least 95 percent of ASTM D1557.

3.08 FILL MATERIAL

- A. Place structural fill material within the influence area beneath all piping, slabs, structures and other areas of excavation.
- B. Place fill in 6" loose lifts and compact each lift to 95 percent of ASTM D1557.
- C. Moisten material as required to aid compaction (+ or - 2 percent optimum moisture content).

- D. Place material in horizontal lifts and in a manner which avoids segregation.
- E. Correct and repair subsequent damage to slabs, piping, concrete structures, facilities or other structures caused by settlement of fill material.

3.09 BACKFILL

- A. Remove form materials and trash from excavation before placing backfill.
- B. Do not operate earth moving equipment within 5 feet of walls of concrete structures for the purpose of depositing or compacting backfill material.
- C. Compact backfill adjacent to concrete walls with hand operated tampers or similar equipment that will not damage the structure.
- D. Place backfill material in 6" loose lifts and compact each lift to 95 percent of ASTM D1557.
- E. Backfill all utility excavations and compact to minimum 95 percent of ASTM D698.

3.10 SUBGRADE PREPARATION AND FILL MATERIAL AT PAVED AREAS

- A. Paved areas include areas to receive Gravel Surfacing, Asphalt Concrete Paving, Portland Cement Concrete Paving, etc.
- B. Scarify upper 6" of natural subgrade and recompact to 90 percent of ASTM D1557.
- C. Place structural fill material to the lines and grades shown in maximum 6" loose lifts and compact each lift to not less than 90 percent of ASTM D1557.

3.11 MOISTURE CONTROL

- A. During compacting operations, maintain optimum practicable moisture content required for compaction purposes in each lift of fill.
- B. Maintain moisture content uniform throughout the lift.
- C. Add water to the material at the site of excavation. Supplement, if required, by sprinkling the fill.
- D. At the time of compaction, maintain the water content of the material at optimum moisture content, plus or minus 2 percent, except as otherwise specified for embankments.
- E. Do not attempt to compact fill material that contains excessive moisture.
- F. Aerate material by blading, discing, harrowing or other methods to hasten the drying process.

3.12 FIELD DENSITY TESTS

- A. Test Methods: ASTM D2922, D2216 and D3017.
- B. Cooperate with testing work by leveling small test areas designated by the Architect.
- C. Backfill test areas.
- D. Field density test shall be performed for every 50 cubic yards of fill material placed.
- E. Architect may order testing of any lift of fill at any time, location or elevation.

3.13 FINISH SITE GRADING AND TOPSOIL PLACEMENT

- A. **Finished Grading:** After all structures have been completed and all backfills have been compacted, all areas on the project construction site which have been disturbed by the Contractor shall be brought to true grade with a minimum of 4 inches of topsoil. Perform earthwork to lines and grades as shown with proper allowance for topsoil.

EDIT

- B. Provide a minimum 4" depth of topsoil in all areas within the limits of construction that are disturbed during the course of this work except areas that are to receive sod or paving material.

INSERT COMMON BERMUDA SEEDING HERE IF REQUIRED.

- 1. **Areas To Receive Sod:** After subgrade preparation, furnish, place, and spread 3" minimum thickness of topsoil over earth areas to be sodded. Do not spread topsoil in frozen or muddy condition. Make allowance for settlement to obtain 3" finished full depth of topsoil. Till thoroughly areas where existing topsoil has not been removed to depth of at least 3" until condition of soil is friable and of uniform texture. Remove stones over 1" in diameter, sticks, and rubbish.
- C. Shape, trim and finish slopes to conform with the lines, grades and cross sections shown.
- D. Make slopes free of loose exposed roots and stones exceeding 3 inches in diameter.
- E. Round tops of banks to circular curves, in general, not less than a 6 foot radius.
- F. Neatly and smoothly trim rounded surfaces; over excavating and backfilling to the proper grade are not acceptable.
- G. Finish site grading will be reviewed by Architect.

3.14 DISPOSAL OF EXCESS EXCAVATION

- A. Dispose of excess excavated materials, not required or suitable for use as backfill or fill off-site OR outside of the area of work.
- B. Compact excess material as specified for fill, dress the completed disposal area to slopes no greater than 4:1 (horizontal:vertical) and slope to drain.

3.15 SETTLEMENT

- A. Settlement in backfill, fill or in structures built over the backfill or fill, which may occur within the 1-year guarantee period in the General Conditions will be considered to be caused by improper compaction methods.
- B. Restore structures damaged by settlement to original condition.

END OF SECTION 31 00 10

PART 1 - GENERAL

1.01 SUMMARY

- A. Remove interfering or objectionable material from designated areas of Work.
- B. Preserve vegetation and existing objects designated to remain from injury or defacement.
- C. Cut trees only at direction of Engineer.
- D. Contractor shall be responsible for implementing and following a Storm Water Pollution Prevention Plan as required by the Arkansas Department of Environmental Quality and in accordance with NPDES ARR150000. The successful Bidder (Contractor) shall develop a Storm Water Pollution Prevention Plan to meet all State and Federal regulations and submit to the Engineer for review and approval prior to commencing work.

1.02 DEFINITIONS

- A. Clearing:
 - 1. Cutting, removing, and disposing of trees, snags, stumps, shrubs, brush, limbs, and other vegetative growth.
 - 2. Removing evidence of their presence from the surface, inclusive of sticks and branches greater than 2 inches in diameter or thickness.
 - 3. Removing and disposing of trash piles, rubbish, and fencing.
- B. Grubbing:
 - 1. Removing and disposing of wood or root matter below the ground surface remaining after clearing.
 - 2. Includes stumps, trunks, roots, or root systems greater than 2 inches in diameter or thickness to a depth of 18 inches below the ground surface.
- C. Stripping: Removing and disposing of organic sod, topsoil, grass and grass roots, and other objectionable material from the areas designated to be stripped that remain after clearing and grubbing.

1.03 RELATED SECTIONS

- A. Section 31 00 00 – Site Earthwork.

PART 2 - MATERIALS

2.01 GENERAL

- A. Provide materials, suitable and in adequate quantity, required to accomplish Work of this Section.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Review with Engineer's representative the location, limits, and methods to be used prior to commencing Work under this Section.

3.02 CUTTING TIMBER

- A. Exercise care when clearing near the clearing limits to avoid damage to existing trees, vegetation, structures, or utilities which are outside of the clearing limits.
- B. Trees shall be leveled into the area to be cleared.
- C. Flush cut stumps not designated for grubbing by cutting to within 2 inches of the ground surface.
- D. Timber is the property of the Contractor.
- E. Dispose of stumps, limbs, brush, snags, non-marketable timber, and other vegetative growth off-site.

3.03 PRESERVATION OF TREES, SHRUBS, AND OTHER VEGETATION

- A. Trees, shrubbery, and other vegetation not designated for removal shall be protected from damage.
- B. Cut and remove tree branches only where, in the opinion of the Engineer, cutting is necessary to effect construction operation.
- C. Remove branches other than those required to effect the Work to provide a balanced appearance of any tree, as approved prior to removal.
- D. Treat scars resulting from the removal of branches with an approved tree sealant.

3.04 CLEARING AND GRUBBING LIMITS

- A. Clear and grub areas within the limits of construction.
- B. Clear and grub in stages as the construction area is increased to avoid unnecessary clearing and grubbing.

3.05 DISPOSAL OF CLEARING AND GRUBBING DEBRIS

- A. Haul the material from the Work site and dispose of in accordance with state, federal, and local laws. Off-site disposal shall be at the Contractor's sole expense.

3.06 AREAS TO BE STRIPPED

- A. The exact depth of stripping shall be determined by the Engineer.
- B. Topsoil requirements are specified in Section 31 00 00.
- C. Strip areas that are cleared and grubbed.
- D. Strip areas in stages to avoid unnecessary stripping.

3.07 DISPOSAL OF STRIPPINGS

- A. Do not mix strippings with borrow excavation.
- B. Stockpile topsoil from the strippings for use in landscape grading.
- C. Dispose of excess topsoil.
- D. Strippings not suitable for use as topsoil shall become the property of the Contractor and shall be removed from the site.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Work of this Section also includes:
 - 1. Replacing topsoil that contains regenerative material.
 - 2. Disposal of trees, stumps, brush, roots, limbs, and other waste materials from clearing operations.
 - 3. Imported topsoil.
 - 4. Crush rock backfill required by over-excavation.
 - 5. Imported pipe zone material.
 - 6. Trench settlement repair, including replacing roadway surfacing, sidewalk, or other structures.
 - 7. Replacing damaged culverts.
- B. Trench excavation is classified as common excavation and includes removal of material of whatever types encountered including rock to depths shown or as directed by Engineer.
- C. Pipe zone includes full width of excavated trench from bottom of pipe to a point 6 inches above top outside surface of pipe barrel.
- D. Conform to federal, state, and local codes governing safe loading of trenches with excavated material.
- E. The right is reserved to modify the use, location, and quantities of the various types of backfill during construction as Engineer considers to be in the best interest of Owner.
- F. There shall be no extra compensation for dewatering and rock excavation.
- G. Pipe shall be installed according to the latest version of AWWA C605.

1.02 REFERENCES

- A. Arkansas Department of Transportation, P.O. Box 2261, Little Rock, Arkansas 72203, latest edition.
 - 1. ARDOT 303 - Aggregate Base Course.
- B. ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959.
 - 1. ASTM D448 - Classifications for Standard Sizes of Aggregate and Bridge Construction.
 - 2. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb. (2.49-kg.) Rammer and 12-inch (304.8-mm) Drop.

3. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10-lb. (4.54-kg.) Rammer and 18-inch (457-mm) Drop.
 4. ASTM D2487 - Standard Classification of Soils for Engineering Purposes.
 5. ASTM D2922 - Test Methods for Density of Soils and Soil-Aggregates in Place by Nuclear Method.
- C. Occupational Safety and Health Administration (OSHA) Standard for Excavation and Trenches Safety System, 29 CFR 1926, Subpart P: Excavations.
- D. The Contractor shall be solely responsible for trench and excavation safety systems in accordance with Act 291 of 1993.

PART 2 - PRODUCTS

2.01 FOUNDATION STABILIZATION

- A. Crushed gravel or crushed rock, free from dirt, clay balls, or organic material, well graded from coarse to fine, containing sufficient finer material for proper compaction, and meeting ASTM D448 Size No. 67 (Concrete Aggregate).

2.02 PIPE ZONE MATERIAL

- A. Select material shall consist of fine loose earth or sand free from clods or rocks larger than 3/4 inches in dimension and of proper moisture content for maximum consolidation.
- B. Crushed granular material conforming to ASTM D448, Size No. 67.
- C. Washed stone bedding size 1/4-inch to 3/4-inch.

2.03 COMMON FILL MATERIALS

- A. Material shall not contain pieces larger than 3 inches, and shall be free of roots, debris, or organic matter.

2.04 SELECT FILL MATERIALS

- A. Class 7, Class 3, and Class 4 as established by Section 303 of Arkansas Department of Transportation Standard Specifications for Highway Construction.
- B. ASTM Soil Classification GC as set forth in ASTM Designation D2487. On site material may be used, provided it is in accordance with ASTM D2487.

2.05 BEDDING MATERIAL

- A. Pea gravel, sand, or other locally available bedding material, as approved.

2.06 TRENCH BACKFILL

- A. Granular Backfill:
1. Natural or artificial mixture of gravel and soil mortar uniformly well graded from coarse to fine.

2. ARDOT Section 303 Class 3, Class 4, or Class 7 as specified in this Section.

2.07 PVC WATER AND SEWER PIPE TRENCH

- A. See Drawings for trench details.

2.08 COMPACTION EQUIPMENT

- A. Suitable type and adequate to obtain the amount of compaction specified.
- B. Operate in strict accordance with manufacturer's instructions and recommendations and maintain in such condition so that it will deliver manufacturer's rated compactive effort.

2.09 IMPORTED TOPSOIL

- A. Suitable sandy loam from an approved source.
- B. Must possess friability and a high degree of fertility.
- C. Free of clods, roots, gravel, and other inert material.
- D. Free of quackgrass, horsetail, and other noxious vegetation and seed.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Where clearing or partial clearing of right-of-way is necessary, complete prior to start of trenching.
- B. Cut trees and brush as near to surface of ground as practicable, remove stumps, and pile for disposal.
- C. Do not permit excavated materials to cover brush or trees prior to disposal.

3.02 PREVENT TRENCH WATER AND ANIMALS FROM ENTERING PIPE

- A. When pipe laying is not in progress, including noon hours, open ends of pipe shall be closed; and no trench water, animals, or foreign material shall be permitted to enter the pipe.

3.03 DISPOSAL OF CLEARED MATERIAL

- A. Dispose of material in such a manner to meet requirements of state, county, and local regulations regarding health, safety, and public welfare.
- B. Dispose of nonflammable and flammable material off the construction site in an approved location.
- C. Do not leave material on the Project site, shove onto abutting private properties, or bury in embankments or trenches.

3.04 REMOVAL OF OBSTRUCTIONS

- A. Remove obstructions within trench area or adjacent thereto such as tree roots, stumps, abandoned piling, logs, and debris.
- B. Engineer may, if requested, make changes in the trench alignment to avoid major obstructions, if such alignment changes can be made within the easement or right-of-way without adversely affecting the intended function of the facility.
- C. Dispose of obstructions in accordance with this Section.

3.05 REMOVAL AND REPLACEMENT OF TOPSOIL

- A. Where trenches cross lawns, garden areas, pasturelands, cultivated fields, or other areas on which reasonable topsoil conditions exist, remove topsoil for a depth of 6 inches for full width of trench to be excavated.
- B. Use equipment capable of removing a uniform depth of material.
- C. Stockpile removed topsoil at regular intervals, and do not mix with other excavated material.
- D. Locate stockpiles so that material of one ownership is not transported and stockpiled on property of another ownership.
- E. Minimum finished depth of topsoil over trenches: 5 inches.
- F. Imported topsoil may be substituted for stockpiling and replacing topsoil.
- G. Maintain finished grade of topsoil level with area adjacent to trench until final acceptance by Engineer.
- H. Repair damage to adjacent topsoil caused by work operations.
 - 1. Remove rock, gravel, clay, and other foreign materials from the surface.
 - 2. Regrade.
 - 3. Add topsoil as required.

3.06 TRENCH WIDTH

- A. Minimum width of unsheeted trenches where pipe is to be laid shall be 18 inches greater than the outside diameter of the pipe, or as approved.
- B. Maximum width at top of trench will not be limited, except where excess width of excavation would cause damage to adjacent structures or property or cause undue stresses on the pipe.
- C. Confine trench widths to dedicated rights-of-way or construction easements, unless special written agreements have been made with affected property owner.

3.07 EXCAVATION

- A. Excavate trench to lines and grades shown or as established by Engineer with proper allowance for pipe thickness and for pipe base or special bedding when required.
- B. If trench is excavated below required grade, correct with foundation stabilization material.
- C. Place material over full width of trench in compacted layers not exceeding 6 inches deep to established grade with allowance for pipe base or special bedding.

3.08 PREPARATION OF TRENCH - LINE AND GRADE

- A. Do not deviate more than ½ inch from line or ½ inch from grade. Measure for grade at the pipe invert, not at the top of the pipe, because of permissible variation in pipe wall thickness.
- B. Grade the bottom of the trench by hand to the line and grade where the pipe is to be laid, with proper allowance for pipe thickness and for pipe base when specified or indicated.
- C. Remove hard spots that would prevent a uniform thickness of bedding.
- D. Check the grade with a straightedge and correct irregularities found.
- E. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of lifting tackle.

3.09 SHORING, SHEETING, AND BRACING OF TRENCHES

- A. Sheet and brace trench when necessary to prevent caving during excavation in unstable material or to protect adjacent structures, property, workers, and the public.
- B. Increase trench widths accordingly by the thickness of the sheeting.
- C. Maintain sheeting in place until pipe has been placed and backfilled at pipe zone.
- D. Remove shoring and sheeting as backfilling is done in a manner that will not damage pipe or permit voids in backfill.
- E. Conform to safety requirements of federal, state, or local public agency having jurisdiction for sheeting, shoring, and bracing of trenches; the most stringent of these requirements shall apply.

3.10 LOCATION OF EXCAVATED MATERIALS

- A. Place excavated material only within construction easement, right-of-way, or approved working area.
- B. Do not obstruct private or public traveled roadways or streets.

3.11 REMOVAL OF WATER

- A. Provide and maintain ample means and devices to promptly remove and dispose of water entering trench during time trench is being prepared for pipe laying, during laying of pipe, and until backfill at pipe zone is completed.
 - 1. These provisions apply during the noon hour as well as overnight.
 - 2. Provide necessary means and devices, as approved, to positively prevent under water from entering the construction area of another contractor.
- B. Dispose of water in a manner to prevent damage to adjacent property.
- C. Drainage of trench water through the pipeline under construction is prohibited.

3.12 FOUNDATION STABILIZATION

- A. When existing material in bottom of trench is unsuitable for supporting pipe, excavate unsuitable material.
- B. Backfill trench to subgrade of pipe base with foundation stabilization material specified.
- C. Place foundation stabilization material over the full width of trench and compact in layers not exceeding 6 inches deep to required grade by making passes with a vibratory compactor (or equivalent).
- D. Material shall be considered unsuitable when it contains more than 5 percent organic material by volumetric sampling or when it will not support a reading of 1.5 on a hand penetrometer.

3.13 ROCK IN PIPE TRENCH

- A. Where rock is encountered in bottom of trench, support pipe on bedding material.
- B. Minimum Bedding Thickness: Minimum of 4 inches or one eighth of the outside diameter of pipe, whichever is greater.
- C. Extend bedding up pipe sides one sixth of outside diameter of the pipe, minimum.
- D. Backfill over pipe according to pipe zone type.

3.14 PIPE ZONE BACKFILL

- A. Depth of the pipe zone above pipe barrel varies with pipe material.
- B. Particular attention must be given to area of pipe zone from flow line to centerline of pipe to ensure firm support is obtained to prevent lateral movement of pipe during final backfilling of pipe zone.
- C. Backfill area of pipe zone from bottom of pipe to horizontal centerline of pipe by hand-placing material around pipe in 4-inch layers.
- D. Achieve continuous support beneath pipe haunches by "walking in" and slicing with shovel.

- E. Backfill area of pipe zone from horizontal centerline to top of pipe zone with pipe zone material as determined by class of backfill.
- F. In lieu of selected material for pipe zone in upper portion of pipe zone, imported pipe zone material approved by Engineer for trench backfill may be substituted.
- G. If the Engineer determines that the existing material is insufficient or unsuitable at trench side for selected material for pipe zone in upper portion of pipe zone, provide suitable material from other trench excavation along pipeline or imported pipe zone material.

3.15 TRENCH BACKFILL ABOVE PIPE ZONE

- A. When backfill is placed mechanically, push backfill material onto slope of backfill previously placed and allow to slide down into trench.
- B. Do not push backfill into trench in such a way as to permit free fall of material until at least 2 feet of cover is provided over top of pipe.
- C. Under no circumstances allow sharp, heavy pieces of material to drop directly onto pipe or tamped material around pipe.
- D. Do not use backfill material of consolidated masses larger than ½ cubic foot.

3.16 EXCESS EXCAVATED MATERIAL

- A. Dispose of excess excavated material off project site in an approved area.

3.17 DRAINAGE CULVERTS

- A. Replace drainage culverts which are removed on near right angles to pipe centerline.
- B. If pipe cannot be reused or is damaged during removal, dispose of it and provide new pipe.
- C. Protect culverts from damage or restore to equivalent condition.
- D. Replace culverts to existing lines and grades.
- E. Do not replace culverts until proposed pipeline is installed and backfill of trench has been completed to subgrade of culvert.

3.18 PIPE COVER

- A. Place select material from excavation over pipe to provide minimum coverage, as shown on Drawings or as directed by Engineer.

3.19 DRAINAGE DITCH RESTORATION

- A. Undercrossings of minor drainage ditches not covered in another Specification Section shall be backfilled so that upper 1 foot of material in ditch between ditch banks is clay.
- B. Compact material for full ditch width by 6 passes of vibratory compactor (or equivalent).

- C. Where indicated on Drawings, provide concrete arch, and/or riprap on ditch banks.

3.20 SETTLEMENT

- A. Correct settlement noted in backfill, fill, or in structures built over backfill or fill within warranty period.

3.21 IMPORTED TOPSOIL

- A. Should regenerative material be present in soil, remove both surface and root which appears in within 1 year following acceptance of Project in a manner satisfactory to Owner.

END OF SECTION

EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 SUMMARY

- A. Install slope protection and erosion control.
- B. Complete Work to present a continuous appearance.

1.02 RELATED SECTIONS

- A. Section 31 00 00 - Site Earthwork.
- B. Section 31 10 00 - Site Clearing.
- C. Section 31 23 33 - Trenching and Backfilling.

1.03 SAFETY REQUIREMENTS

- A. Conform with OSHA requirements, federal, state, and local rules and regulations pertaining to safety and as specified elsewhere in these Specifications.

PART 2 - PRODUCTS

2.01 FILTER FABRIC FOR SILT FENCING

- A. Nonwoven polypropylene or polyester fabric.
- B. Manufacturer: Typar 3401, Trevira S1115, or equal.

2.02 ACCESSORIES

- A. Wood or steel stakes. If using steel stakes (rebar), stakes shall have safety caps meet OSHA requirements.
- B. Rectangular hay bales secured with twine or nylon rope.
- C. Filter fabric shall be supported by steel or wooden post and backed with a woven wire fabric for support.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Stake hay bales with wooden or steel stakes to prevent movement and to provide erosion control.

- B. Install silt fencing to control dust movement and to prevent erosion.
- C. Hay bales and silt fencing support shall be set in shallow trench and anchored a minimum of a 1-1/2 inch in ground surface.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Perform foundation and under floor termite control treatment in accordance with the Arkansas Pest Control Law and to qualify construction under this Contract for continuous guaranteed protection specified.
- B. Applicable Regulations:
 - 1. International Building Code
 - 2. Arkansas Pest Control Law.
 - 3. Federal Insecticide, Fungicide and Rodenticide Act, (Public Law 92-516 of Oct. 21, 1972 as amended by Public Law 100-532, October 25, 1988).

1.02 RELATED DOCUMENTS

- A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications and Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are located in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

- A. In accordance with Section 01 33 00.
- B. Substitutions will not be considered prior to the award of the General Contract.
- C. Submit a Termicide Application Plan, including Product Data, Design Data, Test Reports and Certificates.

1.04 GUARANTEE

- A. Furnish damage guarantee with service and re-service for any subterranean termite infestation without cost to Owner. Write Damage Guaranty Contract additionally to cover any and all subterranean termite damage to the structures and contents in amount of \$10,000. Such damage to be repaired, replaced or corrected at Contractor's expense.
- B. Furnish damage guarantee effective for 5 year period after completion of initial treatment without payment of additional fees or premiums by Owner. Upon expiration of 5-year period, Owner has option of extending damage guarantee contract at an annual fee mutually agreed upon by Owner and applicator. Owner reserves the right to cancel as of any anniversary date. Service, re-service, and Damage Guaranty provisions of the extended damage contract are noncancellable by applicator. Annual fee subject to revision by giving advance written notice to Owner.
- C. Include in the warranty annual inspections of the buildings, whether new or renovated, or building additions during the warranty period. If live subterranean termite infestation or

subterranean termite damage is discovered during the warranty period, and the soil and building conditions have not been altered in the interim:

1. Re-treat the site and perform other treatment as may be necessary for elimination of subterranean termite infestation;
2. Repair damage caused by termite infestation; and
3. Reinspect the building approximately 180 days after the re-treatment.

1.05 ADMINISTRATIVE

- A. Coordinate work related to final grades, landscape planting, foundations, or any other alterations to finished or renovated construction which might alter the condition of treated soils with this specification.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Chemical termite control uses liquid termiticide treatments applied to the soil, forming a continuous chemical barrier in the soil around both sides of the foundation. The application may be surface applied or rodded and trenched. This barrier prevents foraging termites from reaching the foundation and piers. Only the soil adjacent to these foundation elements is treated. For slab construction (including foundations, patios and garages), the entire soil (or gravel) surface shall be treated before the vapor barrier is installed and the slab poured over it. Soil treatment shall be coordinated with all building activities from foundation construction through final grading of the soil around the building's exterior. In order for the treatment to be effective, the final phase of the application must be done after final grading and, where required, after landscaping is completed so that treated soil is not disturbed.

2.02 TERMITE CONTROL CHEMICALS

- A. Use chemicals approved by the Arkansas State Plant Board and of type required to give guaranteed protection specified.

PART 3 - EXECUTION

3.01 PREPARATION

- A. From investigation at the site determine soil texture or otherwise obtain this information from the County Agent, Soil Conservation Service or other approved authorities, if not already known.
- B. Eliminate food sources by removing debris from clearing and grubbing and post construction wood scraps such as ground stakes, form boards, and scrap lumber from the site, before termiticide application begins.

3.02 TREATMENT

- A. Perform foundation and under floor termite control treatment at buildings to be constructed under this Contract. Use type chemical approved by the Arkansas State Plant Board and currently known to give guaranteed protection for the soil and fill used at this Project. Apply chemical using applicator licensed by the Arkansas State Plant Board. Apply in sufficient quantity under and around the structures, to qualify building and contents for continuous guaranteed protection against damage by subterranean termites.
- B. Reapply soil treatment solution to areas disturbed by subsequent excavation or construction activities following application.
- C. Under Slabs: Apply under slabs at the rate recommended by manufacturer. Apply after placement of gravel drainage fill and immediately prior to placement of vapor barrier. When necessary to insure proper penetration, the ground surface will be left loose or lightly scarified until treatment has been completed.
- D. Critical Areas: Treat a one foot strip along critical areas under walls, around interior piers and pipes rising from the ground at the rate recommended by manufacturer. Treatment shall be applied as specified for overall treatment under slabs.
- E. Outside of Foundations: Apply a one foot strip along the outside of the foundations of the building at the rate recommended by manufacturer. Apply in a trench dug to a depth of approximately 2" below finish grade. Loosen earth in trench to a depth of 12" before treating. This treatment is to be performed prior to finish grading.
 - 1. If the exterior perimeter treatment is applied when the horizontal barrier is applied it will be damaged or removed before construction is completed. The exterior foundation perimeter treatment will have to occur in phases when any pads, porches, aprons, sidewalks, final grading or landscape planting are simultaneously involved adjacent to the building foundation. This treatment area should be coordinated after all major construction but before any pads, porches, or other items requiring special consideration are poured adjacent to the foundation walls. Submit written verification that final grading, landscape planting and other items adjacent to the foundation will not disturb treatment of the soil on the exterior sides of foundation walls, grade beams, and similar structures.

3.03 UTILITIES AND VENTS

- A. Turn off and block HVAC ducts and vents located in treatment area prior to application, to protect people and animals from termiticide. Submit written verification that the HVAC ducts and vents, water and sewer lines, and plumbing have been turned off or blocked prior to applying termiticide.

3.04 APPLICATION PLAN

- A. Prior to commencing application of termiticide, submit a Termiticide Application Plan addressing the following items:
 - a. proposed sequence of treatment work including dates and times of application
 - b. termiticide trade name

- c. EPA registration number
- d. chemical composition
- e. concentration of original and diluted material
- f. formulation
- g. manufacturer's recommended application rates
- h. regional requirements
- i. application rate of active ingredients
- j. method of application
- k. area or volume to be treated
- l. amount to be applied
- m. copy of the pest control business license
- n. copy of the pesticide applicator certificates

3.05 APPLICATION

- A. For areas to be treated, establish complete and unbroken vertical and horizontal soil poison barriers between the soil and all portions of the intended structure which may allow termite access to wood and wood related products. Make applications to crawl spaces in accordance with label directions. Applications to crawl space areas that are used as plenum air spaces will not be permitted.

3.06 EQUIPMENT CALIBRATION AND TANK MEASUREMENT

- A. Submit a list of equipment to be used. Conduct calibration test on the application equipment to be used immediately prior to commencement of termiticide application. Measure the volume and contents of the application tank. Testing must confirm that the application equipment is operating within the manufacturer's specifications and meets the specified requirements. Submit written certification of the equipment calibration test results within 1 week of testing. Where results from the equipment calibration and tank measurements tests are unsatisfactory, re-treatment will be required.

3.07 FIELD QUALITY CONTROL

- A. Verification of Measurement
 - 1. Once termiticide application has been completed, measure tank contents to determine the remaining volume. The total volume measurement of used contents for the application must equal the application rate established in the application plan. Submit written verification that the volume of termiticide used meets the application rate established in the application plan.

- B. Inspection
 - 1. Technical Representative: Provide a technical representative who is a certified pesticide applicator. The technical representative must be present at all meetings concerning treatment measures for subterranean termites and during treatment application.

3.08 CLOSEOUT ACTIVITIES

- A. Upon completion of this work, submit the Pest Management Report, or an equivalent computer product, to the contractor. This form shall identify the target pest, type of operation, brand name and manufacturer of pesticide, formulation, concentration or rate of application used.

3.09 PROTECTION OF TREATED AREA

- A. Immediately after the application, protect the area from other use by erecting barricades as required or directed, including signage. Place signage inside the entrances to crawl spaces and identify the space as treated with termiticide and not safe for children or animals. Cover treated areas with plastic if slab is not to be poured immediately following termiticide application.
- B. Disturbance of Treated Soils
 - 1. Re-treat soil and fill material disturbed after treatment before placement of slabs or other covering structures.

END OF SECTION 31 31 16

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PART 32
EXTERIOR IMPROVEMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This item shall consist of a foundation course for surface course, for other base courses, or for pavements.
- B. It shall be constructed on the prepared subgrade, subbase, or other completed base course according to these specifications and in substantial conformity with the lines, grades, compacted thickness, and typical cross section shown on the plans.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Aggregate Base Course shall be either gravel and/or crushed stone so proportioned as to meet the requirements for a class of aggregate specified in the following table:

Sieve,mm	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	
				PERCENT PASSING					
75 (3")	100	100	100						
50 (2")	95-100	95-100	95-100						
37.5 (1-1/2")				85-100	100	100	100		
25.0 (1")								100	
19.0 (3/4")	60-100	60-100	60-100	60-100	60-100	50-90	50-90	65-100	
9.5 (3/8")	40-8-	40-80	40-80	40-80	40-80				
4.75 (#4)	30-60	30-60	20-60	30-60	30-60	25-55	25-55	25-55	
2.0 (#10)	20-50	20-50	20-45	20-45	20-45				
0.425 (#40)	10-35	10-35	10-35	10-35	10-35	10-30	10-30	10-30	
0.075 (#200)	3-15	3-15	3-12	3-12	3-12	3-10	3-10	3-10	
MAX. PLASTICITY INDEX (MINUS									
0.425 MATL.)	13	10	6	6	6	6	6	6	
(#40) MINIMUM PERCENT CRUSHED (RETAINED ON 4.75 mm [#4] SIEVE					15				
MINIMUM PERCENT CRUSHER-RUN MATERIAL						90	90	90	

- B. Class 7 and 8 shall be any mechanically crushed natural rock or stone of igneous, sedimentary, and/or metamorphic origin produced from a solid geological formation by quarrying method.
- C. The Contractor shall have the option of using any higher numbered class Aggregate Base Course than that specified, provided that payment will be for the class specified.

- D. Material furnished for Aggregate Base Course, Class 3 through Class 8, shall have a percent of wear by the Los Angeles Test not greater than 45 as determined by AASHTO T 96.
- E. When it is necessary to blend two or more materials, each material shall be proportioned separately through mechanical feeders to ensure uniform production. Premixing or blending to avoid separate feedings will not be permitted. Production of material by blending materials on the roadway to obtain a mixture that will comply with the requirements specified herein will not be permitted.
- F. For the purpose of this specification, shale and slate are not considered to be gravel or stone. The material furnished shall not obtain more than 5percent by weight of shale, slate, and other objectionable, deleterious, or injurious matter.
- G. For Class 1 and 2 materials, the fraction passing the 0.075 mm (#200) sieve shall not be greater than three-fourths of the fraction passing the 0.425 (#40) sieve. For Classes 3 through 8, the fraction passing the 0.075 mm (#200) sieve shall not be greater than two-thirds of the fraction passing the 0.425 mm (#40) sieve. For Classes 3 through 8 the fraction passing the 0.425 mm (#40) sieve shall have a liquid limit not greater than 25.
- H. To ensure that gravel is uniformly graded, the difference between the percent passing the various sieves shall be as follows for Classes 3, 4 and 5:

Sieve		Percent
19.0 mm - 9.5 mm	(3/4" - 3/8")	5 min.
9.5 mm - 4.75 mm	(3/8" - #4)	5 min.
4.75 mm - 2.00 mm	(#4 - #10)	5 min.
2.0 mm - 0.425 mm	(#10 - #40)	4 min.

- I. When the material contains aggregate larger than that specified above for the class called for in the Contract, the oversize aggregate shall be removed by screening or by screening and crushing. The removal of large size aggregate by hand methods will not be permitted.

PART 3 - EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. The base course material shall be placed on a completed and approved subgrade or existing base that has been bladed to substantially conform to the grade and cross section shown on the plans.
- B. The subgrade shall be prepared as specified in Section 02301 - Site Earthwork and shall be free from an excess or deficiency of moisture at the time of placing base course material.
 - 1. The subgrade shall also comply, where applicable, with the requirements of other items that may be contained in the Contract that provide for the construction,

reconstruction, or shaping of the subgrade or the reconstruction of the existing base course.

- C. Base course material shall not be placed on a frozen subgrade or subbase.
- D. The aggregate shall be placed on the subgrade or other base course material and spread uniformly to such depth and lines that when compacted it will have the thickness, width, and cross section shown on the Drawings.
- E. If the required compacted depth of the base course exceeds 150 mm (6 inches), the base shall be constructed in two or more layers of approximate equal thickness. The maximum compacted thickness of any one layer shall not exceed 150 mm (6 inches) except when vibrating or other approved types of special compacting equipment are used, the compacted depth of a single layer of base course may be increased to 200 mm (8 inches) upon approval of the Engineer.
- F. The material shall be spread the same day that it is hauled. Spreading shall be performed in such a manner that no segregation of course and fine particles nor nests or hard areas caused by dumping the aggregate on the subgrade will exist. Care shall be taken to prevent mixing of subgrade or unspecified material with the base course material during the blading and spreading operation.
- G. Aggregate shall not be dumped or mixed on an existing or newly constructed ACHM course or PCC Pavement that will not be overlaid under the same Contract nor on any open graded base course. Mechanical spreading equipment shall be used, if necessary, to place the base course on the subgrade.
- H. If sufficient working space is not available to allow proper aeration or addition of water to the base, the base material shall be mixed by any satisfactory method before placement.
- I. Each course shall be thoroughly mixed for the full depth of the course and shall be compacted by any satisfactory method that will produce the density thereafter specified.
 - 1. The aggregate shall be maintained substantially at optimum moisture during the mixing, spreading, and compacting operations, water being added or the material aerated as may be necessary.
 - 2. The specified grade and cross section shall be maintained by blading throughout the compaction operation.
 - 3. The material in each course shall be compacted to a density, as determined by AASHTO T 238, Method B, of not less than 98 percent of the maximum laboratory density determined in the laboratory by AASHTO T 180, Method D.
 - 4. The aggregate shall be compacted across the full width of application.
- J. The compacted base course shall be tested for depth and any deficiencies corrected by scarifying, placing additional material, mixing, reshaping, and recompacting to the specified density, as directed.
- K. Where neither prime coat nor surfacing is provided in the same Contract with the base course, the material in the base course shall be uniformly compacted, stable, and free of segregated areas.

- L. The Contractor shall maintain the base course in a satisfactory condition until accepted.

3.02 QUALITY CONTROL

- A. To assure that the material used meets the requirements of the specifications, certain tests for quality control and acceptance will be performed as specified herein. The properties for which quality control and acceptance testing will be performed are gradation, density, moisture content, plasticity index, and thickness as specified in each Section.
- B. The maximum laboratory density shall be determined as follows:

% Retained - 4.75 mm (#4) Sieve	Test Method
10 Max.	AASHTO T 99, Method A
11 - 30	AASHTO T 99, Method C
31 Min.	AASHTO T 180, Method D

Note: In lieu of AASHTO T224, correction for coarse particles retained on the 3/4" (19.0 mm) sieve shall be determined by replacing with an equal mass of material passing the 3/4" (19.0 mm) sieve and retained on the #4 (4.75 mm) sieve.

- C. The in-place density shall be determined by using AASHTO T 310, Direct Transmission. The moisture content shall be determined by AASHTO T 310 or ARDOT Test Method 347 or 348. A new maximum laboratory density and optimum moisture will be determined whenever the Engineer deems necessary or upon evidence provided by the Contractor.
- D. Tests for gradation, liquid limit, and plasticity index shall be performed by AASHTO T 11, T 27, T 89, and T 90.
- E. The Contractor shall furnish all personnel, equipment, and facilities necessary to perform the required sampling and testing.
- F. The Contractor shall provide the Engineer with the opportunity to observe all quality control sampling and testing.
- G. All quality control sampling and testing shall be performed by or under the direct supervision of a technician acceptable to the Owner and in accordance with ARDOT's Manual of Field Sampling and Testing Procedures. Test reports shall be signed and copies made available to the Engineer if requested.
- H. If the results of any test shows that the required minimum density has not been obtained, corrective action shall be taken, followed by a re-test at the same location. The original and re-test reports shall be cross referenced. All corrective actions shall be performed by the Contractor at no cost to the Owner.

3.3 ACCEPTANCE

- A. Acceptance testing for thickness (when specified on the Drawings), gradation, plasticity index, density, and moisture content will be based on lots. The size of standard lots will be 100 cubic yards. Partial lots, of any size, may be established by the Engineer at any time.
- B. Test methods for acceptance shall be the same as specified for quality control testing.
- C. The item of work being tested shall not be considered complete or accepted until passing test reports are submitted to the Engineer.
- D. The Contractor shall take one test for all properties in each lot or partial lot at a location randomly selected by the Engineer.
- E. In addition to the required acceptance tests, the Engineer may require the Contractor to test any location that, by visual observation, appears to be defective.
- F. The Contractor's acceptance sampling and testing procedures and results will be subject to independent assurance sampling and testing conducted by the Owner. The Contractor shall be required to make changes to the equipment and/or procedures if the such tests are unable to verify the Contractor's test results.
- G. All acceptance testing performed by the Contractor is subject to observation by the Engineer. All test reports shall be signed and submitted to the Engineer the next business day after the tests are performed.
- H. If a lot or a partial lot fails to meet the specifications, the Contractor shall remove and replace that lot or partial lot with acceptable material at no cost to the Owner. Tests will be performed on the replacement material as required for the original material. Acceptance of the replacement material will be the same as for the original material.
- I. Payment for the quantity in the original lot will be withheld or recovered, and released after the removal and replacement has been acceptably performed.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Prepare asphaltic concrete pavement in accordance with this Section and where indicated on the Drawings.
- B. Contractor will pay cost of testing.
- C. Construct Work of this Section that is adjacent to or connected to city streets in accordance with requirements of the City for city streets.
- D. Secure permits and inspections, post necessary bonds, and pay necessary fees.

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials, 444 North Capitol Street, North West, Suite 225, Washington, DC 20001.
 - 1. AASHTO M14 - Anionic Emulsified Asphalt.
 - 2. AASHTO M81 - Cut-Back Asphalt Concrete (Rapid-Curing Type).
 - 3. AASHTO M82 - Cut-Back Asphalt Concrete (Medium-Curing Type).
 - 4. AASHTO M208 - Cationic Emulsified Asphalt.
- B. American Society of Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.
 - 1. ASTM C207 - Specification for Hydrated Lime for Masonry Purposes.
 - 2. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb. (2.49-kg) Rammer and 12-in. (304.8-mm) Drop.
 - 3. ASTM D946 - Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction.
 - 4. ASTM D977 - Specification for Emulsified Asphalt.
- C. Arkansas Department of Transportation, P.O. Box 2262, Little Rock, Arkansas 72203.
 - 1. ARDOT - Standard Specifications, Division 400, Latest Edition.

PART 2 - PRODUCTS

2.01 ASPHALTIC PAVING MATERIALS

- A. Prime Coat: Medium curing cut-back asphalt; MC-30 or MC070; AASHTO M82; heated and applied within the temperature range 80 degrees F. - 150 degrees F.
- B. Tack Coat:
 - 1. Rapid curing cut-back asphalt:
 - a. AASHTO M81

- b. SS-1
 - c. Application temperature 70 degrees F. - 160 degrees F.
 - d. Rapid curing emulsified asphalt to match aggregate type.
 - e. Cationic: CRS-1; AASHTO M208
 - f. Application temperature 125 degrees F. - 185 degrees F.
- C. Hot-mix surfacing material shall meet the following requirements:
- 1. Asphaltic Cement: 9.5 mm Mix Design in accordance with Arkansas Department of Transportation, latest edition.
 - 2. Testing: Tests of asphalt mixtures and materials will be made by commercial testing laboratory approved by Owner. Submit test reports to Engineer.
 - 3. Contractor shall be responsible for the cost of testing all material which fails to meet the requirements.

PART 3 - EXECUTION

3.01 SUBGRADE PREPARATION

- A. Subgrade for asphalt paving improvements shall have organic silty and clayey topsoils and other unsuitable material removed and replaced with approved material.
- B. Fill and tamp traces of utility trenches.
- C. Scarify and re-compact subgrade; proof roll with dump truck.
- D. Replace soft spots as needed.

3.02 BASE COURSE FOR ASPHALTIC PAVING

- A. Place material on prepared subgrade for a total compacted thickness, as required on plans.
 - 1. Spread course the same day the material is hauled. It shall be thoroughly mixed, either by repeated handling with a blade grader or by harrowing sufficiently to secure a uniform mixture of coarse and fine particles.
 - 2. Compact base course by systematically rolling and watering as required to obtain a firm, uniform, smooth surface as specified in Part 300 of ARDOT Standard Specifications for Highway Construction.
 - 3. Set blue tops prior to final finishing of base course.
- B. Minimum density shall be 95 Percent Modified Proctor (ASTM D-1557).
- C. Prime coat shall not be put down until base course is compacted.

3.03 PRIME COAT

- A. After acceptance of completed base course, a prime coat shall be uniformly distributed over the prepared base at the rate of 0.3 gallon per square yard.
- B. Remove surplus asphalt material.

- C. Construct and maintain barricades to keep traffic off the primed surface until it is thoroughly cured and ready for asphalt pavement (3 days minimum).

3.04 TACK COAT

- A. Apply tack coat when an asphalt course is to be laid on an asphalt or concrete surface.
- B. Clean surface to be treated with prime or tack.
 - 1. Sweep with mechanical broom immediately preceding the application of prime or tack.
 - 2. Remove patches of asphalt, dirt or other material which does not form an integral part of the surface.
 - 3. When directed, sprinkle the surface with water and give an additional sweeping.

3.05 HOT-MIX SURFACING FOR ASPHALTIC PAVING

- A. Plant Mixing and Transporting: Mixing, transportation, and temperature limitations for hot-mix surface course materials shall be in accordance with the requirements of Division 400, Asphalt Pavements of the ARDOT Standard Specifications for Highway Construction, latest Edition.
- B. Placing, compacting, and acceptance shall be in accordance with Division 400, Asphalt Pavements of the ARDOT Standard Specifications for Highway Construction, latest Edition.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Construction of concrete curbs and sidewalks.

1.02 RELATED SECTIONS

- A. Section 31 23 33- Trenching Backfilling.

1.03 REFERENCES

- A. American Concrete Institute, 22400 W. Seven Mile Road, Detroit, Michigan 48219.
 - 1. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
- B. American Society for Testing and Materials, 1961 Race Street, Philadelphia, Pennsylvania 19103.
 - 1. ASTM C94 - Specification for Ready-Mixed Concrete.
 - 2. ASTM C309 - Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 3. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49-kg) Rammer and 12-in (304.8-mm) Drop.
 - 4. ASTM D994 - Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

1.04 SUBMITTALS

- A. Submit complete information regarding concrete mix to Engineer for review in accordance with the requirements of ASTM C94, Alternate 2.

PART 2 - PRODUCTS

2.01 CURB FORMS

- A. 2-inch dressed dimension lumber or metal of equal strength, free from defects that would impair appearance or structural quality of completed curb.
 - 1. Metal forms: Subject to approval of Engineer.
- B. Short-Radius Forms: 1-inch dressed lumber, plywood, or metal.
- C. Curb Face: No horizontal joints in form material closer than 7 inches from top of curb.
- D. Stakes and Bracing Materials: Provide as required to hold forms securely in place.

2.02 SIDEWALK FORMS

- A. 2-inch dressed lumber, straight and free from defects, or standard metal forms.
- B. Short-Radius Forms: 1-inch dressed lumber or plywood.
- C. Stakes and Bracing Materials: Provide as required to hold forms securely in place.

2.03 CRUSHED ROCK BASE

- A. Clean gravel or crushed rock conforming to requirements for granular fill as specified in Section 31 23 33.

2.04 EXPANSION JOINT FILLER

- A. 1/2-inch thick preformed asphalt-impregnated expansion joint material conforming to ASTM D994.

2.05 CONCRETE

- A. Ready mixed conforming to ASTM C94, Alternate 2.
- B. Compressive Strength: 3,000 psi at 28 days.
- C. Maximum Size of Aggregate: 1-1/2-inch.
- D. Slump: 2 to 4 inches.

2.06 CURING COMPOUND

- A. Liquid membrane-forming, clear or translucent, suitable for spray application.
- B. Conform to ASTM C309, Type 1.

2.07 ACCEPTANCE OF MATERIALS

- A. All materials shall be subject to inspection for suitability, as the Engineer may elect, prior to or during incorporation into the work.

PART 3 - EXECUTION

3.01 EXCAVATION AND BACKFILL

- A. Excavate and backfill in accordance with Section 31 23 33.

3.02 PREPARATION OF SUBGRADE

- A. Bring the areas on which curbs and sidewalks are to be constructed to required grade on undisturbed ground and compact by sprinkling and rolling or mechanical tamping.

- B. As depressions occur, refill with suitable material and recompact until the surface is at the proper grade.
- C. Compact subgrade on fill to 98 percent of maximum density at optimum moisture content as determined by ASTM D1557.

3.03 SETTING FORMS

- A. Construct forms to the shape, lines, grades, and dimensions called for on the Drawings.
- B. Stake wood or metal forms securely in place, true to line and grade.
- C. Brace forms to prevent change of shape or movement in any direction resulting from the weight of the concrete during placement.
- D. Construct short-radius curved forms to exact radius.
- E. Tops of forms shall not depart from grade line more than 1/8 inch when checked with a 10-foot straightedge.
- F. Alignment of straight sections shall not vary more than 1/8 inch in 10 feet.

3.04 CURB CONSTRUCTION

- A. Construct curbs to line and grade shown or established by the Engineer, and conform to the details shown.
- B. Place, process, finish, and cure concrete in conformance with this Section and the applicable requirements of ACI 614. Wherever requirements differ, the more stringent shall govern.
- C. Placement of Preformed Asphalt-Impregnated Expansion Joints (1/2 inch thick):
 - 1. Beginning and end of curved portions of the curb.
 - 2. Connections to existing curbs.
 - 3. At drainage structures.
- D. Contraction Joints: All contraction joints shall be formed by sawing unless otherwise specified, and filled with a commercially available silicone product approved by the Engineer.
 - 1. Contraction joints shall be constructed at 15 foot intervals.
 - 2. Contraction joints shall be 1/8 inch to 3/8 inch in width and 1-1/2 inch in depth.
 - 3. Contraction joints shall be constructed at right angles to the centerline and perpendicular to the surface of the curb and gutter.
 - 4. When curb and gutter is constructed adjacent to, or on rigid pavement, the same joint layout for pavement shall be used, where practicable.
- E. As soon as concrete has set sufficiently to support its own weight, remove the front form and finish all exposed surfaces.
 - 1. Finish top of curb with a steel trowel.
 - 2. Finish edges with a steel edging tool.

3. Rub formed faces with burlap sack or similar device to produce a uniformly textured surface, free from form marks, honeycomb, and other defects.
- F. Fill contraction joints with a commercially available silicone product approved by the Engineer.
- G. Curing:
1. Upon completion of finishing, apply approved curing compound to exposed surfaces of curb.
 2. Curing shall continue for a minimum of 5 days.
- H. Backfilling Curb: Upon completion of curing period, but not before 7 days has elapsed since pouring the concrete, backfill the curb as specified in Section 31 23 33.
- I. Adjusting:
1. Finished curb shall present a uniform appearance for both grade and alignment.
 2. Remove curb sections showing abrupt changes in alignment or grade or which are more than 1/4 inch away from location as staked or which are defective for any reason.
 3. Construct new curb at Contractor's expense.

3.05 SIDEWALK CONSTRUCTION

- A. Thickness of sidewalks shall be as shown on the Drawings.
- B. Place, process, finish, and cure concrete in conformance with this Section and the applicable requirements of ACI 614. Where the requirements differ, the more stringent shall govern.
- C. Placement of Preformed Asphalt Expansion Joints (1/2 inch thick):
1. Where sidewalk ends.
 2. Around posts, poles, or other objects protruding through the sidewalk.
 3. Drainage structures.
 4. Adjacent to curb and gutter
- D. Transverse Joints:
1. Joints shall be cut with a 1/4 inch joint at intervals not greater than the width of the walk being constructed, or as directed.
- E. Finish:
1. Broom surface with fine hair broom at right angles to length of walk and tool at all edges, joints, and markings.
 2. Edges shall be rounded in a 1/4 inch radius, including edges at joints.
- F. Curing:
1. Upon completion of finishing, apply an approved curing compound to exposed surfaces.
 2. Protection sidewalk from damage for period of 7 days.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide and install wheel stops as indicated on the Drawings.

1.02 SUBMITTALS

- A. Submit information regarding type and manufacturer of wheel stop.
- B. Submit manufacturer's recommendation for installation.

PART 2 - PRODUCTS

2.01 AVAILABILITY

- A. Product Number WST- 01 100% recycled plastic standard parking lot wheel stop.
 - 1. Envirofoam Recycled Products, Inc., 28 Seeley Road, Geneva, NY 14456.
Telephone 315-789-1819, Fax 315-781-0126.
 - 2. Or Equal.
- B. Concrete Wheel Stop – submit manufacturer information for approval.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Wheel stops shall be installed per manufacturer's recommendations.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Paint parking lot lines, letter, directional arrows, island curbs, and other areas as shown on the Drawings.

1.02 SUBMITTALS

- A. Provide the following:
 - 1. Paint System Data Sheet (PSDS) from paint manufacturer for each system used (sample form attached).
 - 2. Technical Data Sheets for each product used in the paint system.
 - 3. Copies of the paint system submittals to the coating applicator.

1.03 QUALITY ASSURANCE

- A. Inspection by Engineer, or waiver of inspection of any particular portion of the Work, shall not be construed to relieve Contractor of his responsibility to perform the Work in accordance with these specifications.

1.04 WARRANTY

- A. Contractor shall warrant to Owner and guarantee Work under this Section against defective workmanship and materials for a period of 1 year commencing on the date of final acceptance of the Work.

PART 2 - PRODUCTS

2.01 PAINT

- A. Sherwin-Williams, Promar Traffic Marking.
 - 1. Yellow, Series No. B29Y2.
 - 2. White, Series No. B29W1.
 - 3. Medium blue, Series No. TM2133, Latex.
- B. Colors where shown on Drawings.

PART 3 - EXECUTION

3.01 GENERAL

- A. Paint shall be applied in 2 coats to a clean dry surface using template or a striping machine. Stripes shall be a uniform width of 4 inches wide. Other markings shall be as shown on Drawings.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This item shall consist of furnishing and applying lime, fertilizer, seed, mulch cover, and water according to these specifications at locations shown on the plans or as directed.
- B. The work under this item shall be accomplished as soon as practicable after the grading in an area has been completed in order to deter erosion.

1.02 REFERENCES

- A. Arkansas Department of Transportation (ARDOT), Standard Specifications for Highway Construction, latest edition.

PART 2 - MATERIALS

2.01 TOPSOIL

- A. Existing topsoil shall be reused where practical.
- B. Imported Topsoil:
 - 1. Furnished at sole expense of Contractor.
 - 2. Friable loam free from subsoil, roots, grass, excessive amounts of weeds, stone, and foreign matter; acidity range (pH) of 5.5 to 7.5; and containing a minimum of 4 percent and a maximum of 50 percent organic matter.

2.02 LIME

- A. Lime shall be agricultural grade ground limestone or equivalent as approved by the Engineer.

2.03 FERTILIZER

- A. Fertilizer shall be a commercial grade, uniform in composition, free flowing, and suitable for application with mechanical equipment.
- B. Fertilizer shall be delivered to the site in labeled containers conform to current Arkansas fertilizer laws and bearing the name, trademark, and warranty of the producer.

2.04 SEED

- A. Seed shall have a minimum of 98% pure seed and 85% germination by weight, and shall contain no more than 1% weed seeds.

- B. A combined total of 110 noxious weed seeds shall be the maximum amount per 50 pounds of seed with the following exceptions: Johnson grass seed, wild onion seed, wild garlic seed, field bindweed seed, nut grass seed, sickle pod seed, sesbania seed, indigo seed, morning-glory seed, and cocklebur seed will not be allowed in any amount.
- C. Seed shall be furnished in sealed, standard containers. Seed that has become wet, moldy, or otherwise damaged in transit or in storage will not be acceptable.
- D. Legumes shall be inoculated with an approved culture as recommended by the manufacturer, just prior to seeding.
- E. Seeds shall be composed of the varieties and amounts by weight as shown below.

2.05 SEED MIX

- A. Seed shall be Common Bermuda Grass, applied at the following rates:

	lbs./acre
March 1 - August 31	
Bermuda Grass (Common) unhulled - husk in tact	75
Bermuda Grass (Common) hulled - husk removed	25
September 1 - February 28/29	
Annual Ryegrass	50
Bermuda Grass (Common) unhulled - husk in tact	75

2.06 MULCH COVER

- A. Mulch cover shall consist of straw from threshed rice, oats, wheat, barley, or rye; of wood excelsior; or of hay obtained from various legumes or grasses, such as lespedeza, clover, vetch, soybeans, bermuda, carpet sledge, bahia, fescue, or other legumes or grasses; or a combination thereof. Mulch shall be dry and reasonably free from Johnson grass or other noxious weeds, and shall not be excessively brittle or in an advanced state of decomposition. All material will be inspected and approved prior to use.

2.07 TACKIFIERS

- A. Tackifiers used in mulch anchoring shall be of such quality that the mulch cover will be bound together to form a cover mat that will stay intact under normal climatic conditions.

2.08 WATER

- A. Water shall be of irrigation quality and free of impurities that would be detrimental to plant growth.

PART 3 - EXECUTION

3.01 PROJECT SCHEDULE

- A. Project Schedule shall show an anticipated time for grading and seeding to take place, so that seasonal consideration can be given attention.

3.02 SITE GRADING

- A. Shape, trim, and finish slopes to conform with lines and grades shown.
- B. Make slopes free of loose exposed roots and stones exceeding 2 inches in diameter.
- C. Ensure that site drains properly and there are no areas where water may pond.
- D. Finished site grading will be reviewed by Engineer.

3.03 PREPARATION OF SEEDBED

- A. Areas to be seeded shall be dressed to the shape and section shown on the plans.
- B. If the plans call for replacing topsoil, this shall be done before any preparations for seeding.
- C. Before beginning the seedbed preparation, soil samples shall be obtained from each major soil area for lime requirement analysis.
- D. Lime at the rate determined by the lime requirement test, shall be uniformly spread on areas to be seeded prior to their being roughened or scarified. The seedbed shall be thoroughly pulverized by means of disk harrows or other approved methods, thoroughly mixing lime and soil to a depth of not less than 4 inches (2 inches for slopes 4:1 or steeper) below finish slope elevations. Regardless of the pulverizing method used, the soil shall be broken with the contour of the slope.
- E. Objectionable foreign matter shall be removed and the soil left in a suitable horticultural condition to receive fertilizer and seed. Water may be applied before, during, and after seedbed preparation in order to maintain the desired moisture content in the soil.
- F. When no lime is required, seedbed preparation shall be accomplished as specified above, regardless of the method used in the distribution of fertilizer, seed, and mulch cover.
- G. Rake the area to a uniform grade so that areas drain in the same manner as at the start of the Project.
- H. Lightly compact before planting grass.
- I. Remove trash and stones exceeding 2 inches in diameter from area to a depth of 2 inches prior to preparation and planting grass.

3.04 FERTILIZATION

- A. Fertilizer shall be applied at the rate of 800 pounds per acre of 10-20-10. Fertilizer shall be uniformly incorporated into the soil alone, or in conjunction with the required lime. If the Contractor so elects, the fertilizer may be drilled into the soil or combined with the seed in the hydro-seeding operation.

3.05 TIME OF SEEDING

- A. Conduct seeding under favorable weather conditions during seasons which are normal for work as determined by accepted practice in locality of Project.

3.06 MECHANICAL SEEDING

- A. Sow grassed areas evenly with a mechanical spreader, or as otherwise instructed by the Engineer. Roll with cultipacker to cover seed. Method of seeding may be varied at discretion of Contractor on his own responsibility to establish a smooth, uniformly grassed area.

3.07 HYDRO-SEEDING

- A. If hydro-seeder is used for seeding, fertilizer and seed may be incorporated into one operation but a maximum of 800 pounds of fertilizer shall be permitted for each 1500 gallons of water. If the Contractor so elects, the fertilizer may be applied during preparation of the seedbed. The area shall be lightly firmed with a cultipacker immediately before hydro-seeding

3.08 WINTER PROTECTIVE SEEDING

- A. Winter barley or annual rye grass applied at a rate of 30 pounds/acre shall be used between September 1 and March 1.
- B. Areas receiving temporary winter protective seeding shall be re-seeded when weather conditions become favorable.

3.09 MULCH COVER

- A. Mulch cover shall be applied at the rate of 4,000 pounds per acre immediately after seeding and shall be spread uniformly over the entire area by approved power mulching equipment. When approved by the Engineer, the Contractor may use hand methods to apply mulch cover to small or inaccessible areas.

3.10 MULCH ANCHORING

- A. The mulch shall be effectively pressed into the soil using steel cleated track or cleated roller equipment. The anchoring shall be performed so that the grooves formed are perpendicular to the flow of water down backslopes and foreslopes. The equipment and method used shall produce acceptable results.

3.11 WATER

- A. After application of the mulch cover, water shall be applied in sufficient quantity, as Directed by the Engineer, to thoroughly moisten the soil to the depth of pulverization and then as necessary to germinate the seed.
- B. When directed by the Engineer, the Contractor shall apply water in an amount such that, in conjunction with any rainfall, the seeded and mulched area will receive an amount equivalent to a minimum of 1 inch of water each week beginning the week after seeding and continuing for a minimum of 3 weeks.

3.12 MAINTENANCE

- A. Begin maintenance immediately after each portion of grass is planted and continue until a reasonable stand of grass has been obtained. Repair washed out areas by filling with topsoil, fertilizing, and seeding.

3.13 GUARANTEE

- A. If, at the end of a 180-day period, a satisfactory stand of grass has not been produced, the Contractor shall renovate and reseed the grass or unsatisfactory portions thereof immediately, or, if after the usual planting season, during the next planting season. If a satisfactory stand of grass develops by July 1 of the following year, it will be accepted. If it is not accepted, a complete replanting will be required during the planting season.
- B. A satisfactory stand is defined as grass or section of grass that has:
 - 1. No bare spots larger than 1 square foot.
 - 2. Not more than 15 percent of total area with bare spots larger than 6 inches square.

END OF SECTION

PART 1 - GENERAL**1.01 SUMMARY**

- A. Provide slab sod, fertilizer, and water to establish and maintain grass. Owner shall provide access to water at no cost.
- B. Planting Period: As recommended by sod producer for time of year, subject to Landscape Architect's approval.

1.02 REFERENCES

- A. Federal Specifications.
 - 1. FS O-F-241 - Fertilizers, Mixed, Commercial.

1.03 DEFINITIONS

- A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.04 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for herbicide composition.

1.05 QUALITY CONTROL

- A. Grass that has been cut more than 48 hours before placing shall not be used.
- B. Sod shall not be loaded in bulk on vehicles and dumped in bulk on planting site.
- C. Soil Analysis: For each un-amended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory approved by the Landscape Architect prior to setting Sod. Cooperative Extension Service is an acceptable soil testing lab.
 - 1. The soil-testing laboratory shall oversee soil sampling.
 - 2. Report suitability of tested soil for turf growth.
 - a. State recommendations for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - b. Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver to site, store, and protect products at site.

- B. Sod:
 - 1. Cut sod with approved sod cutters to minimum depth of 2-1/2 inches in satisfactory and uniform widths and convenient lengths for handling.
 - 2. Place cut sod flat, grass side up, on boards and haul to site with soil intact.
 - 3. Sod shall not hang over the edges of the boards.
- C. Fertilizer: Deliver in waterproof bags showing weight, chemical analysis, and name of manufacturer.

PART 2 - MATERIALS

2.01 TOPSOIL

- A. Existing topsoil shall be reused where practical.
- B. Imported Topsoil:
 - 1. Furnished at sole expense of Contractor.
 - 2. Friable loam free from subsoil, roots, grass, excessive amounts of weeds, stone, and foreign matter; acidity range (pH) of 5.5 to 7.5; and containing a minimum of 4 percent and a maximum of 50 percent organic matter.

2.02 SLAB SODDING

- A. Type: Common Bermuda or as indicated on Landscape plans.
- B. Certified nursery grade cultivated grass sod, 95 percent weed free.
- C. Sod shall be live, fresh, and uninjured at time of placing.

2.03 FERTILIZER

- A. FS O-F-241, Type and Grade as recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil to the proportions of nitrogen, phosphoric acid, and soluble potash as recommended by County Extension Agent and/or seed manufacturer, subject to Engineer's approval.

2.04 WATER

- A. Clean, fresh, and free of substances or matter which could inhibit vigorous growth of grass.

2.05 HERBICIDES

- A. As recommended by sod producer and as approved by Landscape Architect.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Fine grade to eliminate uneven areas and low spots. Allow for thickness of topsoil and sod.
- B. Spread topsoil to minimum 4-inch depth and rake smooth.

3.02 FERTILIZING

- A. Apply approximately 90 percent over entire area to receive slab sodding.
- B. Apply remaining 10 percent over sod after placing and rolling.

3.03 SODDING

- A. Upon delivery to site transfer sod from boards to soil surface.
- B. Place slabs closely, leaving a minimum amount of space between slabs.
- C. Use appropriate tools to pull together slabs that do not fit closely.
- D. Do not handle sod by hand except when filling small cracks or at locations where it would be impractical to use boards.

3.04 ROLLING

- A. Roll slab sod as soon after planting as practicable with plain rollers or cultipackers.
- B. Tamp sod with approved hand methods where rolling is impractical.

3.05 MAINTENANCE

- A. Water to prevent grass and soil from drying out.
- B. Control growth of weeds.
- C. Apply herbicides in accordance with manufacturer's instructions.
- D. Remedy damage resulting from improper use of herbicides.
- E. Immediately re-sod areas which show bare spots.
- F. Protect sodded areas with warning signs during maintenance period.

END OF SECTION

PART 33
UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers test for water appurtenances and piping.

1.02 RELATED SECTIONS

- A. Section 33 05 31.15 - Polyvinyl Chloride Pressure Pipe and Fittings.

1.03 SUBMITTALS

- A. Submit testing procedures in accordance with Specifications.

PART 2 - MATERIALS

2.01 WATER FOR HYDROSTATIC TESTING OF PRESSURE LINES

- A. Furnish water from the nearest hydrant or other suitable source for testing purposes.

PART 3 - EXECUTION

3.01 HYDROSTATIC AND LEAK TESTING OF PRESSURE LINES

- A. Upon completion of installation, thoroughly clean new pipe:
1. Flush with water to remove dirt, stones, pieces of wood, or other obstructions that may have entered pipe during construction.
 2. Flush pipelines at a minimum rate of 2.5 feet per second for a duration suitable to Engineer.
- B. Upon completion of installation, pressure test water pipelines:
1. Conduct test in presence of Engineer and Owner.
 2. Minimum Pressure: 100 psig measured at the lowest elevation of the line.
 3. Duration: 2 hours.
 4. Repair visible leaks regardless of the amount of leakage.
- C. Provide water into pipeline for testing and flushing, including necessary:
1. Pumps, gages (increment at 10 psi or less), and meters.
 2. Plugs and caps.
 3. Temporary blowoff piping to discharge water.
 4. Reaction blocking to prevent pipe movement during testing.
- D. Water source for the pump suction shall be potable water from the Owner's distribution system; vessel used shall be approved by the Engineer.

- E. Prevent contamination of the Owner's water distribution system.
- F. After pipelines or isolated sections of pipelines have been filled with water, increase the pressure to test pressure by means of a pump.
- G. Test pressure shall be 100 psi or 50 percent above normal operating pressure, whichever is greater for two (2) hours, except at the lowest elevation of the line, where the test pressure shall be 125 psig or 50 percent above normal operating pressure, whichever is greater.
- H. Duration of hydrostatic leakage test shall be 2 hours, or as specified by Engineer.
- I. Open interior valves, including fire hydrants and other appurtenances, open during tests.
- J. After the specified test pressure has been applied, the entire pipeline shall be checked in the presence of the Engineer giving particular attention to parts of the pipeline and the appurtenances that are exposed.
- K. If leaks are apparent, perform corrective work and replace material that is required to remedy the defect and stop the leaks at no extra cost to the Owner.
- L. If no leaks were apparent or after corrective work has been completed, the pipelines shall be subjected to a leakage test at the pressure specified with a meter inserted in the test pump discharge line.
- M. AWWA C600-17 leak test for Ductile Iron.
 - 1. Hydrostatic Testing shall comply with Section 5.2 of AWWA C600-17.
 - 2. Leakage Criteria to follow AWWA C600-17 Section 5.5.1.4 "Test Allowance."

$$L = \frac{S \times D \times (P^{0.5})}{148,000}$$

L = Quantity of makeup water in gallons per hour

S = Length of pipe section being tested, in feet

D = Nominal diameter of the pipe, in inches

P = Average test pressure during the hydrostatic test, in pounds per square inch (gauge)

- N. AWWA C605-13 leak test for PVC.
1. Hydrostatic Testing shall comply with Section 10.3 of AWWA C605-13.
 2. Leakage Criteria to follow allowable criteria found in AWWA C605-13 Section 10.3.6 "Test Allowance."

$$Q = \frac{L \times D \times (P^{0.5})}{148,000}$$

Q = Quantity of makeup water in gallons per hour

L = Length of pipe section being tested, in feet

D = Nominal diameter of the pipe, in inches

P = Average test pressure during the hydrostatic test, in pounds per square inch (gauge)

This formula is based on a testing allowance of 10.5 GPD/mile/inch of nominal pipe diameter at a test pressure of 150 psi.

- O. If test of pipe laid discloses leakage greater than the allowable leakage as calculated from the above formula, locate the leak or leaks and perform corrective work and replace material that is required in order to remedy the defect and stop the leak.
- P. Corrective work shall be approved by Engineer.

END OF SECTION

POLYVINYL CHLORIDE PRESSURE PIPE AND FITTINGS**PART 1 - GENERAL****1.01 SUMMARY**

- A. Provide polyvinyl chloride (PVC) pipe and fittings.

1.02 RELATED SECTIONS

- A. Section 31 23 33 - Trenching Backfilling.
- B. Section 33 05 05.31 - Hydrostatic Testing.

1.03 REFERENCES

- A. Arkansas Department of Health.
1. ADH: *“Rules and Regulations Pertaining to Public Water Systems, latest Edition.”*
- B. ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959.
1. ASTM D1784 - Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
 2. ASTM D2241 - Specifications for Poly (Vinyl Chloride) (PVC) Pressure - Rated Pipe (SDR Series).
 3. ASTM D3139 - Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 4. ASTM F477 - Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- C. American Water Works Association, 6666 West Quincy Avenue, Denver, Colorado 80235.
1. AWWA C110/A21.10 - American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. For Water and Other Liquids.
 2. AWWA C605 - Underground installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
 3. AWWA: *“The Ten States Standards for Water, 2007 Edition or latest version.”*

PART 2 - PRODUCTS**2.01 PIPE**

- A. PVC pressure pipe, Class 200, SDR-21 in compliance with ASTM D1784 and manufactured from virgin PVC compound with a cell classification of 12454-B with gasket joints and integral bell for buried water piping.

- B. Pipe and fittings shall be manufactured in the United States. Foreign made products shall be unacceptable.
- C. Pipe shall be permanently marked at 5-foot intervals with the following information:
 - 1. Nominal size.
 - 2. Material code designation.
 - 3. Manufacturer's name or trademark and production record code.
 - 4. ASTM or AWWA certification.
 - 5. SDR designation.
- D. Warranty:
 - 1. Manufacturer of the pipe shall warrant product for a period of not less than one (1) year.
 - 2. Forward copies of warranty to the Owner.
 - 3. Replace defective materials at no extra cost to the Owner.

2.02 JOINTS

- A. Buried Pipe: Gasketed slip joint.
- B. Comply with ASTM D3139.

2.03 FITTINGS

- A. Fittings 4 Inches and Larger: Ductile iron, 350 psi pressure class, cement-lined and seal-coated. Where taps are shown on fittings, tapping bosses shall be provided.
 - 1. Flanged Joint: ANSI/AWWA C110/A21.10 and ANSI B16.1, faced and drilled 125-pound ANSI standard.
 - 2. Mechanical Joint: ANSI/AWWA C110/A21.10 and ANSI/AWWA C110/A21.11.
 - 3. Flexible Joint: American Flex-Lox pipe or equal.
- B. Cement Linings: In accordance with ANSI A21.4.
- C. Fittings shall receive an exterior coating of 1 mil thick bituminous material in accordance with ANSI A21.4.
- D. Fittings shall have distinctly cast on them the manufacturer's identification, pressure rating, nominal diameter of openings, and the number of degrees or fraction of the circle on bends.
- E. Fittings Smaller Than 4 Inches: PVC.

2.04 GASKETS

- A. As recommended by pipe manufacturer to conform to pipe.
- B. Comply with ASTM F477.

2.05 MARKING TAPE

- A. Install on pressure systems.
- B. Terra Tape "Extra Stretch."
- C. Or equal.

PART 3 - EXECUTION

3.01 GENERAL

- A. Any connection to water main for the purpose of connecting any water line to the water main, shall use a minimum of Schedule 40, Polyvinyl chloride (PVC) pipe.
- B. Rigid PVC pipe shall be cut, made up, and installed in accordance with the pipe manufacturer's recommendations.
- C. Offset shall be as recommended by the manufacturer for the maximum temperature variation between time of installation and final use.

3.02 TRACE WIRE

- A. Furnish and install a 12-gage insulated copper trace wire with PVC pressure pipe.
- B. Run wire continuous from valve box to valve box, meter box, air release vault, cleanout, or other access points.
- C. Bring wire up inside boxes and vaults in an accessible method.
- D. Bring wire around or tape wire to each pipe section.
- E. Pipe testing shall include following trace wire.
- F. Wire breaks shall be repaired at no additional expense to the Owner.

3.03 MARKING TAPE

- A. On pressure installations of non-metallic pipe, metallic marking tape, Terra Tape Extra Stretch or equal shall be installed 6 to 12 inches above the top of pipe or service line.
- B. The tape shall be in addition to the trace wire specified.

3.04 THRUST BLOCKS

- A. Install 2,500 psi concrete thrust blocks at bends, wyes, or other thrust points on pressure piping.
- B. Block to bear against undisturbed soil and shall be of size and with bearing area as shown on Drawings.

3.05 TESTING

- A. Pressure lines shall be hydrostatically tested at the pressures listed in Section 33 05 05.31.
- B. Use pipe-locating equipment to test continuity of trace wire.
- C. Engineer shall observe and document trace wire test.

END OF SECTION

REINFORCED CONCRETE PIPE AND FITTINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Reinforced Concrete Pipe.
- B. Pipe Joint Material.
- C. Inlets and Junction Boxes.

1.02 RELATED SECTIONS

- A. Section 03 47 00 – Site Cast-in-Place Concrete.
- B. Section 31 23 33 - Trenching and Backfilling.

1.03 REFERENCES

- A. American Association of State Highway and Transportation Officials, 444 North Capitol Street, N.W., Suite 225, Washington, DC 20001.
 - 1. AASHTO M176 - Porous Concrete Pipe.
- B. American Concrete Institute, 22400 W. Seven Mile Road, Detroit, Michigan 48219.
 - 1. ACI 301 - Specification for Structural Concrete for Buildings.
- C. American Society for Testing and Materials, 1961 Race Street, Philadelphia, Pennsylvania 19103.
 - 1. ASTM C14 - Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
 - 2. ASTM C76 - Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - 3. ASTM C443 - Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
 - 4. ASTM C444 - Specification for Preformed Concrete Pipe.
 - 5. ASTM C478 - Specification for Precast Reinforced and Nonreinforced Masonry.

PART 2 - PRODUCTS

2.01 PIPE

- A. Reinforced Concrete Pipe:
 - 1. Class IV or as shown on Drawings.
 - 2. Conform to ASTM C76.
 - 3. Joints shall conform to ASTM C990.

2.02 PIPE JOINT MATERIAL

- A. Cold applied preformed plastic gaskets, AASHTO M198, Type B or Polymer modified asphalt sealants, AASHTO M198 75 1, Type B and ASTM C990.
- B. Primer shall be per gasket manufacturer's recommendations.

2.03 MATERIALS FOR CAST-IN-PLACE CONCRETE

- A. Conform to Section 03 47 00.
- B. Design mix to attain minimum 3,000 psi compressive strength at 28 days.

PART 3 - EXECUTION

3.01 INSTALLATION OF PIPE

- A. Lay sections on properly compacted granular bedding (4-inch minimum) to lines and grades shown on Drawings.
- B. Backfill with approved imported granular materials as specified in Section 31 23 33.
- C. Storm drains shall have a minimum cover of 24 inches.
- D. Pipes (storm, sanitary, water) that cross each other with less than 1-1/2-foot clearance shall have a concrete encased intersection.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide sewage collection system.
- B. Perform pressure and leakage testing of piping.

1.02 RELATED SECTIONS

- A. Section 03 47 00 - Site Cast-in-Place Concrete.
- B. Section 31 23 33 - Trenching and Backfilling.

1.03 SHOP DRAWINGS

- A. Submit specific selection of pipe material and joint type for each pipeline in accordance with Specifications.

1.04 STANDARDS, SPECIFICATIONS, AND CODES

- A. Building drainage (including floor drains) and vent systems shall conform to Arkansas Plumbing Code.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Unless otherwise specified or shown on Drawings, pipe used for wastewater conveyance shall be ductile iron.
- B. Like items of material provided shall be the end products of one manufacturer.
- C. To assure uniformity and compatibility of piping components in piping systems, fittings and couplings shall be furnished by the same manufacturer.

2.02 PIPE ENDS FOR BURIED PIPING

- A. Use mechanical joint or push-on joint pipe ends for buried pipe.
- B. Within limitations noted above, pipe materials and joints do not necessarily have to be the same for all lines in a specific service, except that materials and joints for any particular building, or between any two buildings, or for any particular buried line, shall be the same.

- C. No change in material or joint selection will be permitted after submittal of shop drawings and their final review by Engineer.

2.03 GALLERY AND TRENCH PIPING EXPANSION PROVISIONS

- A. Install piping in galleries and trenches to allow for thermal expansion due to differences between installation and operating temperatures.

PART 3 - EXECUTION

3.01 PIPE PREPARATION AND HANDLING

- A. Inspect exposed pipe and fittings prior to installing in trench.
- B. Inspect interior and exterior protective coating, repair damaged areas in the field with material similar to the original.
- C. Clean ends of pipe thoroughly.
- D. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.
- E. Use proper implements, tools, and facilities for the safe and proper protection of the pipe.
- F. Avoid any physical damage to the pipe.
- G. Do not drop or dump pipe into trenches.

3.02 PREPARATION OF TRENCH - LINE AND GRADE

- A. Do not deviate more than 1/2 inch from line or 1/2 inch from grade. Measure for grade at the pipe invert, not at the top of the pipe, because of permissible variation in pipe wall thickness.
- B. Grade the bottom of the trench by hand to the line and grade to which the pipe is to be laid, with proper allowance for pipe thickness and for pipe base when specified or indicated.
- C. Remove hard spots that prevent a uniform thickness of bedding.
- D. Before laying each section of the pipe, check the grade with a straightedge and correct irregularities found.
- E. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, grade may only be disturbed for the removal of lifting tackle.

3.03 BELL (JOINT) HOLES

- A. At the location of each joint, dig bell (joint) holes of ample dimensions in the bottom of the trench and at the sides where necessary to permit easy visual inspection of the entire joint.

3.04 REMOVAL OF WATER

- A. Remove and dispose of water entering the trench during the process of pipe laying.
- B. Keep trench dry until pipe laying and jointing are completed.
- C. Removal of water shall be in conformance with specifications in Section 31 23 33.

3.05 PREVENT TRENCH WATER AND ANIMALS FROM ENTERING PIPE

- A. When pipe laying is not in progress, including noon hours, open ends of pipe shall be closed; and no trench water, animals, or foreign material shall be permitted to enter the pipe.

3.06 PIPE COVER

- A. Minimum Pipe Cover: 2-1/2 feet unless otherwise indicated.

3.07 LAYING BURIED PIPE

- A. Buried pipe shall be prepared as specified and laid on the prepared base and bedded to ensure uniform bearing.
- B. No pipe shall be laid in water or when, in the opinion of the Engineer, trench conditions are unsuitable.
- C. Joints shall be made as specified for the respective types.
- D. Prevent uplift and floating of the pipe prior to backfilling.

3.08 TESTING - GENERAL

- A. Conduct pressure and leakage tests on newly installed pipelines.
- B. Provide necessary equipment and material and make taps in the pipe, as required.
- C. The Engineer will monitor the tests.

3.09 TESTING NEW PIPE WHICH CONNECTS TO EXISTING PIPE

- A. New pipelines that are to be connected to existing pipelines shall be tested by isolating the new pipe with grooved end pipe caps, spectacle blinds, or blind flanges.

3.10 GRAVITY SEWERS - ALIGNMENT

- A. Prior to final acceptance of the Work, the Engineer will test lines for light.
- B. Provide assistance to Engineer and lanterns testing.
- C. Should any line deviate more than 1/2 inch from a straight line between manholes, the line may be rejected by Engineer.
- D. Remove and replace lines rejected by Engineer at no additional cost to Owner.

3.11 GRAVITY SEWERS LEAK TEST

- A. Sewers shall pass leakage tests as specified.
- B. Leakage test shall be performed in the presence of Owner's representative.
- C. Leakage Test by Low Pressure Air Loss:
 - 1. Plug pipe outlets with suitable test plugs.
 - 2. Brace each plug securely.
 - 3. Pipe air supply to pipeline to be tested so that air supply may be shut off, pressure observed, and air pressure released from the pipe without entering the manhole.
 - 4. A valved branch should be left in the supply line past the shut-off valve terminating in a 1/4-inch female pipe thread for installation of the Owner's test gage.
 - 5. Add air slowly to portion of pipe under test until test gage reads at least 4 psig but less than 5 psig.
 - 6. Shut air supply valve and allow at least 2 minutes for internal pressure to stabilize.
 - 7. Determine time in seconds for pressure to fall .5 psig pressure drop from 3.5 psig to 3.0 psig.
 - 8. Compare observed time with minimum allowable times in the Test Chart for Air Testing at the end of this Section for pass or fail determination.
 - 9. Where ground water level is above the crown of the pipe being tested, test pressure should be increased by 0.4333 psi for each foot the ground water level is above the invert.
 - 10. Do not enter manhole while the line is pressurized.

3.12 MANDREL TEST

- A. Perform deflection (reduction in vertical inside diameter) tests between successive manholes on PVC gravity sewer pipe at least 60 days after installation.
- B. Perform tests utilizing a sharp edge Mandrel.
- C. Deflection shall not exceed 5 percent.

- D. Mandrel dimensions based on 5 percent deflection shall be as follows:
1. 6-inch diameter pipe: 5.70-inch Mandrel OD.
 2. 8-inch diameter pipe: 7.60-inch Mandrel OD.
 3. 10-inch diameter pipe: 9.50-inch Mandrel OD.
 4. 12-inch diameter pipe: 11.40-inch Mandrel OD.

3.13 TEST RECORDS

- A. Records shall be made of each piping system installation during the test. These records shall include:
1. Date of test.
 2. Description and identification of piping tested.
 3. Test fluid.
 4. Test pressure.
 5. Remarks, to include such items as:
 - a. Leaks (type, location).
 - b. Repairs made on leaks.
 6. Certification by Contractor and written approval by Engineer.

3.14 INTERIM CLEANING

- A. During fabrication prevent the accumulation of weld rod, weld spatter, pipe cuttings and filings, gravel, cleaning rags, and other debris within piping sections.
- B. Examine pipe to assure removal foreign objects prior to assembly.
- C. Shop cleaning may employ using a conventional commercial cleaning method if it does not corrode, deform, swell, or alter the physical properties of the material being cleaned.

3.15 EXTERIOR PROTECTION FOR BURIED OR SUBMERGED PIPING ACCESSORIES

- A. Wrap buried, submerged, or embedded mechanical joint fittings and valves with 8 mil polywrap.

**TEST CHART FOR AIR TESTING SEWERS
LEAKAGE TESTING OF SEWERS BY LOW PRESSURE AIR LOSS--
TIME PRESSURE DROP METHOD**

Minimum time in (min:sec) for 0.5 psig drop (3.5 psig to 3.0 psig)

Distance Between Manholes	Nominal Pipe Diameter								
	6	8	10	12	15	18	21	24	36
100	2:50	3:47	4:43	5:40	7:05	8:30	9:55	11:24	12:54
150	2:50	3:47	4:43	5:40	7:05	9:37	13:05	17:57	20:15
200	2:50	3:47	4:43	5:42	8:54	12:49	17:27	22:48	25:43
250	2:50	3:47	4:57	7:08	11:08	16:01	21:49	28:30	32:09
300	2:50	3:48	5:56	8:33	13:21	19:14	26:11	34:11	38:35
350	2:50	4:26	6:55	9:58	15:35	22:26	30:32	39:53	45:09
400	2:51	5:04	7:54	11:24	17:48	25:38	34:54	45:35	51:28
450	3:12	5:42	8:54	12:50	20:02	28:51	39:16	51:17	57:54

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide reduced pressure backflow preventer, wye strainer, enclosure and appurtenances of the sizes indicated.

1.02 RELATED SECTIONS

- A. Section 03 20 00 – Concrete Reinforcing Steel.
- B. Section 03 47 00 – Site Cast-In-Place Concrete.

1.03 REFERENCES

- A. American Water Works Association, 6666 West Quincy Avenue, Denver, Colorado 80235.
 - 1. AWWA C510 - Standard for Double Check Valve Backflow-Prevention Assembly.
 - 2. AWWA C511 - Standard for Pressure-Reducing Principle Backflow-Prevention Assembly.
- B. American Society for Testing and Materials, 1961 Race Street, Philadelphia, Pennsylvania 19103.
 - 1. ASTM A126 - Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.

1.04 SUBMITTALS

- A. Submit under provisions of Specifications.
- B. Certificate of Compliance: Submit Certificates of Compliance attesting that materials provided are in compliance with referenced standards.

PART 2 - MATERIALS

2.01 REDUCED PRESSURE BACKFLOW PREVENTER

- A. Manufacturer: Febco Backflow Prevention, CMB Industries, Model 825Y.
- B. Type: Reduce pressure assembly for high hazard service.
- C. Provide with modular relief valve, spring loaded “Y” type check valves, internal relief valve pressure sensing passages, replaceable relief valve seat ring, and internal parts shall be field serviceable.

- D. Assembly shall automatically reduce the pressure between the check valves (“zone”) to at least 5 psi lower than the inlet pressure. Should the differential between the upstream and the “zone” of the unit drop to 2 psi, the differential relief valve shall open and maintain the proper differential.
- E. Mainline valve body and caps including relief valve body and cover shall be bronze. Check valve moving member shall be center stem guide. Hydraulic sensing passage shall be internally located with the mainline and relief valve bodies and relief valve cover. Relief valve shall have removable seat ring. Seat disc shall be reversible. Shut-off valves and test cocks shall be full ported ball valves.
- F. Assembly shall be rated to 175 psi water working pressure and water temperature range from 32 degrees F. to 140 degrees F.

2.02 WYE STRAINER

- A. Manufacturer: Febco Backflow Prevention, CMB Industries, Model 650.
- B. Constructed of bronze.
- C. Machined seat in the body and tapered seat in the cap for accurate screen alignment. Provide with NPT blow-off connections.
- D. Screen: Flared opening on the upstream for unrestricted flow through strainer and constructed of 40 mesh stainless steel.

2.03 PROTECTIVE ENCLOSURE

- A. Manufacturer: Hot Box, Jacksonville, FL., Unit No. HB2, or approved equal.
- B. Features:
 - 1. Gel coated fiberglass mat, insulated with sprayed applied polyisocyanurate foam insulation frothed in place or board stock laminated between 2 layers of fiberglass mat.
 - 2. Lockable.
 - 3. Designed to protect to -30 degrees F.
 - 4. Mounting Hardware and Assembly Fasteners: Stainless steel.
 - 5. No wood or particle board shall be allowed in assembly.
 - 6. Multi-sectional enclosure shall fit together with overlapping “tongue and groove” joints and secured internally with mechanical fasteners.
- C. Enclosure shall be securely attached to concrete base with anchor brackets installed on the interior of the enclosure, through the flanged base of the enclosure itself or through a stainless steel anchor hinge.
- D. Provide with access panels for easy access. Access panels shall be secured with integral keyed locks. Loose hanging padlocks are not acceptable.

- E. Drain openings shall be designed to remain closed except when device is discharging water. Openings shall be designed to accommodate the maximum discharge of the device, and shall protect against intrusion of wind, debris, and animals through use of aluminum screens with flags.
- F. Heating equipment shall be provided and designed by the manufacturer of the enclosure to maintain an interior temperature of +40 degrees F. with an exterior outside temperature of -30 degree F. and a wind velocity of 15 mph. Heating equipment shall be UL, ETL, or CSA certified. Electrical power source for heat and accessories shall be G.F.I. protected, with 18 inches of clearance from receptacle base to grade.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install backflow preventor and wye strainer in accordance with manufacturer's instructions and as shown on Drawings.
- B. Enclosure shall be assembled and mounted on concrete pads to the manufacturer's instructions and as shown on Drawings. Concrete pad shall be constructed in accordance with Sections 03 15 16 and 03 47 00.
- C. Install enclosure pumb, level, and square.

3.02 ANCHOR BOLTS

- A. Protect threads and clean before nuts are attached and tightened.

3.03 TESTING

- A. Joints shall show no visible leakage.
- B. Repair joints that show signs of leakage prior to final acceptance.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Pipe and culverts and other miscellaneous drain lines around site as shown on Drawings.
- B. Pipe Joint Material.

1.02 RELATED SECTIONS

- A. Section 31 23 33 - Trenching and Backfilling.

1.03 REFERENCES

- A. American Association of State Highway and Transportation Officials, 444 North Capitol Street, N.W., Suite 249, Washington, DC 20001.
 - 1. AASHTO M36 - Corrugated Steel Pipe, Metallic Coated, for Sewers and Drains.
 - 2. AASHTO M176 - Porous Concrete Pipe.
 - 3. AASHTO M218 - Sheet Steel, Zinc-Coated (Galvanized) for Corrugated Steel Pipe.
 - 4. AASHTO M245 - Polymer Precoated Corrugated Steel Pipe.
 - 5. AASHTO M246 - Steel Sheet, Polymer Precoated for Corrugated Steel Pipe.
- B. American Concrete Institute, P. O. Box 9094, Farmington Hills, MI 48333-9094, 38800 Country Club Drive, Farmington Hills, MI 48331 Phone 248/484-3700, Fax 248/848-3701
 - 1. ACI 301 - Specification for Structural Concrete for Buildings.
- C. ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959 USA Phone: (610) 832-9585 Fax: (610) 832-9555.
 - 1. ASTM C14 - Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
 - 2. ASTM C76 - Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - 3. ASTM C412 - Specification for Concrete Drain Tile.
 - 4. ASTM C443 - Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
 - 5. ASTM C444 - Specification for Preformed Concrete Pipe.
 - 6. ASTM C478 - Specification for Precast Reinforced and Nonreinforced Masonry.
 - 7. ASTM C700 - Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
 - 8. ASTM D1785 - PVC Plastic Pipe, Schedules 40, 80, and 120.
 - 9. ASTM D3034 - Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

PART 2 - PRODUCTS

2.01 PIPE AND CULVERTS

- A. Reinforced Concrete Pipe:
 - 1. Class IV or as shown on Drawings.
 - 2. Conform to ASTM C76.
 - 3. Joints shall conform to ASTM C443.

- B. HDPE Pipe:
 - 1. Pipe shall conform to ASTM F2619 or Engineer approved equal.

2.02 PIPE JOINT MATERIAL

- A. Band Couplers:
 - 1. Manufacturers:
 - a. LUV band, with 2 annular corrugations, by Caldwell Culvert; or equal.
 - b. Smooth Cor band, with 2 annular corrugations by Caldwell Culvert; or equal.
 - 2. Minimum gage in accordance with AASHTO M36.
 - 3. Gaskets: Ram-Nek.

- B. Reinforcing End Collars:
 - 1. 12-gage.
 - 2. 6 inches wide.
 - 3. Annular corrugations same as pipe.

- C. Nyloplast Fittings:
 - 1. Meets ASTM D3212.
 - 2. All Series 35 PVC fittings must meet ASTM F1336, ASTM D3034, or ASTM F679.
 - 3. Flexible elastomeric seals must conform to ASTM F477.

PART 3 - EXECUTION

3.01 INSTALLATION OF PIPE AND CULVERTS

- A. Lay sections on properly compacted granular bedding (4-inch minimum) to lines and grades shown on Drawings.

- B. Backfill with approved imported granular materials as specified in Section 31 23 33.

- C. Band Couplers:
 - 1. Install band couplers in accordance with manufacturer's recommendations and AASHTO guidelines.
 - 2. Use Ram-Nek gasket material in end corrugation of each pipe end.

- D. Reinforcing End Collars: Install reinforcing end collar where pipe terminates without protective end treatment such as headwall, inlet box, or grouted rip rap.

END OF SECTION

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CONSTRUCTION SAFETY AND PHASING PLAN

**Construct Terminal Building
Corning Municipal Airport (4M9)
AIP No. 3-05-0068-028-2024
MCE Project No. 23-5837
March, 2024**

Sponsor:
City of Corning, Arkansas
Matt Woolard, Chairman
P.O. Box 538 | Corning, AR 72422
woolardmatt@hotmail.com

CONSTRUCTION SAFETY AND PHASING PLAN

CONSTRUCT TERMINAL BUILDING CORNING MUNICIPAL AIRPORT (4M9) CORNING, ARKANSAS

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INTRODUCTION

This Construction Safety and Phasing Plan (CSPP) has been developed in accordance with FAA Advisory Circular 150/5370-2G (Operational Safety on Airports During Construction) and will be included in the construction bid documents for the Construct Terminal Building project at the Corning Municipal Airport (4M9). The project consists of constructing a terminal building and an asphalt access road and parking lot.

Safety is the primary consideration for any airport, especially during construction. The CSPP developed for this project is intended to minimize the impact the project will have on airport operations while providing a logical sequence of construction activities. The Contractor is to prepare a Safety Plan Compliance Document (SPCD) that details how the Contractor will comply with the CSPP, in accordance to the AC. The SPCD shall be submitted to 4M9 and the Engineer to review for approval prior to the issuance of the Notice to Proceed. The CSPP and SPCD shall be reviewed with the Contractor at the pre-construction meeting and progress meetings during construction.

1. COORDINATION

- a. **Project Contacts.** Below is a list of parties involved during design of the Construct Terminal Building project.

Table 1 – Design Contacts

Organization	Role	Point of Contact	Contact Information
McClelland Consulting Engineers	Consultant (Airfield Design)	Matthew Vinyard, P.E.	(501) 371-0272
Corning Municipal Airport	Sponsor	Matt Woolard	(870) 323-0304
Federal Aviation Administration	FAA Program Manager	Warren Meeks	(817) 222-5684

- b. **Design Submittals.** Throughout the design process, coordination between McClelland Consulting Engineers, Corning Municipal Airport, and the Federal Aviation Administration (FAA) is required. Project documents will be submitted to the Sponsor and the FAA at the 90% stage of preliminary design for review.
- c. **Pre-Design/Pre-Bid Meeting.** Pre-Design/Pre-Bid meetings will not be necessary for this project. The Sponsor has coordinated with airport users and the project will be designed with them in mind. Any questions about the project during the design or bidding phases shall be directed to the Engineer.
- d. **Pre-Construction Meeting (TBD).** Prior to the start of any construction operations on the airfield, a pre-construction conference will be scheduled in order to discuss operational safety, phasing, quality control/quality acceptance, labor requirements, and potential issues that could arise during construction. The Contractor will be apprised of all safety regulations, and will be required to compile and submit a Safety Plan Compliance Document (SPCD) meeting the requirements of AC 150/5370-2G. Notice to proceed for construction is contingent on the Sponsor's receipt and approval of the contractor provided SPCD. Below is a general outline of topics that will be discussed at the meeting:
1. Project Contacts
 2. Project Overview and Safety Items
 3. Safety Plan Compliance Document (SPCD)
 4. Construction Items
 5. Labor Requirements
 6. Civil Rights Requirements

After the pre-construction meeting, a copy of this CSPP will be kept in the airport administrative office for viewing. The Airport Director will be responsible for notifying any airport tenants and users of the AOA closings, as a result of this project, and their timing.

- e. **Contractor Progress Meetings.** In addition to the pre-construction conference, operational safety will be addressed at each Contractor progress meeting. Airport operation safety will be a standing agenda item at all construction progress meetings. At a minimum, the Contractor will be required to update the emergency points of contact, debrief any and all safety incidents, report on safety measures implemented at that point, and safety measures to be implemented before the next meeting. These meetings will also address weekly construction issues, administrative issues such as change orders and/or pay estimates, and any coordination required with the FAA or the Corning Municipal Airport in relation to opening/closing sections of pavement, issuing notice to air missions (NOTAMS), any notices to airport tenants, or impacting navigational aids (NAVAIDS) during construction. Below is an incomplete list of parties that will be involved during construction. The list will be updated after the contract is awarded to include all necessary contact information.

Table 2 – Construction, Emergency, and Utility Contacts

Organization	Role	Point of Contact	Contact Information
CONSTRUCTION			
Corning Municipal Airport	Chairman	Matt Woolard	(870) 323-0304
McClelland Consulting Engineers	Consultant	Matthew Vinyard, P.E.	(501) 371-0272 Office (501) 317-6642 Cell
Arkansas Department of Aeronautics	State Engineer	Richard Mills, P.E.	(501) 376-6781
Contractor	Contractor Project Manager	TBD	TBD
	Contractor Superintendent	TBD	TBD
	Contractor Safety Manager	TBD	TBD
Subcontractor	Subcontractor Contact	TBD	TBD
EMERGENCY			
Hospital		Arkansas Methodist Medical Center	(870) 857-0911
Fire Department	Fire Fighting	911	(870) 857-3510
Police Department	Local Law Enforcement	911	(870) 857-3311
Sheriff Department	County Law Enforcement	911	(870) 857-6752
UTILITY			
One-Call System	Utility Locating	811	1-800-482-8998
Federal Aviation Administration	FAA Facilities – Utilities (SSC)		
Water Utilities	Local Water Utility	Corning Water / Clay County Water	(870) 857-6746 / (870) 259-3327
Power Company	Local Power Utility	Clay County Electric Cooperative / Entergy	(870) 857-3521 / (501) 490-4703

- f. **Changes in Schedule or Scope.** Changes to scope and schedule will be addressed in the timeliest manner possible. The Contractor will be required to inform the Engineer of any expected changes with any follow up correspondence to further define the changes. The Engineer is responsible to

promptly notify the Sponsor. If any changes are deemed necessary, the Engineer will amend the CSPP as required and submit the changes to the Owner and the FAA for review and approval.

- g. FAA ATO Coordination.** Corning Municipal Airport is a non-towered, general aviation airport. FAA ATO Coordination is not required.

2. PHASING

The phasing developed for this project is intended to minimize the impact the project will have on airport operations while meeting FAA Advisory Circular 150/5370-2G requirements and also providing a logical sequence of construction activities. The project consists of two phases of construction; Phase I will be located outside of the Taxiway Safety Area (TSA) and Phase II will be located inside the TSA.

Low profile barricades and taxiway closure markers will be placed as shown on the Construction Safety and Phasing Plan drawings in Appendix A. The closed airfield markings and lighted barricades will be placed to close the taxiway during Phase II in accordance with the Appendix A. A NOTAM will be issued by the Sponsor to reflect taxiway closure period and construction area.

Phase I includes all work outside the TSA including grading, access road and parking lot construction, drainage construction, terminal building construction, utility construction, and concrete sidewalk construction. The work area will be located outside all safety areas; therefore, no pavement closures are anticipated. The maximum duration of Phase I will be 110 days. Liquidated damages of \$350 per day will be assessed for each day Phase I exceeds contract time. The contractor shall give the airport manager at least 7 days' notice prior to beginning Phase I in order for the airport to issue the appropriate NOTAMs.

Phase II includes all work inside the TSA including grading, drainage construction, and concrete sidewalk construction. The work area will be located inside the TSA; therefore, the taxiway will be closed for the duration of Phase II. The maximum duration of Phase II will be 10 days. Liquidated damages of \$350 per day will be assessed for each day Phase II exceeds contract time. The contractor shall give the airport manager at least 7 days' notice prior to beginning Phase II in order for the airport to issue the appropriate NOTAMs.

3. AREAS AND OPERATIONS AFFECTED BY THE CONSTRUCTION ACTIVITY

- a. Affected Areas / Operations.** The areas affected by the project include the taxiway adjacent to the project site.
- b. Mitigation of Affects.** NOTAMs for closures will be coordinated with the Sponsor, Engineer, and Contractor, and submitted to FAA by the Sponsor. The Contractor shall not enter the Runway Safety Area at any time during the project.
 - 1. Temporary changes to taxi operations.** The CSPP drawings in Appendix A shows all areas that must be barricaded or marked.
 - 2. Maintenance of essential utilities.** The Contractor is responsible for field locating all utilities underground and aboveground. Special attention will be given to ensure no unscheduled interruptions of utility services and facilities.
 - 3. Temporary changes to air traffic control procedures.** 4M9 is a non-towered general aviation airport.

4. PROTECTION OF NAVIGATION AIDS (NAVAIDS)

The project is only anticipated to close a taxiway; therefore, no impacts to NAVAIDs are anticipated.

5. CONTRACTOR ACCESS

- a. Access Point.** The Contractor shall access the airport via Highway 62/67 and Airport Road as shown on the Construction Safety and Phasing Plan in Appendix A.

- b. **Haul Routes.** The Contractor will be able to enter the project directly from the access point identified above. The Contractor will follow the routes identified in Appendix A. Any damage to the entrance road or haul route shall be repaired at the Contractor's expense.
- c. **Location of Stockpiled Construction Materials.** The staging area is located near the project area as shown in Appendix A and includes employee parking and material storage. Vehicles, equipment, and stockpiles shall be no closer than 10 feet away from any temporary security fence. Stockpiled materials shall not exceed 20 feet in height and will only be permitted within the boundaries of the staging area. The stockpiles shall also be stabilized in a way so that they are not an attraction to wildlife.
- d. **Vehicle and Pedestrian Operations.** Access to the air operations area (AOA) will be granted from the Contractor's staging area through the access road as shown in Appendix A. Any modification of the access points or haul routes shown on the plans shall have written approval of the Sponsor. All Contractor's employees shall park personal vehicles at the designated contractor staging area as shown in Appendix A. Personal vehicles will not be allowed anywhere inside the AOA. It is the responsibility of the Contractor to provide vehicles that are authorized to operate on the site. These vehicles will be identified in accordance with AC 150/5210-5D. At a minimum, a 3'x3' orange and white checker flag or flashing amber, yellow or red light shall be mounted to the uppermost part of the vehicle. In addition, the Contractor shall identify employees and subcontractor employees which require unescorted access. If a vehicle or piece of equipment is not furnished with a beacon and company information a vehicle with the proper identification must escort it within the AOA.

6. WILDLIFE MANAGEMENT

- a. **Trash.** Various Contractor operations during construction can directly or indirectly create wildlife hazards at airports. One direct wildlife hazard that can be created by Contractor personnel activity is the generation of trash. Food debris and packaging must be collected from construction personnel and disposed of appropriately. It is the responsibility of the Contractor to make arrangements for trash removal from the project site as well as the Contractor's staging area. Trash will be kept in containment that animals cannot penetrate and will be hauled off site regularly. Other construction debris will be hauled off site at the earliest feasible time and by the end of the project. Should this practice prove to be inadequate, the Contractor will be asked to increase the frequency of trash removal.
- b. **Standing Water.** Standing water is a potential wildlife hazard that can be created from construction activity or rainfall events. For this project, standing water will not be allowed to stand after a rain event for more than 48 hours. The Contractor will take precautions and have ready, at no additional cost to the Project, a pump to remove standing water from the project area by pumping to the nearest storm water inlet.
- c. **Tall grass.** Seed and tall grass represent another wildlife attractant on airfields. Seeding on this project, if used, will be specified accounting deterrence of wildlife, including birds. The Contractor is responsible for maintaining the staging, parking, and construction areas free from tall stands of grass.
- d. **Maintaining Fence Line and Gates.** All existing fence lines and gates will be required to remain standing during construction in order to prevent wildlife from entering the airport operations areas. The Contractor will be responsible for keeping the gate secured day and night throughout the duration of the project.
- e. **Disruption of Existing Wildlife Habitat.** The project will be confined to airport property and will only disturb ground that has been previously disturbed; therefore, no disruption to an existing wildlife habitat is anticipated. The project was found to be Categorically Excluded per 1050.1F CATEX 5-6.4(f).

7. FOREIGN OBJECT DEBRIS (FOD) MANAGEMENT

It is the responsibility of the Contractor to maintain a clean project site free from the threat of FOD. The Contractor and its employees will be held responsible for maintaining the project area and keeping it free from FOD whether it is generated from the project site or other airfield areas. Everyone inside the AOA is responsible for the removal of FOD regardless of its origin. In project areas that require the temporary closure of airfield pavement, Airport Personnel will have the final word on the acceptance of cleaned construction areas for aircraft operations. The Contractor shall use a street sweeper or vacuum truck to clean airfield pavement prior to opening closed areas to air traffic.

8. HAZARDOUS MATERIALS (HAZMAT) MANAGEMENT

The Contractor shall take all precautions and management procedures for fuel deliveries and spill recovery. The Contractor shall immediately notify the Airport of any spills of fuels or other hazardous material. Contractor shall submit material safety data sheets on all hazardous materials brought on site. The Contractor shall submit a plan that addresses the management of hazardous and non-hazardous waste in accordance with FAA AC 150/5320-15A, Management of Airport Industrial Waste and include it in the SPCD.

9. NOTIFICATION OF CONSTRUCTION ACTIVITIES

Any person proposing construction or alteration of objects that affect navigable airspace, as defined in Federal Aviation Regulation Part 77, must notify the FAA. The Sponsor has provided FAA notice of what is believed to be the Contractor’s construction equipment heights and locations when the equipment will be closest to the runway during the various phases of the project. **NOTE: The Contractor will not be required to provide additional notice to FAA provided the Contractor’s equipment heights do not exceed the heights already studied, and the Contractor’s equipment locations are no closer to the active runway than those points provided in the study.**

The notices of proposed temporary construction equipment already initiated by the Sponsor and determined by FAA are summarized in Table 3. FAA’s determinations resulting from studies in response to these notices are listed in Appendix B. At a minimum, the Contractor shall:

- Ensure construction meets the requirements set forth in AC 150/5370-2G “Operational Safety on Airports During Construction”.
- Ensure construction equipment used during all project phases is marked and lighted in accordance with AC 70/7460-1L, Chapters 3, 4, 5 and 12.
- Ensure equipment used during the project is removed from the Runway and Runway Object Free Area (ROFA) at night and when not in use.

Table 3 – Coordinates for “Points of Interest”

Study Number	Point of Interest Location	Latitude (NAD83)	Longitude (NAD83)	Height of Equipment	MSL Ground Elevation
Phase I – Runway 18-36 Open					
2024-ASW-2932-NRA	Point 1	36° 24’ 29.46” N	90° 38’ 58.36” W	25’	283’
2024-ASW-2933-NRA	Point 2	36° 24’ 27.93” N	90° 38’ 58.38” W	25’	283’
2024-ASW-2934-NRA	Point 3	36° 24’ 27.96” N	90° 39’ 01.15” W	25’	283’
2024-ASW-2935-NRA	Point 4	36° 24’ 29.49” N	90° 39’ 01.12” W	25’	283’
Phase II - Runway 18-36 Open					
2024-ASW-2936-NRA	Point 5	36° 24’ 29.64” N	90° 38’ 58.36” W	25’	283’
2024-ASW-2937-NRA	Point 6	36° 24’ 29.46” N	90° 38’ 58.36” W	25’	283’
2024-ASW-2938-NRA	Point 7	36° 24’ 29.49” N	90° 39’ 01.12” W	25’	283’
2024-ASW-2939-NRA	Point 8	36° 24’ 29.67” N	90° 39’ 01.12” W	25’	283’
CSPP (Airport Reference Point)					
2024-ASW-2940-NRA	Point 9	36° 24’ 15.23” N	90° 38’ 52.54” W	1’	293’

- a. **Notice to Responsible Representatives / Points of Contact.** An incomplete list of construction and emergency contacts for the Project can be found in Table 3. Upon award of the project, the

Contractor shall provide all appropriate contact information for its staff and subcontractors in its SPCD such as project managers, project superintendents, and safety managers. Once the list is obtained, Table 2 in this document will be updated to provide a comprehensive list of construction and emergency contact information. Should any personnel change occur during the project, it is the responsibility of that organization to provide revised contact information.

- b. Notice to Air Missions (NOTAMs).** The Notice to Air Missions (NOTAM) system provides essential information to personnel concerned with flight and airport operations. NOTAMs provide timely information on unanticipated or temporary changes to components or hazards in the National Airspace System (NAS) which include the closure of runways and taxiways/taxilanes. The construction of this project will require NOTAMs to be issued. A minimum of 7 days' notice for a requested closing shall be directed to the Sponsor who will then coordinate the request with the Department of Operations and FAA SSC. A sample NOTAM form can be found in Appendix C. It is the Contractor's responsibility to verify the appropriate NOTAM is in place prior to commencing an airfield closure.
- c. Emergency Notification Procedures.** Channels of emergency notification will be agreed upon by the Contractor, Engineer, Sponsor, and FAA at the preconstruction meeting before work begins on site. Table 2 in this document will be updated to include a comprehensive list of emergency contact information.
- d. Coordination with ARFF.** No Aircraft Rescue Fire Fighting (ARFF) services are located on the airport. Coordination between the Contractor and the local Fire Department (FD) will be required to mitigate the impact construction operations will have on emergency access routes on the airfield. The Contractor shall notify FD personnel of the following as necessary:
- Deactivation/reactivation of water lines or fire hydrants
 - Rerouting, blocking, and restoration of emergency access routes
 - Use of hazardous materials on the airfield

Contact information for FD personnel and other emergency contact information can be found in Table 2.

- e. Notification to FAA.** FAA notification for emergencies will be the responsibility of the Sponsor. The primary FAA point of contact for this project is Warren Meeks, Arkansas / Oklahoma Airport District Office, (817) 222-5684. Please also refer to Table 1.

10. INSPECTION REQUIREMENTS

The Contractor shall identify a Construction Safety Officer in its SPCD as well as a single point of contact for each subcontractor involved on the project. These contacts will be incorporated into Table 2 - Construction, Emergency, and Utility Contacts in order to provide a comprehensive list of project contacts. The Contractor shall also outline in the SPCD its safety policy and internal inspection requirements to ensure airfield safety compliance.

- a. Daily Inspections.** The Contractor will log daily inspections for FOD and house-keeping practices, report any safety incidents, near incursions into restricted area, etc. The Sponsor's representative will provide daily inspections of the project as well. The daily inspection reports will provide, at a minimum, the following information: construction progress, safety concerns, weather conditions, number of men and equipment working, and on-site location of construction activity. Apparent safety deficiencies will be passed to the Contractor on site for immediate correction.
- b. Final Inspection.** At the time of the final inspection for the project, the project area will be inspected for any safety issues. The Contractor's Construction Safety Officer will be present at the final inspection. Operational safety will be a primary focus, as well as, quality of workmanship, compliance with plans and specifications according FAA Advisory Circulars, and overall satisfaction of the Airport Sponsor. Before the taxilane can be re-opened after a closure, the safety inspection should check for compliance with this CSPP. Also, it should be verified that: all areas are clean and swept free of any foreign object debris (FOD), all construction equipment is

removed from the site, all NAVAIDs and airport lighting (including the beacon) are operational, and all barricades and closure markings have been removed. At this time, any airport closure NOTAMS should be canceled by the Owner. Once all safety issues have been addressed, the pavement can be re-opened.

11. UNDERGROUND UTILITIES

The Contractor is responsible for contacting the local utility stakeout service for site utility stakeout within the project limits prior to beginning work. The location of these utilities should also be reviewed with the Airport Sponsor. Arkansas One-Call is a local utility stakeout provider and its contact information can be found in Table 2. The Contractor shall also coordinate the identification of all FAA facilities within the project limits prior to beginning work by contacting the FAA. The Sponsor may assist as necessary for coordination with the FAA. The Contractor will assist the utility companies and the FAA in their efforts to field verify underground utilities.

12. PENALTIES

Penalties are an important tool used to enforce controls established for the mitigation of safety risks. Table 4 describes the various violations and subsequent consequences established for the Project. Any Contractor personnel found in violation of a safety rule identified in the Contract and/or CSPP, a rule set by any public entity having jurisdiction while on airport property, can be subject to the penalties for noncompliance.

Table 4 – Penalties for Noncompliance

Violation	Consequence
Violation of Construction Safety Plan	1 st Occurrence: Verbal Warning and CSPP Review
	2 nd Occurrence: Written Warning and Construction Halted During Review of CSPP and SPCD with Engineer
	3 rd Occurrence: \$1,000 Fine and Construction Halted During Review of CSPP and SPCD with Engineer
	4 th Occurrence: Person removed from Project

13. SPECIAL CONDITIONS

Airport operations take precedence over all work, especially if a question of safety is involved. Special conditions such as low visibility, snow removal, aircraft in distress, aircraft accident, security breach, or work being completed by others may require the rescheduling and moving from one work area to another. Any and all work stoppage caused by airport operations shall be considered as included in the contract prices paid for contract items of work involved and no additional compensation will be considered.

14. RUNWAY AND TAXIWAY VISUAL AIDS

- a. **Construction.** The Contractor will close the taxiway as shown on the Construction Safety and Phasing Plan (Appendix A). After completion of the phase and the safety inspection, the lighted barricades and taxiway closure marker shall be removed.
- b. **Markings.** Closed airfield markings and lighted barricades shall be installed as the first task of the construction project. The airfield markings will consist of X's placed on the closed pavement ahead of the lighted barricades and lighted barricades placed to prevent aircraft from proceeding onto closed pavement. The closed taxiway markings and barricades shall be removed as the last item in any phase of work and are not to be removed until the corresponding phase of construction is complete, the work areas are swept clear of all debris, and all safety deficiencies have been corrected.

15. MARKINGS AND SIGNS FOR ACCESS ROUTES

All pavement markings and signs for construction personnel shall conform to AC 150/5340-18F and, to the extent practicable, with the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD) and/or state highway specifications. Signs in the AOA, or adjacent to areas used by aircraft shall comply with the frangibility requirements of AC 150/5220-23. The height of temporary

signage shall not penetrate any approach or part 77 surfaces.

16. HAZARD MARKINGS AND LIGHTING

Low profile barricades and closed taxilane markers will be used as a method of traffic control in the Project. Barricades will be used during construction to prevent aircraft from entering the closed taxilane. Closed taxilane markers will be placed ahead of the barricades to indicate the taxilane is closed. The proposed location of low-profile barricades and closed taxiway markers is shown in Appendix A. The flashers on the low-profile barricades should be spaced no more than 10’ apart and must be operated between sunset and sunrise and during periods of low visibility. The barricades should be spaced no further apart than 12’ on center. The Contractor shall describe additional methods of traffic control, if any, in the SPCD.

17. WORK ZONE LIGHTING FOR NIGHTTIME CONSTRUCTION

Nighttime work is not allowed on this project; therefore, lighting will not be required.

18. PROTECTION OF RSA/TSA, OFA, OFZ AND APPROACH/DEPARTURE SURFACES

The Contractor will not be allowed inside the RSA at any time during the project. The Contractor will not be allowed to work inside the TSA while the taxilane is open due to possible interference with aircraft operations. The areas described below are shown on the Construction Safety and Phasing Plan in Appendix A, where applicable. Low profile barricades will separate construction from ground operations. All personnel and equipment within the limits of the construction shall be accompanied by Contractor personnel who are authorized by the airport, equipped with a two-way Unicom radio, and who is familiar with proper communication procedures. Table 5 shows the safety and object free area dimensions.

Table 5 – Safety and Object Free Area Dimensions

Area	Distance from CL	Length Past RW
Runway Safety Area (RSA)	60’	240’
Runway Object Free Area (ROFA)	200’	240’
Taxiway Safety Area (TSA)	24.5’	---
Taxilane Object Free Area (TLOFA)	39.5’	---

- a. **Runway Safety Area.** No construction activity inside the RSA is permitted while the runway is open and operational, reference Table 5 for RSA dimensions.
- b. **Runway Object Free Area (ROFA).** Construction activities may be performed inside the ROFA only if it is accordance with the requirements on the phasing plan. Equipment must be moved outside the ROFA when not in use and stockpile materials are not allowed to be stored inside the ROFA. The dimensions for the ROFA can be found in Table 5.
- c. **Taxiway Safety Area (TSA).** No construction is permitted inside the TSA while the taxiway/taxilane is operational. Before opening the taxiway/taxilane after any construction activity, the contractor is responsible for maintaining the TSA. Stockpile materials shall be removed prior to the taxiway opening. Open trenches shall be backfilled or covered appropriately and should be designed to allow safe operation of the heaviest aircraft operating on the taxiway or runway without damaging the aircraft. The TSA must be cleared and graded and have no ruts, bumps, depressions, or other surface variations that are potentially hazardous to aircraft. The dimensions for the TSA can be found in Table 5.
- d. **Taxilane Object Free Area (TLOFA).** Construction activities may be performed inside the TLOFA only if it is accordance with the requirements on the phasing plan. Equipment must be moved outside the TOFA when not in use and stockpile materials are not allowed to be stored inside the TOFA.
- e. **Obstacle Free Zone (OFZ).** The Runway Obstacle Free Zone is the volume of airspace centered above the runway centerline. The elevation of the OFZ is equal to the elevation of the nearest point on the runway centerline. Equipment may not penetrate the OFZ of an active runway. Equipment

should be used in accordance with the phasing plan and stored in the staging area when not in use.

- f. **Runway Approach/Departure Surfaces and Clearways.** All personnel, material, and equipment must remain outside the protected approaches and surfaces while the runway is operational. Objects that do not penetrate the surfaces may still be considered obstructions and can affect the instrument approach procedures. FAA Form 7460-1 must be provided to the FAA district office before any objects such as cranes, excavators, or other tall equipment can be placed in these areas.

19. OTHER LIMITATIONS ON CONSTRUCTION

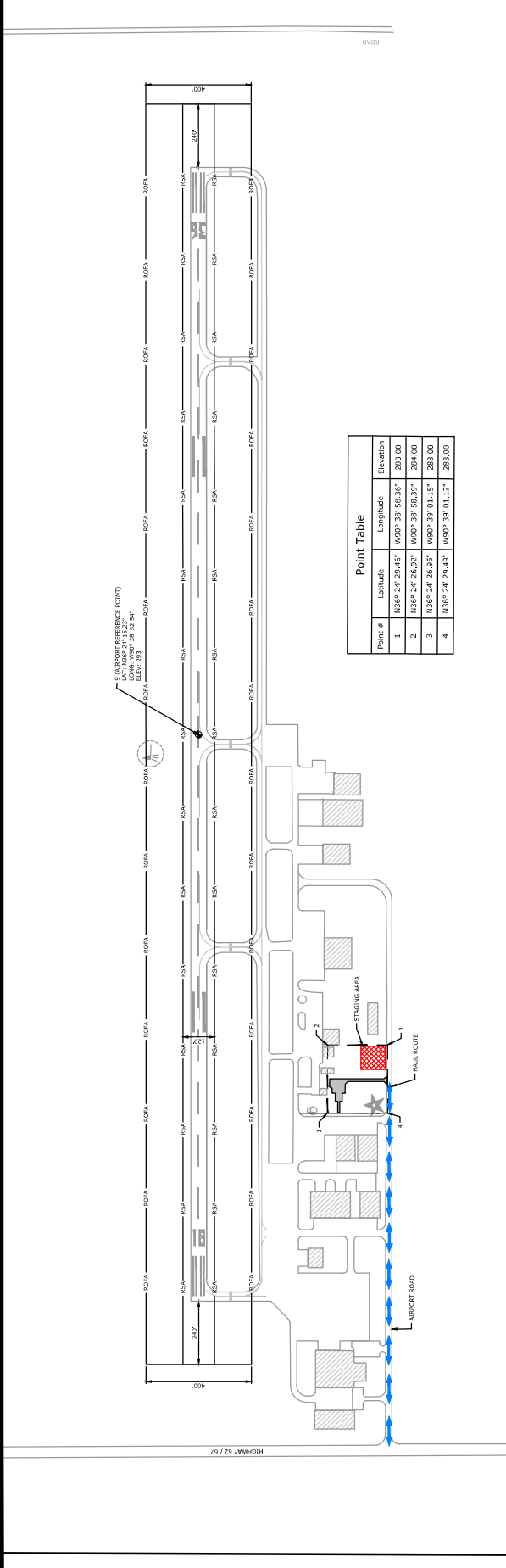
If the Contractor anticipates using any equipment taller than 20-feet or working any closer to the runway than indicated in the FAA study, the Contractor will file a notice with the FAA in accordance with Section 9 – Notification of Construction Activities. Permission must be granted by the Sponsor for the Contractor to access any other areas, not shown in the CSPP, controlled by the airport either inside or outside the fence.

20. SAFETY PLAN COMPLIANCE DOCUMENT (SPCD)

This document is to be completed by the Contractor as a supplemental document to the CSPP. The SPCD will contain any information that is pertinent to the CSPP as seen by the Contractor. The SPCD should include a general statement by the construction Contractor that they have read and will abide by the CSPP. The Contractor statement should include the name of the Contractor, the title of the project CSPP, the approval date of the CSPP, and a reference to any supplemental information (that is, "I, Name of Contractor, have read the Title of Project CSPP, approved on Date, and will abide by it as written and with the following additions as noted:"). The supplemental information in the SPCD should be written to match the format of the CSPP indicating each subject by corresponding CSPP subject number 1-19 and title. If no supplemental information is necessary for any specific subject, the statement, "No supplemental information," should be written after the corresponding subject title. The SPCD should not duplicate information in the CSPP.

APPENDIX A

CONSTRUCTION SAFETY AND PHASING PLAN

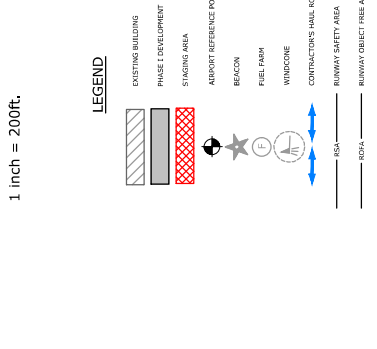


LIMITS OF CONSTRUCT TERMINAL BUILDING - PHASE I RUNWAY 18-36 OPEN

PHASING NOTES
 THESE PHASING NOTES DESCRIBE PHASING OF THE EXISTING SAFETY AREA (RSA). THE CONTRACTOR SHALL HAVE 150 DAYS TO COMPLETE PHASE I. LIQUIDATED DAMAGES OF \$ 500 WILL BE ASSESSED FOR EVERY DAY PHASE I EXCEEDS CONTRACT TIME.

GENERAL SITE NOTES
 1. THE CONTRACTOR SHALL CONDUCT THE WORK IN A MANNER THAT WILL INSURE, AS FAR AS IS REASONABLY PRACTICABLE, THE SAFETY AND WELL-BEING OF THE GENERAL PUBLIC AND AIRPORT PERSONNEL AT OR NEAR THE AIRPORT IN CONNECTION WITH THE WORK AND OPERATIONS OF THE AIRPORT DURING CONSTRUCTION.
 2. THE CONTRACTOR SHALL OBTAIN A FULL SET OF LATEST APPROVED CONSTRUCTION PLANS ON SITE DURING CONSTRUCTION.
 3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS, LICENSES, ETC. REQUIRED BY ALL LOCAL, STATE, AND FEDERAL AGENCIES.
 4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS, LICENSES, ETC. REQUIRED BY ALL LOCAL, STATE, AND FEDERAL AGENCIES.
 5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS, LICENSES, ETC. REQUIRED BY ALL LOCAL, STATE, AND FEDERAL AGENCIES.
 6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS, LICENSES, ETC. REQUIRED BY ALL LOCAL, STATE, AND FEDERAL AGENCIES.
 7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS, LICENSES, ETC. REQUIRED BY ALL LOCAL, STATE, AND FEDERAL AGENCIES.
 8. UPON NOTIFICATION OF A DECLARED AIRCRAFT EMERGENCY, THE CONTRACTOR SHALL IMMEDIATELY CLEAR THE RUNWAY AND / OR TAXIWAY OF EQUIPMENT AND PERSONNEL.
 9. ALL CONCRETE SHALL DEVELOP 3000 PSI COMPRESSIVE STRENGTH IN 28 DAYS UNLESS OTHERWISE SPECIFIED.
 10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION LAYOUT AND STAKING.
 11. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND LAYOUT COORDINATES IN THE FIELD. REPORT ANY DISCREPANCIES IMMEDIATELY TO THE ENGINEER FOR DIRECTION PRIOR TO COMMENCING CONSTRUCTION.
 12. THE CONTRACTOR SHALL KEEP ALL ADA SURFACE CLEAR AND SHIPPY FREE OF DEBRIS. WORK AREAS WILL NOT BE OPENED FOR USE UNTIL THEY HAVE BEEN SHIPPY FREE OF ALL TRASH AND DEBRIS.

CONTRACTOR SAFETY REQUIREMENTS
 1. ALL CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH AIRPORT SECURITY PROGRAM (ASPP) AND SECURITY PROGRAM (ASPP) AND SECURITY PROGRAM (ASPP).
 2. ALL CHANGES TO THIS SAFETY PLAN MUST BE APPROVED BY ENGINEER, AND FAA APPROVED.
 3. THE CONTRACTOR SHALL OBTAIN A FULL SET OF LATEST APPROVED CONSTRUCTION PLANS ON SITE DURING CONSTRUCTION.
 4. THE RUNWAY SAFETY AREA (RSA) IS 120' WIDE, CENTERED ON THE RUNWAY CENTERLINE AND EXTENDING 60' FROM THE CENTERLINE.
 5. CONTRACTORS SHALL OBTAIN APPROVAL FROM THE AIRPORT MANAGER PRIOR TO COMMENCING CONSTRUCTION AND SHALL OBTAIN APPROVAL FROM THE AIRPORT MANAGER PRIOR TO COMMENCING CONSTRUCTION AND SHALL OBTAIN APPROVAL FROM THE AIRPORT MANAGER PRIOR TO COMMENCING CONSTRUCTION.
 6. CONTRACTORS SHALL VERIFY WITH THE OWNER THAT THE APPROPRIATE NOTICES ARE IN PLACE PRIOR TO COMMENCING WORK.
 7. CONSTANT MONITORING OF AIRCRAFT RADIO COMMUNICATIONS DURING CONSTRUCTION IS REQUIRED.
 8. CONTRACTORS GROUND VEHICLE OPERATIONS SHALL BE IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS AND PROCEDURES.
 9. ALL CONSTRUCTION SHALL BE COMPLETED BY 0500 HOURS (LOCAL TIME) ON RED (DAY OR NIGHT) OR SCORDED BY A VEHICLE 50 EQUIPPED.
 10. ALL EQUIPMENT AND MATERIALS NOT IN USE SHALL BE STORED IN THE STAGING AREAS.
 11. RUNWAY, TAXIWAY, & AIRRON SHALL BE KEPT CLEAR OF ALL DEBRIS & EQUIPMENT.
 12. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES TO PROTECT AIRCRAFT, FACILITIES, STRUCTURES, OR DAMAGED BY THE CONTRACTOR'S OPERATIONS.
 13. ANY DAMAGE TO SURROUNDING AREAS, TAXIWAYS, RUNWAYS, OR MAIL ROUTES SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE TO ORIGINAL OR BETTER CONDITION, AT A CLOSE TO THE OWNER.



APPENDIX B

FINAL DETERMINATION FOR POINT STUDIES

(Final Determinations will be added once they are issued by the FAA)

APPENDIX C

SAMPLE NOTAM FORM

SAMPLE NOTAM

_____ **AIRPORT**

FAA NOTAM # _____ **DATE:** _____

AIRPORT I.D. # _____ **TIME:** _____

NOTAM TEXT:

NOTIFICATION:

_____ TOWER
PHONE # _____ INITIALS _____ TIME _____ CALLED IN BY _____

_____ AFSS
PHONE # _____ INITIALS _____ TIME _____ CALLED IN BY _____

AIRLINES

CANCELLED:

NOTIFICATION:

_____ TOWER
PHONE # _____ INITIALS _____ TIME _____ CALLED IN BY _____

_____ AFSS
PHONE # _____ INITIALS _____ TIME _____ CALLED IN BY _____

AIRLINES

APPENDIX

**Contractor is responsible for adherence to all applicable
Federal and State Laws and Regulations
including, but not limited to,
the following and any applicable amendments:**

Ark Act 291 of 1993
Trench and Excavation Safety Systems

Code of Federal Regulations Title 29
website: <http://ecfr.gpoaccess.gov/>

Arkansas State Licensing Law for Commercial Contractors
website: www.arkansas.gov/clb



State of Arkansas
Arkansas Department of Labor
Arkansas Occupational Safety and Health

10421 WEST MARKHAM • LITTLE ROCK, AR 72205-2190
Phone: 501-682-9091 Fax: 501-682-4532 TRS: 800-285-1131

CONTRACT FOR EXCAVATION REPORTING FORM

This form must be completed by any public body (state agency, county, municipality, school district, or other local tax unit or improvement district) awarding a contract for a public construction project which will involve any trench or excavation of five feet (5') or more. *Arkansas Code § 22-9-212.*

Name of Public Agency: _____

Address of Public Agency: _____

Contact Person: _____ Phone number: _____

Person Filing Report: _____

Name of General Contractor: _____

Address: _____ Phone number: _____

Name of any subcontractor doing trenching or excavation: _____

Subcontractor address: _____ Phone number: _____

Estimated start date: _____

Estimated completion date: _____

Site location/address/street/road: _____

Arkansas Code § 22-9-212 also requires that the current federal OSHA standard for excavation and trenching be incorporated into the project's specifications and that the contract bid form include a separate pay item for trench or excavation safety systems.

The Arkansas Department of Labor provides free training on trenching and excavation safety.

SEND NOTICE TO:

Arkansas Department of Labor
Safety Division
10421 West Markham Street
Little Rock, AR 72205-2190
(501) 682-9091
fax: (501) 682-4532
e-mail: kevin.looney@arkansas.gov



**STATE OF ARKANSAS
DEPARTMENT OF LABOR
ARKANSAS OCCUPATIONAL SAFETY & HEALTH**

10421 WEST MARKHAM • LITTLE ROCK, AR 72205-2190
Phone: 501-682-9091 Fax: 501-682-4532 TRS: 800-285-1131

**REPORTING FORM FOR
WORK NEAR OVERHEAD HIGH VOLTAGE POWER LINES AND
CONDUCTORS**

This form must be completed by any person, firm, or corporation that desires to carry on any work or activity within ten feet (10') of overhead energized electrical lines or conductors. *Arkansas Code § 11-5-307*. The ten feet clearance applies to any part of any machinery, equipment or materials, as well as any employee or person.

Name of company or individual: _____

Address: _____ Phone Number: _____

Name & title of person filing report: _____

Date work to be performed: _____

Expected date of completion: _____

Has the operator of the electrical lines been notified? _____

IMPORTANT

*Arkansas Code § 11-5-307 also requires written notice to the owner or operator of the electrical lines. You must also make appropriate arrangements with the operator of the electrical lines **before** proceeding with any work which would violate the ten feet clearance requirement.*

The Arkansas Department of Labor provides free training on working safely near high voltage lines.

SEND NOTICE TO:

**Arkansas Department of Labor
Safety Division
10421 West Markham Street
Little Rock, AR 72205
(501) 682-9091
fax: (501) 682-4532
e-mail: kevin.looney@arkansas.gov**